



## **THE EXISTENCE OF PROBLEM-BASED LEARNING, DISCOVERY LEARNING, CASE-BASED METHOD, AND PROJECT-BASED LEARNING IN MEASURING STUDENTS' HIGHER-ORDER THINKING SKILLS IN GEOGRAPHY**

***Eksistensi Problem-Based Learning, Discovery Learning, Case-Based Method, and Project-Based Learning dalam Mengukur Keterampilan Berpikir Tingkat Tinggi Siswa dalam Geografi***

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### **ABSTRACT**

Geography learning encompasses complex physical, environmental, and social dimensions that require students to develop higher-order thinking skills (HOTS) to address environmental and spatial challenges in the 21st century. However, geography instruction in practice often remains teacher-centered and monotonous, resulting in low student engagement and an excessive emphasis on memorization. Therefore, innovative learning models oriented toward critical thinking and problem-solving skills—such as Problem-Based Learning (PBL), Discovery Learning, Case-Based Learning (CBL), and Project-Based Learning (PjBL)—are needed to promote active and meaningful learning. This study aims to: (1) identify the proportion of research focusing on the development and application of HOTS-oriented learning models in geography education; (2) analyze the advantages of PBL, Discovery Learning, CBL, and PjBL in geography learning; and (3) formulate effective strategies for implementing these learning models. The study employed a qualitative meta-synthesis approach supported by comparative quantitative analysis (meta-review) to synthesize findings from various empirical studies. The results indicate that the application of PBL, PjBL, Discovery Learning, and CBL significantly enhances the quality of geography learning processes and outcomes. These learning models encourage students to actively construct knowledge through problem-solving, concept discovery, project development, and analysis of real-world cases relevant to physical and social geographic phenomena. Moreover, the implementation of these models contributes to the development of HOTS, spatial literacy, analytical skills, collaboration, and data-driven decision-making. Consequently, the strategic and proportional integration of these learning models, aligned with learning objectives and material characteristics, is essential to realizing innovative, participatory, and contextually meaningful geography education that responds to contemporary challenges.

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## ABSTRAK

*Pembelajaran geografi mencakup dimensi fisik, lingkungan, dan sosial yang kompleks yang mengharuskan siswa untuk mengembangkan keterampilan berpikir tingkat tinggi (HOTS) untuk mengatasi tantangan lingkungan dan spasial di abad ke-21. Namun, pengajaran geografi dalam praktiknya seringkali tetap berpusat pada guru dan monoton, sehingga mengakibatkan rendahnya keterlibatan siswa dan penekanan yang berlebihan pada hafalan. Oleh karena itu, model pembelajaran inovatif yang berorientasi pada keterampilan berpikir kritis dan pemecahan masalah—seperti Pembelajaran Berbasis Masalah (PBL), Pembelajaran Penemuan, Pembelajaran Berbasis Kasus (CBL), dan Pembelajaran Berbasis Proyek (PjBL)—diperlukan untuk mendorong pembelajaran aktif dan bermakna. Studi ini bertujuan untuk: (1) mengidentifikasi proporsi penelitian yang berfokus pada pengembangan dan penerapan model pembelajaran berorientasi HOTS dalam pendidikan geografi; (2) menganalisis keunggulan PBL, Pembelajaran Penemuan, CBL, dan PjBL dalam pembelajaran geografi; dan (3) merumuskan strategi efektif untuk menerapkan model pembelajaran ini. Studi ini menggunakan pendekatan meta-sintesis kualitatif yang didukung oleh analisis kuantitatif komparatif (meta-review) untuk mensintesis temuan dari berbagai studi empiris. Hasil penelitian menunjukkan bahwa penerapan PBL, PjBL, Discovery Learning, dan CBL secara signifikan meningkatkan kualitas proses dan hasil pembelajaran geografi. Model pembelajaran ini mendorong siswa untuk secara aktif membangun pengetahuan melalui pemecahan masalah, penemuan konsep, pengembangan proyek, dan analisis kasus dunia nyata yang relevan dengan fenomena geografis fisik dan sosial. Selain itu, implementasi model-model ini berkontribusi pada pengembangan HOTS (Higher Order Thinking Skills), literasi spasial, keterampilan analitis, kolaborasi, dan pengambilan keputusan berbasis data. Oleh karena itu, integrasi strategis dan proporsional dari model-model pembelajaran ini, yang selaras dengan tujuan pembelajaran dan karakteristik materi, sangat penting untuk mewujudkan pendidikan geografi yang inovatif, partisipatif, dan bermakna secara kontekstual yang menjawab tantangan kontemporer.*

