

3D Map Project in Collaborative Learning: Solution for Improving Geography Learning Outcomes

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Abstract

Traditional learning models often fail to meet the demands of student engagement and the development of 21st-century skills. This research aims to test the effectiveness of the Collaborative Project-Based Learning (CPjBL) model, integrated with a 3D Map project, in improving geography learning outcomes on the topic of Rural-Urban Interaction. This study employed a two-cycle Classroom Action Research (CAR) design involving 35 students of class XII-B2 at SMAN 1 Tulungagung. Data were collected through cognitive tests to measure material mastery and observation sheets to assess student learning activities. The results showed a significant improvement in both the learning process and outcomes. Student learning activity increased from 46% (Poor category) in Cycle I to 78% (Good category) in Cycle II. This increased engagement positively correlated with cognitive results, where the average student score rose from 65.5 to 81.3, and the classical learning completeness percentage surged from 25.7% to 77.1%. This study concludes that the 3D Map-based CPjBL model effectively enhances students' conceptual understanding by fostering a more participatory learning environment. The implication is that these findings offer a replicable pedagogical framework for educators to transform geography learning into a more dynamic and student-centered experience, while simultaneously cultivating essential skills such as collaboration, problem-solving, and spatial reasoning.

Keywords: Learning Model, Collaborative Project-Based Learning, Learning Outcomes

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1. Introduction

Traditional learning approaches are currently considered less than ideal in meeting the learning needs of today's students. Several creative learning strategies have been developed to assist a more efficient and effective learning process to overcome this problem, one of which is Collaborative Project-Based Learning. In collaborative learning, social contact is fundamental; interaction between humans and their environment is the primary basis (Herrera-Pavo, 2021). Students practice recognizing and tolerating others' points of view and their negotiation in different areas, forming the process of engagement in cooperative learning. Aiming to prepare students for various challenging real-life problems, Undari (2023) and Aliffah (2024) say that through this model, students actively create critical thinking, social skills, and collaboration during project implementation. Project-based collaborative learning hones students' ability to seek and obtain correct information, improves problem-solving skills through group activities, and empowers them to design projects and find solutions (Pratiwi et al., 2023).

Collaborative learning, or cooperative learning, is a pedagogical approach involving individuals' collaboration within a group. This approach may evolve into more organized collaborative working formats in the future. In collaborative learning, students encounter authentic scenarios that encourage mutual respect and recognize each other's competence. Key characteristics that facilitate the effectiveness of collaborative learning include building positive interdependence, supportive face-to-face contact, individual accountability, and skill development (Balasooriya et al., 2016). Collaborative learning occurs to achieve a common educational goal. It is similar to cooperative learning. Collaboration emphasizes the equitable sharing of roles and responsibilities to achieve educational goals and collectively overcome challenges, whereas cooperation focuses on equal and balanced participation among individuals (Lestari & Azzahri, 2022).

The concept of problem-based learning, also known as project-based learning, is characterized by the collective intelligence of individuals within a group or environment, formulated to formulate solutions to relevant problems. Project-based learning utilizes problems as an important phase in the acquisition and synthesis of new knowledge and information gained from real-world experiences. Innovative learning models in the educational process can increase student engagement in learning activities (Hutabarat et al., 2020). Ramadhanti et al's research findings show that skilled educators can use various innovative techniques in learning activities, thus impacting student learning outcomes (Ramadhanti et al., 2024). Additional benefits of adopting a Project-Based Learning approach include the need for students to engage in problem-solving tasks set by educators, thus encouraging greater independence in their learning process.

The reason for combining these models into CPjBL is to create a synergy that addresses the weaknesses of each model when applied separately. Stand-alone PjBL runs the risk of students in a group simply dividing tasks and then working individually without deep interaction. This is where the role of Collaborative Learning becomes crucial. By integrating the principles of collaboration, CPjBL ensures that the project completion process is not merely a division of labor, but a dynamic process involving discussion, negotiation of ideas, and mutual construction of understanding. Thus, the CPjBL model is designed to leverage the structure and real-world relevance of PjBL as the "what" to be done, while adopting the process of social interaction and shared responsibility from Collaborative Learning as the "how" to do it. This combination aims

to facilitate students to collaborate creatively, so they not only produce a project but also develop critical and innovative thinking skills in finding solutions.

