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The Effect of Problem-Based Learning Using Canva on Senior High School Geography Students' the Concept Understanding of Village and City Spatial Patterns

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ABSTRACT

Geography learning about spatial patterns of villages and cities in high schools still faces obstacles in students' understanding of concepts due to teacher-centered learning. This study aims to determine the effect of problem-based learning (PBL) models with the help of Canva media on students' conceptual understanding. Quasi-experimental research was conducted at SMAN 10 Kendari on class XII IPS students. Class XII IPS.1 was designated as an experimental class that learned using problem-based models combined with Canva media, and class XII IPS.2 became a control class with conventional learning methods based on the same abilities. Research data were collected through a concept understanding test and then analyzed using parametric inferential statistical tests. The analysis using independent sample t test after get the normality and homogenity test. The results of the t-test showed a significance value of 0.000, with students in the experimental class having a higher increase in conceptual understanding than those in the control class. This finding shows that PBL utilizing Canva media has proven to be effective in helping students understand the subject matter in problem-oriented learning steps and media that attract students' attention. This study implies that the use of Canva digital media in PBL can be an effective strategy to improve students' conceptual understanding. Teachers are advised to use Canva digital learning media as a teaching aid, especially when implementing PBL, so that students can more easily understand the concepts being studied.

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1. Introduction

Geographic learning at the Senior High School level is aimed at forming students who are able to understand the dynamic interaction between humans and the environment, as well as the spatial patterns that occur as a result of these interactions. One of the important materials studied in geography is the spatial pattern of Villages and Cities (Kamil et al., 2020). The spatial material of villages and cities contains geographical concepts and requires spatial understanding and a critical analysis of social and environmental dynamics (González, 2020; Kuijpers, 2024).

In practice, learning materials about the spatial patterns of villages and cities often encounter various obstacles. The results of the initial observations in class XII of SMA Negeri 10 Kendari showed that most students still had difficulty understanding the material on the spatial patterns of villages and cities. In the two parallel classes, 68% of the students scored below the minimum completion criterion (KKM) of 75, with an overall average score of 62.4 on the most recent topic-based assessment. Specifically, only 32% achieved individual scores at or above the KKM, while the remaining 68% scored between 45 and 74, indicating incomplete mastery of core concepts, such as the characteristics of rural and urban areas, factors influencing urbanization, and spatial interaction patterns. This condition can be seen from their learning evaluation scores, which have not reached the minimum completion criteria standard set, the low enthusiasm of students in discussions, and the inability of students to link concepts to real phenomena around them. One of the reasons why students' understanding is still low is that the learning model is still centered on the teacher, such as the lecture method, which in previous research often makes students just silent and does not participate much during the learning process (Ardiansyah et al., 2024; Astaifi, 2024; Faqiroh, 2020; Sukariasih et al., 2019).

To address this issue, a learning approach that fosters students' active participation in all learning activities is required. One approach that is widely regarded as effective in enhancing conceptual understanding is the implementation of the Problem-Based Learning (PBL) model (Ardiansyah et al., 2024; Hafizah et al., 2024;

Huang & Liao, 2024). PBL is a learning model that encourages students to learn by presenting a structured real-world problem (Abdullah et al., 2019; Hung & Tsai, 2020; Nicholus et al., 2023). The PBL model emphasizes finding solutions to problems through group work, discussion, and collaborative problem solving, which ultimately forms a deeper understanding of concepts (Astaifi, 2024; Hafizah et al., 2024; Nisa et al., 2023; Williamson et al., 2023).

Previous studies have shown that the use of PBL models helps students hone their critical thinking skills significantly and their conceptual understanding of various subjects (Ardiansyah et al., 2024; Astaifi, 2024; DongJin & Ashari, 2024; Ratnaningsih et al., 2018). In the context of geography learning, PBL allows students to understand the relationship between space and geographical phenomena through case studies or real problems such as the disparity in development between villages and cities, migration, and spatial planning (Hafizah et al., 2024; Pries, 2024; Takahashi et al., 2024).

PBL success is also greatly influenced by the learning media used (Saqr et al., 2023). In today's digital era, the use of interactive visual media can provide practical support for conveying information that is more enjoyable and easy to understand (Schiuma et al., 2022). Canva is a relatively popular and easily accessible media choice for students. The research used Canva as a digital-based graphic design application, which makes it easy for users to create various visual tasks such as presentations, infographics, posters, and other attractive designs (Hidayati et al., 2024). Using Canva, students can express their ideas and understanding in the form of creative visuals that not only clarify concepts but also increase their interest in learning (Ramadhan et al., 2024).

Media in the form of text and images like Canva simultaneously will be easier for the brain to understand than text alone (Effendi et al., 2024; Schüler et al., 2024). Kartiwi (2022) showed that when Canva is used in geography learning, it can significantly increase student engagement and understanding, especially in materials that require spatial visualization. Other previous studies related to Canva can increase student learning activity, which encourages the mastery of concepts (Agustini, 2023; Muhajir et al., 2024; Nabillah & Tanjung, 2023).