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## INTRODUCTION

Learning geography is very complex, covering physical/environmental and social topics, requiring students to develop higher-order thinking skills to solve various problems related to environmental issues in the 21st century (Wijayanto et al., 2023). However, the geography learning process in the field is often still teacher-centered and tends to be

monotonous, so many students consider it a boring activity that emphasizes memorization too much (Nawalinsi, 2016). Therefore, innovative learning approaches oriented towards the development of critical thinking and problem-solving skills, such as Problem-Based Learning, Discovery Learning, Case-Based Method, and Project-Based Learning, are needed to encourage students' active involvement in understanding geosphere

phenomena in depth and analytically (Armawati & Bigharta Bekt, 2025; Nawalinsi, 2016).

The Problem-Based Learning model is an approach that focuses on presenting real-world problems to motivate students to develop higher-order thinking skills, such as problem solving and critical thinking (Larasati, 2017; Muavi et al., 2024). Through this model, students not only understand concepts theoretically, but are also trained to solve contextual problems related to everyday life through group work (Devyanti & Andriani, 2025). In addition, research shows that the application of the PBL model in geography learning has been proven to significantly improve students' critical thinking skills, as it gives students the freedom to explore, collaborate, and develop higher-order thinking skills (Muavi et al., 2024; Nurhayati & Aini, 2025).

In addition to PBL, the Discovery Learning model also emphasizes the process of independent inquiry in which students discover concepts through direct experience, while Project Based Learning provides opportunities for students to solve contextual problems and create real works through objective research in their surroundings (Anwar et al., 2021; Nawalinsi, 2016). The Case-Based Method, as a complementary approach, requires students to analyze real situations or cases to make decisions based on a deep understanding of geographical concepts (Rahma et al., 2023). These approaches are designed to create an active learning environment, where teachers act as facilitators who guide students in understanding the characteristics of the material and their abilities through a systematic problem-solving process (Meriska & Sudibyo, 2025; Nawalinsi, 2016). However, the reality in the field shows that geography learning is still dominated by memorization and discussion of things that happen in other countries without any connection to everyday life, so that students are forced to memorize concepts whose application is unknown (Nawalinsi,

2016). This condition shows the need for pedagogical transformation that integrates inquiry-based learning and technology to connect abstract concepts with empirical realities in the students' environment (Nawalinsi, 2016; Wijayanto et al., 2023).

This is in line with the principles of Problem-Based Learning, which exposes students to authentic problems to encourage the development of higher-level cognitive domains through independent investigation and discovery (Estiva, 2023; Saputra et al., 2025). However, the application of standard PBL often does not fully meet the specific needs of geography, especially in terms of problem solving that requires critical and spatial thinking skills simultaneously (Silviarza et al., 2020). Therefore, integration with other inquiry-based approaches such as Discovery Learning and Project Based Learning is an important strategy to enrich students' learning experiences in comprehensively processing spatial data and environmental phenomena (Aristin et al., 2023; Yusup et al., 2018).