The Collaborative Project-Based Learning (CPjBL) learning model is an educational approach that integrates two learning methods, Collaborative Learning and Project-Based Learning, with an emphasis on the innovative dimension of collaboration between learners (Kasus et al., 2023). The application of the CPjBL model has the potential to create meaningful and effective learning experiences for learners by making them the main subjects in the learning process. (Hindun et al., 2024). This model has the privilege of facilitating students to collaborate creatively in discussion groups to complete relevant projects, thus encouraging the development of critical and creative thinking skills in producing innovative solutions (Arisanty, 2020). With the application of the CPjBL model, the learning atmosphere in the classroom is expected to become more dynamic through active student involvement in interaction with the learning material presented.

One subject suitable for collaborative project-based learning is geography on urban and rural interaction. This material equips students with physical and non-physical problems that occur in villages and cities and introduces villages and cities in detail. One application of the Collaboration Project-Based Learning Model on the material of urban and rural interactions is creating a 3D Map. Learners are expected to know the detailed differences in the physical appearance that have been completed in the 3D Map project, given the importance of urban and rural interaction material that is not only limited to learning activities in the classroom but can also be implemented in students' daily lives. This approach also allows students to develop spatial and creative thinking skills through group collaboration (Oktavianto, 2017).

The purpose of this study is to evaluate how the learning outcomes of grade XII-B2 students in Geography on the subject of Urban and Rural Interaction at SMA Negeri 1 Tulungagung are applied through a project-based collaborative learning model. Although learning models such as Project-Based Learning (PjBL) are generally recognized as effective, in-depth empirical research on their implementation in specific disciplinary contexts is still limited. In particular, there is a gap in the literature on how the synthesis between Collaborative Learning and Project-Based Learning (CPjBL), when actualized through spatial-tactile media such as 3D Map projects, can effectively overcome the challenges of teaching complex village-city interaction concepts in Geography lessons. Therefore, this study aims to fill this gap. The novelty of this study lies in providing strong empirical evidence through the Classroom Action Research (CAR) methodology regarding the effectiveness of an integrated “pedagogical package” a combination of the CPjBL model with 3D Map media. More than just measuring results, this study offers an authentic implementation narrative, including the identification of initial challenges and successful improvement strategies, resulting in a validated and replicable model of practice for geography educators.

2. Method

Classroom Action Research (CAR) is the approach chosen for this research because it is important in improving the quality of learning processes and outcomes in the classroom on an ongoing basis (Arikunto, 2021). CAR is a controlled research process conducted by instructors or teachers to solve learning problems in the classroom and improve their teaching practices reflectively and collaboratively (Arikunto, 2021). The

study was designed in several continuous cycles, with each cycle reflecting the essential stages of CAR. These stages include planning, acting, observing, and reflecting. This cycle will be repeated and changed according to the reflection results so that the expected learning outcomes on the material of rural and urban interactions are better. Each research cycle will be conducted in the same class to maintain consistency and data validity.

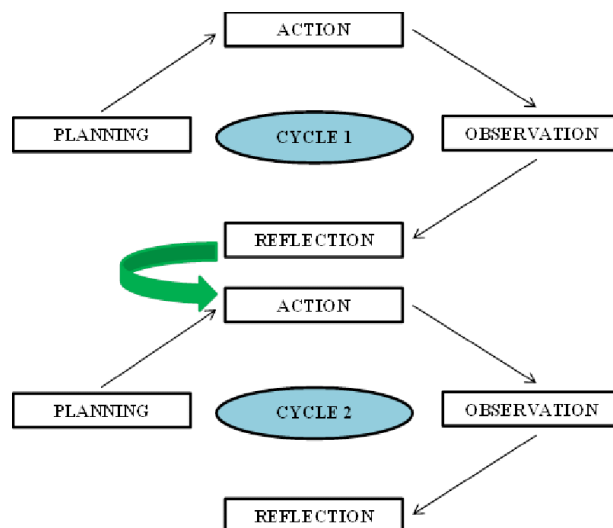


Figure 1. Classroom Action Research Cycle

The participants in this study were all 35 students of class XII B2 SMAN 1 Tulungagung in the academic year 2024/2025. The selection of these participants is based on the characteristics of a regular class with no students with specific learning barriers that require special treatment, thus enabling the implementation of the designed learning model evenly. This Classroom Action Research will be conducted at SMAN 1 Tulungagung, an upper secondary education institution in Tulungagung Regency, East Java Province.