The integration of PBL models and Canva media in geography learning on the material of village and city spatial patterns is expected to create learning that in previous separate research on PBL and Canva made students more involved, learning felt more enjoyable, and the material was easier to understand (Audina et al., 2024; Fadjarajani et al., 2024; Partini & Asrul, 2024; Silviariza & Handoyo, 2020). Students are not just recipients of information, but also seekers and constructors of knowledge through PBL that is packaged visually. The use of this integration is theoretically projected to increase students' conceptual understanding of the material significantly (Ulfa et al., 2024).

The use of Canva can strengthen important skills in the modern era, such as the ability to think critically, be creative, communicate well, and work together with others (Anggraeni & Pentury, 2022). In the learning process using Canva, students practice processing information, design visualizations, convey ideas, and work together in groups (Permatasari et al., 2024; Syifa et al., 2024). All these are essential skills needed in life in the modern era.

Given these conditions, the researcher felt it was important to conduct an experimental study to determine the effectiveness of the PBL model combined with Canva media in helping grade XII students understand the material on the spatial patterns of villages and cities. The findings of this study are expected to provide valuable input for developing geography learning strategies that are more creative and relevant to the needs of today's students. Previous PBL research has focused on understanding physics, problem-solving competencies, learning outcomes, and critical thinking (Ade & Wahyudi, 2022; Arifin et al., 2024; Diyana & Sutopo, 2024; Nurjanah et al., 2023). Previous research on Canva has focused on the effects of creativity, presentation skills, and digital literacy (Effendi et al., 2024; Permatasari et al., 2024). Previous research was still partial PBL and the use of the Canva. Previous studies that applied PBL with media and platforms such as Google Sites, edmodo, interactive learning media, and animation have focused on in-depth analysis of how digital media-assisted PBL models specifically influence students' conceptual understanding, as most assessments are based on cognitive or process skill scores, rather than on the depth of students' understanding of geography material (Audina et al., 2024; Fauziah et al., 2024; Napitupulu & Jasmidi, 2023). However, no research has explored the integrated impact of PBL and Canva in teaching spatial village-city concepts in high school geography.

This research aims to determine the effect of using a PBL model assisted by Canva media on students' understanding of village and city spatial patterns in Grade XII students. The geographical material reviewed is material on the spatial patterns of villages and cities in general and around the Kendari City context. A comparison of the results of the influence was obtained through a conventional learning model, where teaching and learning activities were led mainly by the teacher with the primary methods in the form of lectures, discussions, and questions and answers. This research hypothesizes that the Canva-assisted PBL model has a significant effect on the conceptual understanding of geography students.

2. Method

The study employed a quasi-experimental design with a non-equivalent pretest-posttest control group. The study was conducted during the semester of the 2024/2025 academic year and involved Grade XII students at SMA Negeri 10 Kendari. Two classes were selected as samples: an experimental class and a control class, which were chosen based on comparable initial abilities from the last geography average score in student raport. Both classes were administered a pretest in the form of a multiple-choice reasoned test to assess their prior knowledge, with a similar score in the average range of 40-42. The experimental class was taught using a PBL model integrated with Canva media, whereas the control class received conventional instruction through direct learning methods including lectures, class discussions, and question-and-answer sessions. Upon completion of the instructional period, both groups were given a posttest using the same test format as the pretest to evaluate the development of their conceptual understanding. The treatment duration was five weeks or meeting, including the pretest and posttest.

This study involved all Grade XII students, consisting of three classes with 91 students whose academic abilities were relatively the same. Sampling for the experimental and control classes was carried out randomly, so that each class in the population had an equal opportunity to be a sample. The random sampling technique is used to select research samples where each member of the population has an equal opportunity to be selected randomly so that it can represent the population objectively and reduce bias in data collection (Adeniyi & Ewemooje, 2023; Ballance, 2023). A lottery method was used for the selection process. From the results of the draw, two classes were selected: XII IPS 1 as the experimental class that will be taught with a PBL model and Canva media, and XII IPS 2 as the control class that continues to use direct learning methods with lectures, questions, and answers. PBL with Canva involves five learning steps. First, problem orientation, including the teacher, begins the lesson by playing a short video (homemade from Canva) or displaying an infographic of the matter. Second, organizing students for learning includes the teacher providing a Canva template (infographic, digital map, or blank presentation) so that the students do not start from scratch. Third, guiding inquiry, including the teacher, facilitates discussion and provides feedback through live comments in Canva. Students begin drafting an infographic or spatial map in Canva. Fourth, developing and presenting the product, including presentations, is done digitally via Canva Live or a classroom screen. Fifth, problem-solving analysis and evaluation include using a Canva Whiteboard or digital reflection template (e.g., "What I learned, my difficulties, my new ideas"), and assessment is based on a rubric (which can also be shared via Canva).