It is important to understand that the four learning models, namely PBL, Discovery Learning, Case Based Method, and PjBL, have unique characteristics that complement each other in fostering higher-order thinking skills. However, their application in the field is often not optimal due to teachers' limited pedagogical understanding of the integration of these methods and constraints in managing learning resources that support the inquiry process (Nawalinsi, 2016; Yogaswara & Fauzi, 2025). These obstacles require a comprehensive study of the effectiveness of each model in the context of geography learning, including how PBL, Discovery Learning, Case Based Method, and PjBL can be integrated to overcome the weaknesses of traditional approaches and optimize the development of spatial literacy and analytical skills of students in facing the challenges of the

21st century (Nawalinsi, 2016; Wijayanto et al., 2023).

The main objectives of this study are, first, to identify the proportion of research on the development of higher-order thinking learning models (PBL, Discovery Learning, Case Based Method, and PjBL) in the application of learning in geography material. Second, what are the advantages of the four learning models in geography material. Third, strategies for using higher-order thinking learning models in the application of material in geography.

## METHODS

### Study Design

This study uses a Qualitative Meta-Synthesis approach supported by Comparative Quantitative Analysis (Meta-Review). This approach was chosen to synthesize findings from various empirical studies that have been selected and narrowed down based on several criteria (Pramono & Wulandari, 2024). Meta-synthesis allows for the summarization of descriptive and qualitative research findings (e.g., the use of PBL in geography learning materials) (Pramono & Wulandari, 2024; Rahmat & Sudarsono, 2021), as well as comparing quantitative data such as the prevalence and determinants of stigma in various study populations (Adiansyah, Ramani, & Baroya, 2023; Rahmi & Sari, 2023).

## RESULTS

### 1. PBL (Problem Based Learning) learning method in teaching geography

The results of this study are presented in four comparative tables to provide a clear picture of the higher-order thinking learning models (PBL, Discovery Learning, Case Based Method, and PjBL). The following table shows the use of PBL (Problem Based Learning) in geography materials.

| No | Use of Materials               | Combination | Measured Variables       | Analysis Findings                                          | Source (Author, Year)  |
|----|--------------------------------|-------------|--------------------------|------------------------------------------------------------|------------------------|
| 1  | Natural Resources in Indonesia | STEM        | HOTS                     | STEM-based PBL has been proven to increase students' HOTS. | Aprilia et, al. (2025) |
| 2  | Natural Disaster Mitigation    | -           | Critical Thinking Skills | PBL has a significant impact on critical thinking skills.  | Irma et, at. (2025)    |

### Literature Search Strategy and Selection Criteria

A systematic search was conducted on leading academic databases, including SCOPUS, SINTA (Science and Technology Index), and Copernicus. The search strategy focused on articles published in the last 5 years (2020–2025) and focused on the Indonesian context. (Sudastrri, Wulandari, & Januraga, 2025).

Strict Inclusion Criteria Applied:

1. Publications must have been published between 2020 and 2025.
2. The main topic must focus on higher-order thinking learning models (PBL, Discovery Learning, Case-Based Method, and PjBL) using geography materials.
3. The research population must focus on the application of learning at the high school level.
4. Studies must be indexed in Scopus, SINTA, or Copernicus.

Data were extracted from selected articles based on study population, research design, and use of learning models with identified geography materials (PBL, Discovery Learning, Case Based Method, and PjBL). Findings were then grouped based on social and physical/environmental material focus to facilitate in-depth comparative analysis.