Collaborative Project-Based Learning (CPjBL) is the learning model to be applied. This model was chosen because it can encourage students to be actively involved in the learning process through cooperation in completing projects relevant to the material of village and city interactions (Hidayati & Darmuki, 2023). The application of CPjBL will be integrated with the use of three-dimensional map media (3D Map) as a tool for visualization and spatial analysis of rural-urban interactions, which is expected to improve students' conceptual understanding.

The CPjBL learning process begins with the teacher designing clear learning objectives and selecting project topics that are relevant and interesting to students. The teacher then develops realistic project scenarios or contexts and divides students into small, heterogeneous groups, where each member has the opportunity to contribute. Once the groups are formed, students collaboratively plan the project, assign specific roles and responsibilities to each member, and develop a work schedule to ensure that everyone contributes actively. During the project, students actively communicate, share resources, and collaborate to overcome challenges, often with the support of technology such as collaborative platforms. Meanwhile, teachers play an active role in monitoring each group's progress, providing guidance, feedback, and necessary technical support, as well as helping to overcome any obstacles or conflicts that may arise. The final stage of this syntax is evaluation and reflection. Teachers assess the project results, which include not

only the final product but also the students' collaboration skills and critical thinking abilities. The process concludes with a reflection session, where students are invited to evaluate their learning experiences, the difficulties they encountered, and how this new knowledge and skills can be applied in the real world (Wicaksono, 2023).

3. Results and Discussion

Each data collection cycle, Cycle I and Cycle II, divides data collection into four stages: planning, implementation, observation, and reflection. The research results conducted in each cycle are outlined in the following chapter.

A. Cycle 1 Results

Cycle I observations were conducted twice a meeting and produced data on student activity, distribution of student learning outcomes, and student learning outcomes. The results of student activity observations include activities at the preparation, implementation, and evaluation stages of learning, as shown in Table 1 below.

Table 1. Results of Observation of Student Activity (Non-Tests) XII-B2 Cycle

No	Learning Stage	Observation Aspect	Score (1-5)
1.	Preparation Learning	1. Student readiness by learning the prerequisite material or what will be discussed	2
		2. Students' general readiness to follow the learning process	2
		3. Students' response to the apperception and motivation given by the teacher	2
2.	Implementation Learning	4. Conduciveness of the classroom atmosphere and learning environment during learning activities	3
		5. Students' attention to the teacher's explanation of the material and the mechanism of the project assignment	3
		6. Student activity in recording important points from the material explanations and project assignments	3
		7. Student's activeness in planning and dividing tasks for project completion	2
		8. Student contribution in conveying ideas or opinions during the discussion of learning activities	2
		9. Students give opinions related to the learning activities that are being carried out	2
3.	Evaluation Learning	10. Students' ability to complete evaluation questions related to learning outcomes at the end of the session	2
Total Score			23
Percentage of Student Activity			46%
Criteria			Less

Referring to the data in Table 1, it can be identified that the average score of student

activeness in class XII-B2 in Cycle I in learning Geography material on Village and City Interaction reached 46%, which is classified as 'Less'. The low level of active participation of students is reflected in several aspects. For example, in points 1, 2, and 3, it can be seen that students' initial readiness, mastery of previous material, and readiness to take part in the lesson are still not optimal. This aligns with the finding that underprepared students tend to show lower involvement in the learning process (Febriyanti & Ain, 2021).

Furthermore, points 7, 8, and 9 indicate that students have not shown high enthusiasm and proactivity in learning. Low scores on heterogeneous group formation and project task preparation (points 7 and 8) imply that students have not fully adapted to the collaborative learning model. Collaborative learning requires readiness and willingness to work together, which may not have been built in this initial cycle (Kusuma et al., 2021). Students' difficulty expressing their opinions during the discussion (point 9) is also an important note, as the process of equalizing perceptions in the group requires a longer adaptation time. As a result, as seen in point 10, students' ability to work on evaluations, especially project-based ones, is still minimal.