Before the data collection process was conducted, the researcher prepared the research instrument. The instrument used was a multiple-choice reasoning test to measure students' conceptual understanding. These test questions had previously undergone a trial phase to ensure their suitability as measuring tools in this study. The instrument was analyzed by conducting a validity test to determine the accuracy of the questions, a reliability test to measure the consistency of the questions, and an analysis of the level of difficulty and discriminatory power to ensure that each question was able to accurately measure students' abilities and distinguish between high- and low-ability students. Instrument validity is based on the correlation coefficient (r_{xy}) to measure the closeness (strong, weak, or nonexistent) of the relationship between variables, in this case variables X and Y. The correlation coefficient value is -1 to +1, the relationship is said to be positive if the correlation coefficient value (r) is large, and the relationship is said to be negative if the correlation coefficient value is negative. The instrument reliability coefficient can be calculated by splitting it in half based on even and odd numbers so that two tests are obtained, each of which is half the length of the original test. The two tests were then correlated to obtain r_{gg}, and to interpret the overall reliability of the test, we used the correlation coefficient of the two halves of the test (r_{gg}).

Instrument validity with correlation coefficient. The relationship is said to be positive if the correlation coefficient (r) is large. The relationship is said to be negative if the correlation coefficient is negative. The calculation of the validity of the concept mastery test consisting of 30 questions yielded 24 valid questions, while the other six questions were invalid. The overall test reliability test used the correlation coefficient of two halves of the test (r_{gg}), which was then corrected using the Spearman-Brown formula. The results of the calculation of the reliability of the concept mastery test are 0.8. Thus, the concept mastery test had high reliability, ranging from 0.6 0.8.

The difficulty level ranges from 0.00 1.0. A question with an ease index of 0.0 indicates that the question is too difficult, while a score of 1.0 indicates that the question is too easy. The calculation of the ease level of the 30 concept mastery tests yielded two easy questions, numbered 1 and 20. Twenty-six questions were classified as moderate. Two questions were classified as difficult (numbers 9 and 16). The discrimination index (D) is a number that indicates the level of discriminating power. The results of the calculation of the power of distinction of the concept mastery test totaling 30 pieces yielded five questions included in the bad category.

22 questions were included in the Sufficient category. Three questions were included in the good category: numbers 8, 14, and 15. Based on validity, reliability, level of difficulty, and power of distinction, the number of questions in the concept mastery test used was 24 out of 30 questions that were tested.

The advantages of using the model to improve conceptual understanding were determined by comparing the normalized gain values <g> from the control and experimental classes. The normalized gain average value was obtained using the following formula from Lin and Yu (2023):

$$\langle g \rangle \equiv \% \langle G \rangle / \% \langle G \rangle max. = (\% \langle Sf \rangle - \% \langle Si \rangle) / (100 - \% \langle Si \rangle)$$

In this case, ⟨g⟩ shows the normalized gain average of both learning methods, which is calculated as the ratio between the gain obtained, ⟨G, ⟩ and the maximum gain that can be achieved ⟨ by G⟩max. ⟨Si⟩ and ⟨Sf⟩ are the average class values in the pretest and posttest, respectively. Table 1 shows the categories of high- and low-normalized gains (Grossberg, 1983; Wang et al., 2018). To analyze the research data by testing the hypotheses, parametric inferential statistical analysis was performed using SPSS for Windows version 25.

Table 1. Normalized Gain Values and Their Classification

Average normalized gain	Classification
$\langle g \rangle \geq 0,7$	High
$0,7 > \langle g \rangle \geq 0,3$	Medium
$\langle g \rangle < 0,3$	Low

3. Results and discussion

The learning process was conducted during the experimental class. Students were taught using a PBL model combined with Canva media. There are five PBL steps, and investigations are applied to students' surroundings. The control class used conventional methods in the form of lectures and discussions, all of which were carried out in the classroom. After the entire learning series was complete, both classes were given the same test to determine how far they understood the material that had been studied. The limitation of this study is the relatively short duration of the learning implementation, so it cannot describe the long-term impact of implementing the Canva-assisted PBL model on students' concept retention and conceptual understanding in all geography materials.

The test consists of essay questions that have been validated by material and instrument experts. The instrument validator results obtained a score of 3.5, and the material validator results obtained was 3.4; therefore, the average validation result was 3.45 from a maximum score of 4 with valid criteria. The scores from this test were then analyzed to determine the extent to which students' conceptual understanding developed after they learned with their respective learning models. Conceptual understanding is measured based on specific criteria, including students' ability to explain, connect, and directly practice the concepts they have learned.

The data obtained revealed notable differences between the two classes. Overall, the results indicate that students in the experimental class demonstrated a higher level of conceptual understanding than those in the control class. Comprehensive information regarding the conceptual understanding outcomes of both classes is presented in Table 2, which provides a summary of the data collected from the experimental and control groups.

