

# Implementation of the Discovery Learning Model in Geography Learning in High School and its Implication for Student Critical Thinking Skills

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**Abstract.** This research conducted aims to analyze student's critical thinking skills as an implication of the application of the discovery learning model in geography learning. in this regard, the research was designed as experimental research using SMA Negeri 1 Baturiti as research location. The samples of this research were randomly selected from the same class. Data collection uses observation and test method. The implication of applying the discovery learning model in geography learning on student's critical thinking skills were analyzed using the F test. The result of this research shows that the discovery learning model in geography learning has an implication for student's critical thinking skills between the experimental class and the control class with a value of  $F=86.899$  ( $p < 0.05$ ).

**Keywords:** Discovery Learning Model, Critical Thinking Skills, Geography Learning.

## 1 Introduction

The Merdeka curriculum emphasizes a student-focused approach, with teachers serving as guides in the learning process. This system produces students who have creativity, productivity, innovation, effectiveness and good integration. This curriculum also focuses on Higher Order Thinking Skills (HOTS), including critical thinking skills, which include argument analysis, making conclusions, applying inductive or deductive reasoning, evaluation, and decision making or problem solving. What is demanded in the Merdeka Curriculum cannot be separated from the demands of 21st century learning. Learning and Innovation Skills-4Cs proclaimed in 21st Century learning by UNESCO.

Critical thinking is related to high-level cognitive thinking such as analyzing, evaluating, and creating (Zubaidah et al., 2015)<sup>[1]</sup>. Herlinda (in Prameswari. Et al, 2018)<sup>[2]</sup> stated that critical thinking is thinking that uses one's mind to solve a problem by first understanding the problem, expressing opinions or arguments clearly and being able to draw conclusions from existing problems. In line with that, Saputra (2020)<sup>[3]</sup> also explains that critical thinking is an organized process in solving problems that involves mental activity which includes the ability to formulate problems, provide arguments or opinions, carry out evaluations, and make decisions. Referring to this opinion, it shows that critical thinking skills are thinking skills that involve high-level cognitive processes that invite students to think according to their abilities or think reflectively on problems that include the domains of analyzing, evaluating and creating.

The 2018 Program for International Student Assessment (PISA) report states that Indonesia is in 74th place with an average score of 371 and in PISA 2022, it has experienced an increase of around 5 to 6 positions compared to PISA 2018. This increase is the highest achievement in terms of ranking (percentile) in Indonesia's history following PISA. However, the Ministry of Education and Culture recognizes the importance of this issue and is conducting evaluations and trying to improve educational standards to overcome the obstacles of the 21st Century. PISA is a program initiated by member countries of the Organization for Economic Co-operation and Development or what is known as the Organization for Economic Co-operation and Development (OECD) to support countries in developing a competent workforce according to global norms. Indonesia is trying to improve education standards by improving the curriculum, including implementing the Merdeka curriculum to prepare the young generation who can compete at the international level.

The development of critical thinking and effective problem solving skills is very important for students, because it will encourage students to improve skills with higher levels of concentration, deeper analytical skills, and better thought processing. Apart from that, solutions to international problems, such as environmental damage, global warming, as stated by Sari, et al (2019) <sup>[4]</sup> also require critical thinking and very advanced problem solving skills. Critical Thinking Skills can be formed through optimal efforts by requiring interactive classes. In this case, students are seen as thinkers, not those being taught, while teachers act as mediators, facilitators and motivators who help students learn rather than teach (Nuryanti., et al. 2021) <sup>[5]</sup>.

Critical thinking skills must be applied to all subjects at school, including geography as one of the subject at high school level. Geography is a science that studies all human and natural activities and interaction between the two through a spatial perspective until certain spatial patterns are formed. The holistic understanding of this phenomenon can create conceptual insights, thought patterns and applicative abilities that are unique to space to be applied in various fields of work. Teaching geography functions to develop the ability of prospective citizens and future citizens to think critically about life problems that occur around them and train them to respond quickly to environmental conditions and life on the surface of the earth in general (Sumatmadja, 2006) <sup>[6]</sup> Geography lessons require critical thinking skills in solving everyday life problems. In this regard, to maximize critical thinking skills in geography learning, it is necessary to involve students in understanding harmony with what exists in society to achieve learning objectives so that in the learning process efforts are made so that students can do more analysis.