Table 2. Distribution of Student Learning Outcomes (Tests) XII-B2 in Cycle I

No	Value Range	Value	Number of Students
1.	40-47	40,46,47,47	4
2.	48-55	49,50,54,55,55	5
3.	56-63	56,57,57,57,59,60,62	7
4.	64-71	64,64,65,66,66,70	6
5.	72-79	72,72,73,75,76,77,78	7
6.	80-87	80,86,87	3
7.	88-95	88,89,90	3
Total		2293	35
Average		65,5	

Table 2 shows that the scores of students' learning outcomes in Cycle I were very different and divided into seven intervals. The highest frequency of scores was in the intervals 56-63 and 72-79, each with seven students. Followed by the interval 64-71 with six students, the interval 48-55 with five students, the interval 40-47 with four students, and the intervals 80-87 and 88-95 each with three students. Overall, the average score achieved by students of class XII-B2 in Cycle I was 65.5. This average score is still below the Minimum Completion Criteria (KKM) set of 75.

Table 3 presents information on the lowest score, the highest score, the average, the number of students who achieved mastery, and the percentage of learning mastery for a more detailed picture of student learning achievement.

Table 3. Student Learning Outcomes (Tests) XII-B2 Cycle I

No	Learning Outcome	Value
1.	Highest score	90
2.	Lowest score	40
3.	Average score	65,5
4.	Number of students who have not completed learning	26
5.	Number of students who completed learning	9
6.	Percentage of student learning completeness	25,7%

7. Criteria for learning completeness	Very Less
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The data in Table 3 confirms that students' learning performance in Cycle I was not optimal. The lowest score achieved was 40, while the highest score reached 90. Although there were students who obtained high scores, the class average of 65.5 showed that most students had not achieved the expected mastery of the material. Only 9 out of 35 students (25.7%) reached the KKM, while the other 26 still needed improvement. With a percentage of classical completeness of 25.7%, this achievement in Cycle I falls into the 'Very Less' category. These results indicate the need for in-depth reflection and improvement of learning strategies in the next cycle, as is the essence of Classroom Action Research.

B. Cycle 2 Results

Based on the reflection in Cycle I, improvements were made to the planning and implementation of actions in Cycle II, which was also carried out in two meetings. Data collection in Cycle II followed the same procedure, including observation of student activity, analysis of score distribution, and recapitulation of learning outcomes. The results of student activity observations in Cycle II are presented in Table 4.

Table 4. Results of Observation of Student Activity (Non-Tests) XII-B2 Cycle II

No	Learning Stage	Observation Aspect	Score (1-5)
1.	Preparation Learning	1. Student readiness by learning the prerequisite material or what will be discussed	4
		2. Students' general readiness to follow the learning process	4
		3. Students' response to the apperception and motivation given by the teacher	4
2.	Implementation Learning	4. Conduciveness of the classroom atmosphere and learning environment during learning activities	5
		5. Students' attention to the teacher's explanation of the material and the mechanism of the project assignment	4
		6. Student activity in recording important points from the material explanations and project assignments	4
		7. Student's activeness in planning and dividing tasks for project completion	4
		8. Student contribution in conveying ideas or opinions during the discussion of learning activities	3
		9. Students give opinions related to the learning activities that are being carried out	3
3.	Evaluation Learning	10. Students' ability to complete evaluation questions related to learning outcomes at the end of the session	4
Total Score			39
Percentage of Student Activity			78%
Criteria			Good

Table 4 shows a significant increase in student activity in Cycle II. The average score of student activeness in learning Geography of Village and City Interaction material increased to 78%, which is categorized as 'Good'. This improvement is seen evenly in various aspects. Students' readiness in the preparation stage (points 1, 2, 3) showed improvement, indicating that students began to realize the importance of preparation before learning. A more conducive classroom atmosphere (point 4) and better student attention to the teacher's explanation (points 5 and 6) are also supporting factors. The increase in proactivity in group formation (point 7) indicates that students are getting used to collaborative working patterns. Nevertheless, activeness in preparing project tasks (point 8) and the courage to express opinions (point 9) still show a score of 3, which means there is still room for further improvement, but it is better than Cycle I. This increase in student activity can be attributed to improving learning strategies in the next cycle in PTK, which can increase students' active participation. Table 5 shows the shift in student learning outcome scores in Cycle II.