Table 2. Data on Students' Concept Understanding in Experimental and Control Classes

Value	Experimental Class			Control Class		
	Pre Test	Post Test	Gain	Pre Test	Post Test	Gain
Total Data	36	36		36	36	
Minimum	25	50	0,33	30	50	0,17
Maximum	70	95	0,88	55	85	0,77
Average	40,83	77,92	0,63	42,50	71,53	0,50
Deviation Standard	11,37	10,10	0,14	8,24	7,54	0,12

(**Source**: Research results, 2025).

Based on Table 2, the experimental class had a lower minimum pretest score of 25 than the control class, which recorded a minimum score of 30. The maximum pretest score in the experimental class was 70, surpassing that of the control class (55). The mean pretest score of the experimental class was 40.83, which was slightly lower than the mean of 42.50. In terms of the posttest performance, both classes achieved a minimum score of 50. However, the experimental class demonstrated superior achievement, with a maximum

score of 95, compared to the control class's maximum of 85. Furthermore, the experimental class attained a significantly higher mean posttest score of 77.92, as opposed to the control class mean of 71.53. The experimental class had a higher score than the control class because the PBL and Canva learning steps support students' understanding of their activeness, problem-solving activity, group dynamics, and creativity in using Canva. The learning process supports student understanding, as shown in the posttest data. The students in the experimental class got a gap of 6.39 poin in the postest, indicating that student-centered learning with five steps of PBL with Canva as the main media has a good impact on students' understanding.

Table 2 shows that the lowest gain score in the experimental class was 0.33, while in the control class, it was only 0.17. The highest gain score for the experimental class reached 0.88, while the control class had a maximum of 0.77. The average gain in the experimental class was recorded at 0.63, higher than the control class, which had an average of 0.50. The average pretest, posttest, and gain scores of both classes are depicted in graphical form, the results of which can be seen in Figure 1.

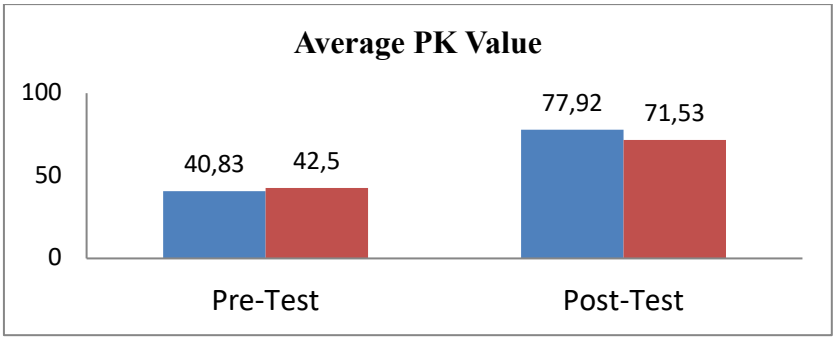


Figure 1. Student Concept Understanding Profile of Both Classes

Figure 1 presents a comparison of the average conceptual understanding of students in the experimental and control classes during the pretest and posttest. Before the implementation of the learning intervention, the experimental class had a mean score of 40.8, which was slightly lower than the control class, which obtained a mean score of 42.5. Following the learning process, both classes demonstrated notable improvements in conceptual understanding. The average score of the experimental class increased significantly to 77.9, whereas that of the control class increase to 71.5. These findings indicate that the application of a PBL model supported by Canva media had a more substantial positive impact on enhancing students' conceptual understanding compared to conventional teaching methods supported by previous research (Hsbollah & Hassan, 2022; Prihatiningtyas & Astuti, 2024; Ulfa et al., 2024). An overview of the improvements in conceptual understanding in both classes is shown in Figure 2.

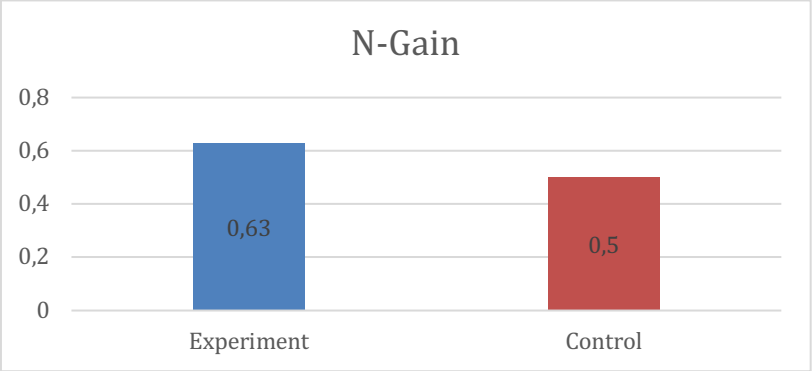


Figure 2. Profile of Improvement in Student Concept Understanding of Both Classes

Before determining the appropriate type of statistical test, a normality test and homogeneity of variance test were conducted as the initial steps in the analysis. The normality test was performed on the data regarding students' conceptual understanding in both the experimental and control classes, encompassing pretest, posttest, and gain scores. A homogeneity of variance test was carried out to assess the equality of variances between the two classes, applied to the pretest, posttest, and gain scores.