|    |                                |               |                                                         |                                                                                            |                             |
|----|--------------------------------|---------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------|-----------------------------|
| 3  | Natural Resources in Indonesia | Kahoot        | Learning Outcomes                                       | Kahoot-based PBL has been shown to improve student learning outcomes.                      | Wardana & Sri (2023)        |
| 4  | Environmental pollution        | Local wisdom  | Student understanding                                   | Local wisdom-based PBL has been proven to improve students' understanding.                 | (Awaluddin, 2025)           |
| 5  | Climate Change                 | -             | Learning Outcomes (Cognitive)                           | PBL has a significant impact on student learning outcomes.                                 | Anisa et, al. (2025)        |
| 6  | Environmental pollution        | E-Modul       | HOTS                                                    | E-Module based PBL is proven to increase students' HOTS                                    | (Wijayanto, 2023)           |
| 7  | Natural Disaster Mitigation    | Micrplearning | Critical Thinking Skills                                | PBL has a significant influence on Critical Thinking Skills                                | (Adilah & Rosyida, 2024)    |
| 8  | Atmosphere                     | -             | Spasial Thingking                                       | PBL has a significant influence on spatial thinking                                        | (Mike & Nofrion, 2023)      |
| 9  | Atmosphere                     | -             | Spasial Thingking                                       | PBL has a significant effect on spatial thinking.                                          | (Ningrum & Perkasa, 2024)   |
| 10 | -                              | -             | Keaktifan Belajar                                       | PBL has an effect on increasing learning activity.                                         | (Ekstrada et al., 2023)     |
| 11 | Biodiversity                   | -             | Critical Thinking Skills                                | PBL has a significant influence on Critical Thinking Skills                                | Nurfadilah et, at (2023)    |
| 12 | Population                     | -             | Learning Outcomes                                       | PBL has been proven to improve student learning outcomes.                                  | (Nur, 2020)                 |
| 13 | Maritime Axis                  | -             | Critical Thinking Skills                                | PBL has a significant influence on Critical Thinking Skills                                | (Herzon & Utomo, 2020)      |
| 14 | Atmosphere                     | -             | Analytical Thinking Skills                              | PBL has a significant influence on analytical thinking skills                              | (Rahim & Pambudi, 2025)     |
| 15 | Space and Environment          | Outdoor Study | Learning Outcomes                                       | Outdoor Study-based PBL has been proven to improve student learning outcomes.              | (Kusuma et al., 2025)       |
| 16 | Hydrologic Cycle               | -             | Critical Thinking Skills                                | PBL has a significant impact on critical thinking skills.                                  | (Makbul Muavi et al., 2024) |
| 17 | -                              | -             | 4C (Critical, Creativity, Communication, Collaboration) | PBL has a significant influence on 4C (Critical, Creativity, Communication, Collaboration) | (Tanamir & Rianto, 2024)    |
| 18 | Region                         | Kahoot        | Learning Outcomes                                       | Kahoot-based PBL has been shown to improve student learning outcomes.                      | (Manek & Asa, 2025)         |

|    |                                        |                    |                            |                                                                                   |                             |
|----|----------------------------------------|--------------------|----------------------------|-----------------------------------------------------------------------------------|-----------------------------|
| 19 | Inter-Regional and Inter-Country Trade | -                  | Literasi Geografi          | Kahoot-based PBL has been shown to improve students' geographic literacy.         | (Khotimah et al., 2022)     |
| 20 | Hydrologic Cycle                       | Prezi Presentation | Learning Outcomes          | Prezi Presentation-based PBL has been shown to improve student learning outcomes. | (Wibawati & Prastono, 2024) |
| 21 | -                                      | -                  | Literasi Geografi          | PBL has been shown to improve students' geographic literacy.                      | Nurdessyanah et, al. (2025) |
| 22 | Population                             | Webgis             | Spasial Thingking          | WebGIS-based PBL has a significant influence on spatial thinking                  | Laksmiarini et, al. (2025)  |
| 23 | Geographic Information Systems         | -                  | Spasial Thingking          | PBL has a significant influence on spatial thinking                               | Bana et, al. (2025)         |
| 24 | Environmental pollution                | -                  | Learning Outcomes          | PBL has been proven to improve student learning outcomes.                         | Rosa (2020)                 |
| 25 | Atmosphere                             | -                  | Analytical Thinking Skills | PBL has a significant influence on analytical thinking skills                     | Nisa & Aida (2024)          |
| 26 | Environmental pollution                | -                  | Creative Thinking Skills   | PBL has a significant influence on Creative Thinking Skills                       | Novia (2020)                |

From the table, it can be seen that there are 26 articles on the development of HOTS (Higher Order Thinking Skills) learning models based on PBL (Problem Based Learning) in geography teaching. These articles are considered highly credible for review because they are indexed in reputable national and international journals. Of the twenty-six articles, only three specifically discuss the use of PBL (Problem Based Learning) in relation to social material in geography, namely two articles on population and trade between regions/countries (economic geography).