Table 5. Distribution of Student Learning Outcomes (Tests) XII-B2 in Cycle II

No	Value Range	Value	Number of Students
1.	40-47		
2.	48-55		
3.	56-63		
4.	64-71	67,69,70,71	4
5.	72-79	72,72,73,74,75,75,76,77,79,79	10
6.	80-87	80,80,82,82,83,83,84,84,85,85,85,85	12
7.	88-95	89,89,89,90,91,92,92,92,95	9
Total		2846	35
Average		81,3	

The data in Table 5 shows a positive shift in the distribution of student learning outcomes in Cycle II. There were no more students who obtained scores in the range of 40-63. The highest frequency is now in the 80-87 interval with 12 students, the 72-79 interval with 10 students, and the 88-95 interval with nine students. Only four students are still in the 64-71 interval. A significant improvement can be seen in the average student score of 81.3. This average has exceeded the KKM (75), indicating the successful implementation of the action improvement. The optimized use of the Collaborative Project-Based Learning model in this cycle, possibly with a better emphasis on the division of roles and the utilization of 3D Map media, contributed to the students' more profound understanding.

Table 6. Student Learning Outcomes (Tests) XII-B2 Cycle II

No	Learning Outcome	Value
1.	Highest score	95
2.	Lowest score	67
3.	Average score	81,3
4.	Number of students who have not completed learning	8
5.	Number of students who completed learning	27
6.	Percentage of student learning completeness	77,1%
7.	Criteria for learning completeness	Good

Based on Table 6, student learning outcomes in Cycle II showed substantial improvement. Students' lowest score rose to 67, and the highest score reached 95. The average learning outcome was 81.3. The number of students who completed their learning increased dramatically to 27, while those who did not decreased to 8. The percentage of classical learning completeness reached 77.1%, which is included in the 'Good' criteria. This increase shows that the modifications and improvements made after the Cycle I reflection, including strengthening the collaboration aspect and the more directed utilization of 3D Map media, effectively improved students' understanding and learning outcomes. Although the percentage of completeness has not reached 100%, the increase from 25.7% to 77.1% is a significant achievement in Classroom Action Research aimed at continuous improvement.

The comparison of results between Cycle I and Cycle II clearly shows the positive impact of implementing the Collaborative Project-Based Learning model based on the 3D Map after undergoing adaptation and improvement. In Cycle I, the low student engagement (46%) and learning outcomes (average 65.5; completeness 25.7%) indicated challenges in the initial implementation. Students seemed unfamiliar with the demands of collaborative project-based learning, which requires initiative, communication, and shared responsibility (Kurniawan et al., 2018). Lack of initial readiness and enthusiasm were the main obstacles.

Through reflection and re-planning, Cycle II's actions focus on overcoming these weaknesses. These improvements may include providing more precise directions on the group work mechanism, more intensive facilitation from the teacher during the project process, and emphasis on the benefits of using 3D Map media to visualize and analyze rural-urban interactions. As a result, there was a significant increase in student activeness to 78% (Good criteria). This increase in activity was positively correlated with an increase in learning outcomes, where the average student score rose to 81.3 and the percentage of learning completeness reached 77.1% (Good criteria). These findings support the argument that the reflective process and corrective actions in PTK, combined with innovative learning models and relevant media, can gradually improve the quality of learning processes and outcomes (Harahap, 2016).

Although in Cycle II the completeness had not reached the ideal target (e.g., 85% or 100% if that is what is expected), the improvement was already significant. It showed that the learning model applied was going in the right direction. Some students who have not completed Cycle II (8 students) may need further individual attention or approach. However, applying the Collaborative Project-Based Learning model based on a 3D Map has been proven to improve students' learning outcomes on the Village and City Interaction material in class XII-B2 SMAN 1 Tulungagung.