The pretest and posttest normality tests and the data gained from the control and experimental classes used the SPSS 25.0 application with the One-Sample Kolmogorov-Smirnov Test, which can be seen in Table 3 below.

The results of the normality test shown in Table 3 indicate that the significance value (α) of all experimental and control class data exceeds 0.05, which indicates that both data are normally distributed.

Table 3. Summary of The Normality PK Data Result

Conceptual Understanding				
Student Group	**Class**		**Description**	
	Experiment	**Control**		
	Sig.	**Sig.**	**Control**	**Experiment**
Pretest	0,526	0,090	Normal	Normal
Posttest	0,415	0,025	Normal	Normal
Gain	0,863	0,434	Normal	Normal

(**Source**: Research results, 2025).

The homogeneity of variance test was carried out using the SPSS 25.0 application and the Levene test to determine the similarity of the variances of the two groups. The results of the homogeneity of variance test for conceptual understanding data in the experimental and control groups are presented in Table 4.

Table 4. Summary of Results of the Homogeneity of Variance Test for PK Data

Concept Understanding		
Tested Data	**Sig.**	**Description**
Pretest	0,123	Homogeneous Data Variance
Posttest	0,062	Homogeneous Data Variance
Gain	0,149	Homogeneous Data Variance

(**Source:** Research results, 2025).

Based on the results of the homogeneity test of data variance in Table 4, with a sig. (α) values greater than 0.05, all Pretest, posttest, and gain data had homogeneous data variance.

Hypothesis testing was carried out using SPSS 25.0, and the independent samples t-test. The results of this test analysis, which compared the average conceptual understanding and the increase in conceptual understanding between students in the experimental and control classes, are shown in Table 5.

Table 5. Summary of The Hypothesis Test Result of The Average Value of Students' Conceptual Understanding

Variable	**Significance**		**Decision**
	Probability	**Alpha (α)**	
Conceptual understanding	0,003	0,05	There is an influence

(**Source**: Research results, 2025).

Based on Table 5, the average probability value of the students' conceptual understanding was 0.003. The value obtained was below the significance level of 0.05, indicating a significant influence on the average conceptual understanding between students in the experimental and control classes. A summary of the results of the hypothesis test related to the average N-Gain of students' conceptual understanding is shown in Table 6.

Table 6. Summary of The Hypothesis Test Result of The Average N-Gain of Students' Conceptual Understanding

Variable	**Significance**		**Decision**
	Probability	**Alpha (α)**	
Conceptual understanding	0,000	0,05	There is a difference

(**Source**: Research results, 2025).

Table 6 shown the N-gain probability value for students' conceptual understanding is recorded at 0.000 and 0.001. Considering that both values are below alpha 0.05, it can be concluded that there is a significant difference in the average N-gain of conceptual understanding between students in the experimental and control classes. The p-value of 0.000 indicates a statistically significant effect of the PBL with Canva model because the p-value are below the alpha <0.05. Practically, this means teachers can adopt this model with confidence that it leads to real learning gains.

Based on the results of the descriptive analysis, it can be observed that students' conceptual understanding of rural and urban spatial patterns improved following instructional intervention. In the experimental class,

where the PBL model assisted by Canva media was implemented, the average posttest score increased significantly from 40.83 in the pretest to 77.92. Similarly, in the control class, which received conventional instruction, the average posttest score rose from 42.50 to 71.53. These findings indicated an overall improvement in students' comprehension of the topic, with a notably greater enhancement observed in the experimental group.

The implementation of the PBL model supported by Canva media that caused the experimental class to build a deep conceptual understanding was carried out through five systematic stages. Learning began with problem orientation, where the teacher sparked students' curiosity through videos or infographics created by themselves using Canva, which addressed real-life issues, such as development inequality and urbanization. Questions such as "Why are big cities becoming increasingly crowded, while many villages are losing their young population?" encouraged students to critically observe, respond, and identify problems. The organizing students In the learning stage, the students were divided into small groups and assigned a project to analyze the spatial patterns of villages and cities equipped with Canva templates (infographics, digital maps, or presentations) to focus on content and thinking processes, not just format. In the guided inquiry stage, students explored data, compared the characteristics of villages and cities, and collected real-life case examples while continuing to receive feedback from the teacher through online collaboration in Canva. The product development and presentation stage trains students to express the results of their investigations in the form of comparative infographics, posters of spatial planning solutions, or digital maps, which are then presented interactively using the Canva Live feature or live displays in the classroom. This process hones not only higher-order thinking skills but also communication and collaboration skills. In the analysis and evaluation stage, teachers and students jointly reflected on the proposed solutions through critical discussions and digital reflections using a whiteboard or reflection template in Canva while assessing the conceptual accuracy and realism of the solutions based on an integrated rubric. This approach creates contextual, active, and visual learning, where Canva acts not only as a presentation tool but also as an interactive medium that facilitates exploration, collaboration, and creative expression of concepts, factors that are likely to be the main reason for the higher increase in conceptual understanding in the experimental class compared to the conventional method in the control class.