## 2. PjBL (Project Based Learning) learning method in teaching geography

The results of this study are presented in three tables to provide a clear picture of the PjBL (Project Based Learning) higher-order thinking learning model in relation to geography material.

| No | Use of Materials                             | Combination                   | Measured Variables | Analysis Findings                                                                                                                | Source (Author, Year) |
|----|----------------------------------------------|-------------------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| 1  | Distribution of Flora and Fauna in Indonesia | -                             | Learning Outcomes  | Project-based learning (PjBL) has been proven to improve student learning outcomes.                                              | (Zanah et al., 2024)  |
| 2  | Mapping                                      | Geographic Inquiry Activities | Spasial Thingking  | Geographical inquiry activities in project-based learning is most suitable used by the students with kinesthetic learning style. | (Oktavianto, 2022)    |

|   |                     |                    |                           |                                                                                                                                                                                              |                            |
|---|---------------------|--------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| 3 | Hydrologic Cycle    | 3D Diorama Media   | Creative Thinking Ability | The application of 3D Diorama media based on the Project Based Learning (PjBL) model has been proven to have a positive effect on improving students' creative thinking skills in geography. | (Putri, 2025)              |
| 4 | Indonesian culture  | Edmodo Application | Creative Thinking Ability | There is an influence of the PjBL learning model assisted by the Edmodo application on the creative thinking ability of students in geography.                                               | (Ika et al., 2024)         |
| 5 | Geosphere           | Canva              | Learning Activity         | PjBL has an effect on increasing learning activity.                                                                                                                                          | (Arita et al., 2024)       |
| 6 | Geomorphology       | STEM               | Critical Thinking Ability | PjBL based STEM has a significant influence on Critical Thinking Skills                                                                                                                      | (Jannah et al., 2023)      |
| 7 | Ecosystem           | Micrplearning      | HOTS                      | PjBL has a significant influence on HOTS                                                                                                                                                     | (Habibunnisa et al., 2024) |
| 8 | Political Geography | Case Method        | Critical Thinking Skills  | PjBL based Case Method has a significant influence on critical thinking                                                                                                                      | (Sugiharto et al., 2024a)  |
| 9 | Earth and Space     | -                  | Learning Outcomes         | Project-based learning (PjBL) has been proven to improve student learning outcomes.                                                                                                          | (Muljani, 2022)            |

Nine credible articles were found on the use of PjBL (Project Based Learning) in geography. In the nine articles, there were only two uses of social material in geography, or 22%, namely in the subjects of Political Geography and Indonesian Culture. The remaining 78% was used for environmental/physical material, including: Distribution of Flora and Fauna in Indonesia, mapping, Hydrologic Cycle, Geosphere, Geomorphology, Ecosystem, Earth and Space.

### 3. Discovery Learning Method in Geography Teaching

The results of this study are presented in tables to provide a clear picture of the Discovery Learning model of higher-order thinking in relation to geography material.

| No | Use of Materials            | Combination | Measured Variables | Analysis Findings                                                        | Source (Author, Year)     |
|----|-----------------------------|-------------|--------------------|--------------------------------------------------------------------------|---------------------------|
| 1  | Natural Disaster Mitigation | -           | Learning Outcomes  | Discovery Learning has been proven to improve student learning outcomes. | (Zulhendri & Anwar, 2020) |