C. Discussion

The research results presented show the dynamics of the process and learning outcomes of students of class XII B2 SMAN 1 Tulungagung on the material of Village and City Interaction through the application of the Collaborative Project-Based Learning (CPjBL) model based on a 3D Map. An in-depth analysis of the data obtained from Cycle I and II provides a comprehensive picture of the interventions' effectiveness.

The findings of Cycle I showed that the level of student activeness of 46% was still in the 'Lack' category. Observation data indicated several crucial aspects that contributed to this condition. The low scores on the learning readiness aspect (points 1, 2, and 3 of

Table 1), such as students not yet equipping themselves with materials and being less responsive to apperception, suggest that students have not fully adopted the transition to a learning model that demands active participation. This aligns with the view that learning readiness is an important foundation for student engagement in more complex learning processes (Wijaya & Pujani, 2022).

In addition, the low scores on proactive aspects in group formation and project task preparation (points 7 and 8 in Table 1) reflect the challenges in the initial implementation of CPjBL. Students may not be familiar with the demands of collaborative learning that require initiative, negotiation, and independent task sharing. Reliance on more directive teacher instructions in conventional learning models may still influence students' learning patterns. According to (Mughtar et al., 2025) Adapting to project-based learning models often takes time for students to develop collaboration and project management skills. In addition, students' difficulties in expressing opinions (point 9 of Table 1) may be interpreted as a lack of self-confidence or an open discussion culture within the group.

The consequence of this low activeness and adaptation challenge is reflected in the cognitive learning outcomes of Cycle 1. The average class score of 65.5, which was below the KKM (75), as well as the percentage of classical learning completeness, which only reached 25.7% (category 'Very Poor'), showed that students' understanding of the material on Village and City Interaction was not optimal. The low ability of students to do evaluation questions (point 10 of Table 1), which in this context may be related to project completion, reinforces the assumption that the process of internalizing concepts through project work has not been effective. The 3D Map media, which is expected to enrich the learning experience, may also not have been utilized to its full potential due to group dynamics and task understanding constraints.

Based on in-depth reflection on the findings of Cycle I, a series of action improvements were implemented in Cycle II. These improvements focused on strengthening scaffolding or teacher assistance, providing more explicit instructions on group work mechanisms and project management, and optimizing the role of 3D Map media as a spatial analysis tool.

As a result, Cycle II data showed a significant improvement in both the process and learning outcomes. The percentage of student activeness jumped to 78% ('Good' category). The increase in scores in almost all aspects of student activity observation (Table 4) indicates positive changes in learning participation. Students showed better readiness (points 1, 2, 3), the classroom atmosphere became more conducive (point 4), and attention to teacher explanation increased (points 5, 6). A significant increase in the proactivity aspect of group formation (point 7) shows that students are starting to adapt and internalize the essence of collaborative learning. Although preparing project tasks and expressing opinions (points 8, 9) still require more attention, they have shown improvement. This improvement is consistent with research by (Sari et al., 2020) Planned interventions in PTK, including strengthening the teacher's role as a facilitator, can increase students' active involvement in project-based learning.

This increase in activeness has positive implications for student learning outcomes. The average class score in Cycle II increased to 81.3, exceeding the KKM. The number of students who completed their learning increased dramatically from 9 students to 27 students, so the percentage of classical learning completeness reached 77.1% (category 'Good'). The shift in score distribution (Table 5), which shows the absence of students in

the low score range (40-63) and the concentration of students in the higher score range (72-95), is empirical evidence of the effectiveness of the corrective action. This success can be attributed to the synergy between the CPjBL model, which encourages collaborative construction of knowledge, and 3D Map media, which facilitates a more concretely and interestingly understanding of spatial concepts of rural-urban interaction. As stated by (Junanah et al., 2025) Three-dimensional visual media can significantly assist students in visualizing abstract concepts and improving information retention.