The findings of the improved conceptual scores in the study are related to specific indicators of conceptual understanding development. Based on Bloom's Taxonomy framework, conceptual understanding encompasses various cognitive levels, from understanding to creating, and the results of the Canva-assisted PBL implementation indicate that improvements occurred not only in the aspects of remembering or defining concepts, but more dominantly in the ability to apply, analyze, and create, key indicators of deep understanding (Anderson & Krathwohl, 2015; Hartono, 2023). During the learning process, students were not only able to correctly state the definitions of villages and cities (understanding level), but also demonstrated the ability to identify examples and non-examples of spatial patterns and explain their characteristics in their local context (application level). In activities investigating problems such as urbanization and inequality in development, students engaged in the process of analyzing the cause-and-effect relationships between geographic concepts, such as how access to education and employment in cities drives population migration from villages. The culmination of this achievement was observed when students created infographics, digital maps, or solution posters using Canva, activities that required them to integrate various spatial concepts into an original product, which is an indicator of the create level. The collaborative and reflective process in PBL also encourages students to evaluate the effectiveness and realism of their proposed solutions, such as assessing the feasibility of an environmentally friendly spatial plan or equitable distribution of public facilities. This demonstrates that improvements in conceptual understanding occur not only at lower cognitive levels but more strongly in aspects that require critical and synthetic thinking. Thus, the combination of PBL and Canva not only helps students understand what spatial patterns are but also why and how these concepts are interconnected and applicable in real-life contexts, reflecting the achievement of holistic and sustainable conceptual understanding.

From the results of the descriptive analysis, the use of the PBM assisted by Canva media has a much better effect than direct learning methods. The data also showed that before learning began, the average pretest scores of students in the experimental and control classes did not show a significant difference in the material on rural and urban spatial patterns. Their initial abilities were relatively similar before the two learning models were applied.

When viewed from the average gain in students' conceptual understanding after learning the material on rural and urban spatial patterns, there was a reasonably straightforward difference between the two classes. The experimental class had an average gain of 0.63, and for the control class, it only reached 0.5. This

difference in results indicates that students' conceptual understanding in the experimental class experienced a greater increase than that in the control class.

Theoretically, the results of this study can be explained through a social constructivism approach, where the PBL model encourages students to actively construct understanding through the exploration of authentic problems, such as development inequality and urbanization, which is a complex and spatial phenomenon (Hung & Tsai, 2020) This is effective in learning spatial concepts because it requires students to identify, analyze, and connect geographic elements in a real-world context, thereby strengthening spatial thinking skills and conceptual connections (Silviariza & Handoyo, 2020). In the context of geography, spatial concepts are abstract and multidimensional, and require clear visual representations for easy understanding (Harudu et al., 2024). This is where Canva's role becomes crucial: as an intuitive visual tool, Canva allows students to create infographics, conceptual maps, and interactive presentations that simplify spatial data into more concrete and meaningful forms (Effendi et al., 2024). With its drag-and-drop features, ready-to-use templates, and real-time collaboration, Canva supports complex geospatial visualizations, such as urbanization patterns or land-use changes, in a creative, engaging, and accessible manner, especially for students with visual learning styles (Enshanty, 2024). The integration of PBL and Canva creates a learning environment that is not only contextual and participatory but also strengthens students' mental representation of the structure and dynamics of space, thereby significantly improving conceptual understanding compared to conventional methods that tend to be verbal and one-way.

The findings of this study are consistent with those of previous related research, indicating that the PBL model is more effective than conventional instructional approaches. This effectiveness is supported by the calculated average normalized gain (n-gain), which demonstrates superior performance in the experimental class compared with the control class. PBL is better at improving problem-solving skills and learning outcomes (Ade & Wahyudi, 2022; Nurjanah et al., 2023).

The difference in results occurred because of the impact of using the PBL model. This model is implemented by students working together in small groups with a learning approach that emphasizes the active role of students, while the teacher acts as a facilitator (Nemakhavhani, 2024). The given problems are also taken from real situations in daily routines (Sarkingobir & Bello, 2024). In this process, students are invited to work together to solve complex problems so that they can hone their abilities to solve problems, reason, communicate, and evaluate themselves independently (Aswan et al., 2024).