|    |                         |                                   |                               |                                                                                                                     |                                  |
|----|-------------------------|-----------------------------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------|----------------------------------|
| 2  | Environmental pollution | Google Classroom and Zoom Efforts | Critical Thinking Ability     | Discovery Learning based Google Classroom and Zoom Efforts has a significant influence on Critical Thinking Skills. | (Amelia et al., 2021)            |
| 3  | Environmental pollution | Tri Hita Karana                   | Learning Outcomes             | Discovery Learning based Tri Hita Karana has been proven to improve student learning outcomes                       | (Astawa, 2022)                   |
| 4  | -                       | Activity learning                 | Learning Outcomes             | Discovery Learning has been proven to improve student learning outcomes.                                            | (Lestari et al., 2022)           |
| 5  | Lithosphere             | -                                 | Learning Outcomes             | Discovery Learning has been proven to improve student learning outcomes.                                            | (Zhiddiq et al., 2021)           |
| 6  | Maritime Axis           | -                                 | Spasial Thingking             | Discovery Learning has been proven to improve student Spasial Thingking.                                            | (Virgiawan et al., 2023)         |
| 7  | Mapping                 | Project Portfolio Instrument      | Learning Outcomes             | Discovery Learning based Project Portfolio Instrument has been proven to improve student learning outcomes          | (Oktavia et al., 2024)           |
| 8  | Environmental pollution | Media Articulate Storyline        | Critical Thinking Skills      | Discovery Learning based Media Articulate Storyline has a significant influence on critical thinking                | (Harapan, 2021)                  |
| 9  | Atmosphere              | Liveworksheets                    | Critical Thinking Skills      | Discovery Learning based Liveworksheets has a significant influence on critical thinking                            | (Armawati & Bigharta Bekt, 2025) |
| 10 | Atmosphere              | Media Maket                       | Critical Thinking Skills      | Discovery Learning based Media Maket has a significant influence on critical thinking                               | (Muftiana et al., 2025)          |
| 11 | Population Mobility     | Liveworksheets                    | Learning Outcomes             | Discovery Learning based Liveworksheets has been proven to improve student learning outcomes                        | (Sari & Asiyah, 2023)            |
| 12 | Atmosphere              | -                                 | Reduce Student Misconceptions | That there is an influence of Discovery Learning learning model in overcoming misconceptions that                   | (Indriana et al., 2021)          |



|    |             |   |                     |                                                                                                        |                  |
|----|-------------|---|---------------------|--------------------------------------------------------------------------------------------------------|------------------|
| 13 | Lithosphere | - | Motivation to learn | occur in atmospheric material<br>Discovery Learning has a significant influence on motivation to learn | (Tigwandi, 2021) |
|----|-------------|---|---------------------|--------------------------------------------------------------------------------------------------------|------------------|

Thirteen credible articles were found on the use of Discovery Learning in geography. In nine articles, there was only one use of social material in geography, or 7%, namely in the material on Population Mobility. The other 93% was used for environmental/physical material, including three each on Environmental Pollution and Atmosphere. Two articles covered Lithosphere. The remaining articles each covered one topic, namely Maritime Axis, Mapping, and Natural Disaster Mitigation.

#### 4. CBL (Case Based Learning) learning method in teaching geography

The results of this study are presented in tables to provide a clear picture of the CBL (Case Based Learning) higher-order thinking learning model in relation to geography material.

| No | Use of Materials                   | Combination        | Measured Variables       | Analysis Findings                                                                                        | Source (Author, Year)     |
|----|------------------------------------|--------------------|--------------------------|----------------------------------------------------------------------------------------------------------|---------------------------|
| 1  | Cultural and Political Geography   | Team-Based Project | Learning Outcomes        | Case-Based Learning (CBL) based Team-Based Project has been proven to improve student learning outcomes. | (Sugiharto et al., 2024b) |
| 2  | Environmental pollution            | -                  | HOTS                     | Case-Based Learning (CBL) has a significant influence on HOTS                                            | (Deswita, 2025)           |
| 3  | Basic Social and Cultural Sciences | Google site-based  | Critical Thinking Skills | Case-Based Learning (CBL) based Case Method has a significant influence on critical thinking             | (Asep, 2024)              |
| 4  | Geomorphology                      | -                  | Critical Thinking Skills | Case-Based Learning (CBL) has a significant influence on critical thinking                               | (Safitri et al., 2023)    |
| 5  | Geosphere                          | Canva              | Learning Activity        | PjBL has an effect on increasing learning activity.                                                      | (Arita et al., 2024)      |