From Cycle I to Cycle II, the successful improvement of learning outcomes and student engagement provides several important implications. Firstly, it has been proven that the project-based learning (CPjBL) model has great potential to improve cognitive understanding and instill modern skills such as problem-solving, collaboration, and communication. Cycle I showed that proper teacher adaptation and support were required to implement the innovative model. Effective facilitation, carefully forming heterogeneous groups, and clarity of project instructions were key to success (Hamzah et al., 2023.)Second, integrating 3D Map media significantly enriches the learning process of the Village and City Interaction material. This media can transform concepts that may be abstract into something more visual and easy to understand. Students can directly observe, analyze, and discuss spatial interaction patterns, which may be challenging with only text or two-dimensional images. This supports the finding that relevant and engaging learning media can increase student motivation and engagement (Nainggolan et al., 2024). Thirdly, Classroom Action Research (CAR) as a research approach shows its strength in contextualized and sustainable improvement of learning practices. The reflection-action cycle allows teachers to identify specific problems, design appropriate solutions, and evaluate their impact directly in their classrooms (Zahroh et al., 2025).

4. Conclusion

Based on data analysis and discussion, this study concludes that the application of the Collaborative Project-Based Learning (CPjBL) model integrated with 3D map media effectively improves geography learning. A review of the research results shows a significant positive transformation in the learning process in class XII-B2 at SMAN 1 Tulungagung in the subject of Village-City Interaction. This improvement is not only reflected in the cognitive achievements of students that exceed the minimum competency standards, but also in a significant increase in student participation and activity during the learning process. The success of the intervention in Cycle II proves that a reflective approach in Classroom Action Research (CAR) can overcome the initial challenges of student adaptation to a more dynamic and participatory learning model.

In Cycle I, the initial conditions showed a low level of student activeness (46%) and learning outcomes that were not optimal, with an average class score of 65.5 and a percentage of classical learning completeness of only 25.7%. This indicated the need for a more adaptive and participatory learning intervention. After reflection and implementing improved actions during Cycle II, there was a significant increase. Student activeness increased to 78% ('Good' criteria), indicating greater participation in each learning phase, from preparation to evaluation. This increase in student activity aligns with findings that student-centered and collaborative learning models can encourage more active engagement (Arini & Sukriono, 2024).

The increase in learning activities was positively correlated with an increase in students' cognitive learning outcomes. In Cycle II, the average student score increased to 81.3, exceeding the Minimum Completion Criteria (KKM) set. The number of students who completed learning also increased significantly to 27, so the percentage of classical learning completeness reached 77.1% ('Good' criteria). This success shows that the CPjBL model, which emphasizes collaborative project work, can facilitate students in constructing a deeper understanding of the material. (Nugraha et al., 2025) Furthermore, the integration of 3D Map media has proven effective as a visualization tool that helps students understand the spatial concept of rural-urban interaction (Indriani, 2018). Thus, this study shows that a systematic Classroom Action Research (CAR) approach can find and overcome learning problems effectively by using a cycle of planning, implementation, observation, and reflection. (Utomo et al., 2024) The implementation of CPjBL based on a 3D Map Impacts not only the number of learning outcomes but also the quality of the learning process, which is more dynamic and participatory (Murdilah et al., 2025.)

The implications of these findings offer a practical and replicable pedagogical framework for geography educators. This study shows that the synergy between the CPjBL model and visual-tactile media such as 3D maps can transform the learning of abstract spatial concepts into a more concrete, engaging, and student-centered experience. Furthermore, this model not only focuses on cognitive outcomes, but also inherently fosters essential 21st-century skills, such as collaboration, problem solving, and spatial reasoning. Thus, this approach can be a solution for creating a more dynamic learning environment and preparing students to face real-world challenges.

However, this study has several limitations. The results of this study are context-specific, as it only involved one class in one school, namely class XII-B2 SMAN 1 Tulungagung. The homogeneous characteristics of students without specific learning barriers also limit the generalization of these findings to a more diverse student population. Furthermore, this study focused on only one geography topic, namely Village-City Interaction, so the effectiveness of this model on other materials has not been tested. For future research, it is recommended to replicate this study on a larger scale, involving a variety of schools with different student demographic characteristics to test the external validity of this model. Further research could also explore the application of the CPjBL and 3D Map “pedagogical packages” to other geography topics or even to other disciplines that require spatial understanding. Finally, longitudinal studies could be conducted to measure the long-term impact of this model on student knowledge retention and collaboration skills, as well as to investigate differentiation strategies for students who may still require additional guidance within the collaborative framework.

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