The first hypothesis test proved that there was a significant difference in the average conceptual understanding between students who learned through the PBL model and those who learned using the direct method. The second hypothesis test yielded consistent results, indicating a statistically significant difference in the average N-gain scores for conceptual understanding between the two groups of students. These findings are further supported by previous studies, which also reported a significant improvement in students' conceptual understanding when the PBL model was implemented as compared to the traditional direct instruction method (Purwati & Khasanah, 2017).

The conceptual understanding of students taught using the PBL model was better than that of students who underwent direct learning. The PBL Model makes students more actively involved during the learning process so that the subject matter is more embedded in their memories (Nisa et al., 2023). The PBL model helps students discover important concepts through real problems they encounter every day by practicing their inquiry skills (Salari et al., 2018). In this learning, students become the center of learning, and they must find solutions to the problems they face, while teachers only function as companions and provide direction when needed (Huang & Liao, 2024). The main goal is to train students to develop high-level thinking skills (Pattiasina et al., 2024).

PBL in learning practices in experimental classes makes real problems the center of learning activities. Teachers guide students to be directly involved in analyzing and solving the problems they face to build their understanding and knowledge (Nisa et al., 2023). The application of PBL in the classroom is also indicated to develop high-level thinking skills, such as honing critical thinking, analytical, and creative skills, all of which are important for facing the challenges of life now and in the future (Huang & Liao, 2024).

The PBL model in the application of learning presents authentic problems to the students. The problems give students in-depth and authentic investigations that focus on finding concrete solutions to problems that are often encountered every day (Faqiroh, 2020). Investigation activities enable students to master concepts in theory and get used to thinking critically, finding solutions to problems, and connecting learning materials with real situations that they face in everyday life (Nisa et al., 2023).

The application of PBL in experimental classes utilizes real complex, open, and structured problems as a means for students to hone their critical thinking. Students learn to find solutions to various problems, while building a new understanding of the process. In the control class, conventional learning methods that use real

problems only apply the concepts that have been taught. In PBL, these problems are the starting point that triggers the students' learning process before they learn the formal concept (Abidin, 2020).

PBL in experimental classes helps students train in their thinking, from critical thinking to analysis, while developing their ability to solve various problems they face. The application of PBL not only emphasizes mastery of steps or procedures, but also pays great attention to the students' thinking process in understanding and finding solutions to the problems they face. This model helps students become more active, learn independently, and relate their knowledge to real situations in everyday life, ultimately mastering the concepts taught (Hafizah et al., 2024).

The application of PBL in this study was combined with the use of Canva media. The content of audio-visual media is essential because the delivery of material through PBL must be able to attract students' attention. Engaging in audio-visual media content requires skills and expertise from a teacher (Kartiwi & Rostikawati, 2022). Canva, as an online-based application, is easy to apply and provides engaging content for free and complete features with access to the belajar.id account from the Ministry of Primary and Secondary Education (Diyana & Sutopo, 2024).

Canva, as one of the online graphic design-based digital media, is currently widely used in the world of education and offers many choices of attractive and easy-to-use templates to create posters, infographics, presentations, and interactive learning materials (Fitria, 2024; Muhsin, 2024; Prihantini et al., 2023). Teachers can easily create various presentation designs, learning videos, infographics, posters, brochures, resumes, flyers, certificates, student worksheets, storyboards, school bulletins, and many more, which have been useful in experimental classes and learning activities. Canva provides a presentation feature with various teaching material design templates that can be changed according to needs, and provides a choice of attractive fonts and colors to beautify the appearance of the material created (Effendi et al., 2024).

Canva supports PBL with technology and the ability to convey information visually effectively. In experimental class learning, teachers apply Canva in the form of material posters, question cards, or presentation slides, which are more attractive than conventional media. The use of Canva in learning is not only limited to teachers; students can also use it to do assignments, such as making posters, videos, or other presentations. Canva is very useful during learning activities because it can increase students' creativity and skills, while encouraging them to be more innovative in developing the material being studied (Fitria, 2024).

Conceptual understanding is the main target of the implementation of PBL with Canva. Conceptual understanding shows students' ability to understand the meaning of a concept, recognize its characteristics, and integrate it with other concepts in a single unit of knowledge material related to villages and cities. Students are not only required to memorize information in PBL with Canva, but also to understand the meaning and application of the concept in everyday life, which is reflected in solutions and activeness (Nurjanah et al., 2023).

Conceptual understanding can be achieved because PBL with Canva is optimally designed, and students actively participate in finding concepts through the discovery process. Conceptual understanding develops along with students' cognitive development, and the application of PBL with Canva teachers adjusts to the stage of student development. Conceptual understanding has several indicators, including being able to state the definition of a concept in its own words, providing examples and non-examples, and applying concepts to find solutions to problems. PBL with Canva is oriented towards a conceptual understanding that facilitates students' knowledge (Prihatiningtyas & Astuti, 2024).