Five credible articles were found on the use of PjBL (Project Based Learning) in geography. In the five articles, only two used social materials in geography, or 40%, namely in Cultural Geography. The other 60% were used for environmental/physical materials, including environmental pollution, geomorphology, and geosphere.

#### Discussion:

#### Advantages of the four learning models in geography

The Problem-Based Learning model places problem orientation at the early stages of learning by providing students with discourse on real-world problems, while the

guided inquiry model places problem orientation at the core of learning, where students ask questions and seek answers through investigation (Rahmawati et al., 2019). The Problem-Based Learning model places students at the center of learning through contextual problem solving related to real life, thereby encouraging critical thinking and collaboration in finding evidence-based solutions (Arbadilah et al., 2025). Problem-Based Learning is most widely used in teaching geography at the high school level. This proves that the very broad subject matter of geography, which is highly dynamic in everyday phenomena, can be used as the center of learning. Teachers can also contextualize these phenomena within the students' immediate environment to gain comprehensive understanding and direct impact.

In practice, teachers instruct students to study the meaning of problems, discuss them in groups, identify concrete examples, and complete cognitive and analytical tasks to deepen their understanding of the causes and effects of the phenomena being studied (Fadillah, 2023). This approach is in line with the objectives of Problem-Based Learning to help students acquire new knowledge, develop independent learning strategies, respond to critical and analytical thinking, and improve problem-solving skills through teamwork (Putra & Masruri, 2019).

In addition, another learning model, namely Project Based Learning, has also proven to be effective in the application of geography learning. Project Based Learning is more effective in improving geography learning outcomes compared to the Problem Based Learning, Inquiry, and Discovery methods (Meo & Masruri, 2018; Nawalinsi, 2016). Statistical analysis shows that the Project Based Learning method has the most significant impact on improving student learning outcomes because students show

higher enthusiasm, deeper interest, and active involvement in project creation and group presentations (Nawalinsi, 2016).

In Project-Based Learning, various cognitive, psychomotor, and affective domains of students are developed in a very structured manner. Project-Based Learning requires students to produce a product that is expected to answer challenges or become a solution to the geosphere phenomena being studied. Project-Based Learning responds more to answers to students' environmental problems (Jannah et al., 2023). In group teams, students are able to work independently and collaborate by responding to cognitive, psychomotor, and affective aspects in the creation of a product (Ika et al., 2024). Students who learn to produce products increase their usefulness and have a direct impact in responding to challenges and providing solutions in their living environment.

Discovery learning has the key advantage of encouraging students to actively discover geographical concepts and principles through exploration, observation, and analysis (Indriana et al., 2021). In the context of geography, this approach is highly relevant because the learning material is closely related to natural and social phenomena that can be observed directly or through spatial data such as maps, satellite images, and graphs. Using satellite imagery, students can distinguish between urban and suburban areas. Through discovery learning, students not only receive information passively, but are trained to ask questions, identify spatial patterns, and draw conclusions based on evidence. This contributes to strengthening critical thinking, problem solving, and spatial literacy skills, which are core competencies in geography learning (Armawati & Bigharta Bekti, 2025).

Another advantage is the ability of discovery learning to improve the connection between geographical concepts and the daily

lives of students. The discovery process, which starts from contextual issues such as natural disasters, climate change, or regional dynamics, makes learning more meaningful and applicable. Students are encouraged to understand the cause-and-effect relationships between geosphere phenomena and human activities, thereby forming a holistic and integrative understanding. In addition, this model also supports the development of scientific attitudes, curiosity, and independent learning, which are important for shaping students as lifelong learners in the field of geography (Harapan, 2021).

The key advantage of CBL (Case-Based Learning), or the case-based method, is its ability to connect geographic concepts to real-world problems occurring in the local environment, regionally, and globally. By presenting actual cases such as natural disasters, land use conflicts, regional inequality, or environmental change, students are trained to analyze geographic phenomena comprehensively based on data and facts. This approach encourages students to integrate the physical and social aspects of geography, ensuring a holistic understanding, not a partial one. Furthermore, CBL helps develop critical thinking, analytical skills, and spatial decision-making, which are crucial in geographic studies (Deswita, 2025).

Another advantage of CBL learning in geography is its ability to foster students' communication, collaboration, and reflective attitudes. Group case discussions encourage students to present arguments, defend opinions based on spatial data, and appreciate differing perspectives. This process not only strengthens conceptual understanding but also develops social and professional skills relevant to the needs of the 21st century. Thus, geography learning through the case-based method becomes more contextual, participatory, and meaningful, while also

preparing students to face complex spatial problems in real life (Sugiharto et al., 2024b).

### **Strategy for using higher order thinking learning models in the application of material in geography**

The strategy of using Problem-Based Learning (PBL) in geography instruction emphasizes the presentation of real-world problems related to geospheric phenomena and human life, such as urban flooding, coastal environmental degradation, or conflicts over land use. The teacher acts as a facilitator, guiding students to identify problems, formulate questions, collect spatial data, and analyze cause-and-effect relationships between geographic phenomena. Through PBL, students are trained to think critically and systematically, and are able to apply physical and social geography concepts in everyday contexts.

Project-Based Learning (PjBL) and Discovery Learning models can be strategically applied to strengthen process skills and conceptual understanding of geography. In PjBL, students are directed to produce tangible products, such as thematic maps, regional study reports, disaster mitigation videos, or mini-research projects on the local environment. These projects encourage collaboration, creativity, and geospatial literacy skills. Meanwhile, Discovery Learning positions students as concept inventors through observation, data processing, and independent conclusion-making, for example, in understanding patterns of population distribution, climate, or landscapes. This strategy is effective in fostering curiosity and a deeper understanding of basic geographic concepts.

Case-Based Learning (CBL) is used by presenting actual and contextual case studies, such as those related to disaster-prone areas, urban sprawl, or land-use change. Students

analyze the cases based on spatial data, regional policies, and the resulting socio-environmental impacts, then formulate alternative solutions. This strategy is highly relevant for integrating aspects of physical and human geography, while simultaneously fostering higher-order thinking (HOTS) and decision-making skills. By combining PBL, PjBL, Discovery Learning, and CBL in a balanced manner, geography learning becomes more meaningful, contextual, and oriented toward developing 21st-century competencies.

## CONCLUSION

Based on the discussion above, it can be concluded that the application of Problem Based Learning (PBL), Project Based Learning (PjBL), Discovery Learning, and Case Based Learning (CBL) learning models in geography learning is an effective strategy to improve the quality of the learning process and outcomes. These four models encourage students to actively build knowledge through problem solving, concept discovery, project development, and analysis of real cases relevant to physical and social geographic phenomena. In addition, the use of these learning models can develop higher-order thinking skills (HOTS), spatial literacy, analytical skills, collaboration, and data-based decision-making. Students not only understand concepts theoretically but are also able to relate them to environmental conditions and problems in the surrounding area, so that geography learning becomes more contextual and meaningful. Thus, combining PBL, PjBL, Discovery Learning, and CBL in a planned and proportional manner according to the characteristics of the material and learning objectives is very important to realize geography learning that is innovative, participatory, and relevant to the challenges of the 21st century. This strategy supports the formation of students who are critical, care about the environment, and are able to play an

active role in solving spatial and regional problems.

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