Students experienced a substantial increase in conceptual understanding through the implementation of PBL with Canva. Students find it easier to learn the material because the combination of finding their material and the media used is interesting (Agustini, 2023; Purwati & Khasanah, 2017). The results of the concept understanding test of villages and cities showed that the experimental class with a PBL model combined with Canva media had a higher score than the control class. The average posttest score of the experimental class reached 77.92, far exceeding the control class, which was only 71.53, with an average increase of 37.09 points from pretest to posttest, compared to 29.03 points in the control class.

The findings of this study are not only consistent with the results of previous studies but can also be interpreted in depth through relevant theoretical frameworks, such as social constructivism and Mayer's multimedia learning theory, which provide a strong basis for understanding why the combination of the PBL model and Canva media can significantly improve conceptual understanding. According to constructivism theory, knowledge is not transferred directly from teachers to students, but rather is constructed through an active process of exploration, discussion, and reflection, processes that naturally occur in PBL stages, where students work in groups to analyze real-world spatial problems, such as urbanization and development inequality (Nurhasnah et al., 2024). In this context, the teacher acts as a facilitator to guide students through the zone of proximal development, encouraging them to achieve higher understanding through collaboration.

Furthermore, the effectiveness of Canva media can be explained by Mayer's Cognitive Theory of Multimedia Learning (CTML), which states that learning becomes more effective when information is presented through a combination of visual and verbal channels, allowing the brain to process information in parallel and build stronger mental representations (Mayer, 2014). In this lesson, Canva facilitates dual coding through the use of infographics, digital maps, and visual presentations that integrate concise text, spatial symbols, colors, and contextual images, elements that help students understand the complex relationship between rural and urban areas more intuitively. For example, visualizing urbanization flows through Canva's interactive map allows students to see population movement patterns not just as abstract data but also as phenomena connected to economic, social, and infrastructure factors. This supports coherence, signaling, spatial contiguity, and the multimedia design principles proposed by Mayer to optimize cognitive processing (Mayer, 2021; Schüler et al., 2024). Thus, the finding of higher N-gain in the experimental class is not only a result of the active PBL method but also a synergistic effect between the constructivist approach and media design that aligns with the cognitive principles of learning. While several previous studies have demonstrated the advantages of PBL, this study enriches the discourse by theoretically demonstrating how the integration of technology such as Canva not only attracts students' interest but also cognitively supports the internalization of complex geospatial concepts, an important contribution to the development of evidence and theory-based geography learning (Ade & Wahyudi, 2022; Nurjanah et al., 2023).

The findings of this study have significant practical implications for teachers, curriculum development, and innovation in the digital era of geography learning media. For teachers, the implementation of the PBL model integrated with Canva offers an effective learning approach to enhance students' conceptual understanding through real-world contexts and project-based activities while facilitating learning differentiation by providing space for individual creativity and expression (Syifa et al., 2024). Teachers can utilize Canva not only as a presentation tool, but also as a collaborative platform that supports exploration, spatial data visualization, and interactive presentation of learning outcomes (Hidayati et al., 2024). From a curriculum perspective, these results emphasize the need to integrate scientific approaches and problem-based learning in geography learning design, particularly on contextual and spatial topics, such as rural and urban spatial patterns (Fadjarajani et al., 2024). Furthermore, this study encourages the development of digital learning media that supports multimodal and constructivist learning principles (Kustini et al., 2020). Canva can be adopted as an example of accessible, free, and flexible media that aligns with educational digitalization policies, such as the Belajar. id platform (Putri & Jumardi, 2023). Schools and educational institutions can encourage teacher training in the use of visual design-based educational technology to support students' spatial literacy and critical thinking (Sumarmi et al., 2021). Thus, the combination of PBL and Canva is not only theoretically relevant but also has great potential to be replicated and developed as an innovative learning model that can be widely applied in the context of geography learning at various levels of education.

4. Conclusion

The conclusion of this study shows that the application of the PBL model combined with Canva media has a significant and greater influence on students' conceptual understanding than conventional methods, with an average N-gain of 0.63, statistically significant ($p = 0.000$), and the average posttest score of the experimental class reached 77.92. All data in the experimental class were higher than those in the control class. These findings prove that the combination of PBL and Canva effectively encourages active student engagement and strengthens critical thinking skills, creativity, and the ability to connect geography concepts to real-world contexts. The significant support from PBL and Canva learning supports students' understanding of student activeness, problem-solving activities, group dynamics, and creativity in using Canva. This research implies that the use of Canva digital media in PBL can be an effective strategy for improving students' conceptual understanding. Therefore, it is recommended that teachers systematically apply this model to geography learning, especially on topics that require spatial visualization and authentic problem analysis. For further research, it is recommended not only to explore the use of Canva at other levels or models in general, but also to specifically test the effectiveness of Canva's integration in other learning models, such as Inquiry Learning or Project-Based Learning on geospatial materials in secondary schools, and to evaluate its impact on students' higher-order thinking skills and digital literacy using a broader and longer-term experimental design.

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