Referring to this idea, it can be stated that geographical learning requires critical thinking to obtain and process information appropriately from various sources. If a student does not have critical thinking skills, they are unable to process, evaluate and search for the information needed to face environmental challenges. This is in line with what Fisher stated. (2014) <sup>[7]</sup> that critical thinking and problem solving skills are important in all subjects, including geography.

The reality revealed in a number of studies is that students' critical thinking skills in geography learning are considered to have not been developed. Nihayah (2015) <sup>[8]</sup> stated that

in geography learning at MA Nahdlatul Syubban Jepara, teachers only offer learning to students through the lecture method, thus making students passive during the teaching and learning process. Hindriyanto's (2019) <sup>[9]</sup> research results reveal that students' learning abilities in analyzing geography learning problems are still weak. So far, geography learning is still text-based, meaning that students simply memorize and know geographic phenomena through books. Learning mainly consists of memorizing concepts that cannot be implemented in everyday life. Teachers play a more important role in the learning process in providing material, while students only receive explanations from the teacher without being involved in the learning process. This results in students being unable to think critically and participate actively in learning activities, so that geography learning objectives cannot be achieved. Hadi (2020) <sup>[10]</sup> stated that teachers' implementation of geography learning tends to use conventional methods. The teacher's role in this case is only to convey the material, while the students only listen without providing more information about the lesson. Critical thinking is one of the goals of education that requires continuous practice to improve students' skills in thinking critically and making rational decisions about what to do (Fisher, 2014) <sup>[7]</sup>. In this regard, to build students' Critical Thinking Skills in learning, teachers must continue to train students and develop them. This can be done by involving students to search, read from various relevant sources, process information, conclude, consider cases, transfer new ideas, explore implementation and consequences (Paul & Elder, 2007) <sup>[11]</sup>. The development of critical thinking skills in learning can be focused through three processes, as follows: (1) Think, namely communicating and critically examining a phenomenon and contextual problems so that identification can be carried out, (2) Heart, namely internalizing how productive students are in analyzing, understanding and evaluating contextual phenomena and problems during the interaction process between students and their learning environment so that the causes of problems can be understood, and (3) Conation, namely the tendency to act/act to provide solutions to contextual problems individually, collaboratively, critically and creatively (Astawa, 2024) <sup>[12]</sup>. Being aware of the problems and learning conditions that can be applied, a learning model is needed that can encourage students to come to conclusions through their own observations which teachers can implement as connectivism in geography learning. The learning model that can be implemented is the Discovery Learning Model. Balim (2009) <sup>[13]</sup> revealed that Discovery Learning is learning that encourages students to come to conclusions based on their own activities and observations. In line with that, Hammer (1997) <sup>[14]</sup> also states that Discovery Learning is a learning process that encourages students to come to a conclusion based on their own activities and observations.

Discovery learning as a learning model will apply inquiry-based instruction which can encourage students to investigate for themselves, build on past experiences and knowledge, use intuition, imagination, creativity, search for new information to find facts, correlation and new truth. Learning in this case is not the same as absorbing what is said or read, but students will learn to actively seek answers and solutions themselves. Discovery learning can be designed with experiential and interactive activities. Experiential means that educators are able to activate students to build their knowledge and skills as well as values

and attitudes through direct experience. In this case, educators can use stories, games, visual aids and interesting techniques to provoke participants' curiosity. Apart from that, educators also direct students in new ways of thinking, acting and reflecting.

Techniques for applying the discovery learning model can vary, but the goal is always the same for students, namely to be able to achieve the final result through direct experience and an independent learning process. The Discovery Learning Model in this research is used to teach material on Village and City Spatial Patterns (Class However, on this occasion the material only focused on the structure and spatial patterns of villages. Learning is carried out in groups (three groups) by conducting direct field observations. Independently, students are also given relevant things, in the form of reading materials, videos and certain simulations.

## 2 Research Method

This research was designed as quasi-experimental research. This experiment is considered the most suitable for use in research in the field of education because it involves a sample of students whose participants cannot be taken randomly considering that the students are in one particular class. The quasi-experimental design used is in the form of a Non-Equivalent Post-Test Only Control Group Design.

Nonequivalent Posttest-Only Control Group Design

E	X	Q <sub>1</sub>
K	–	Q <sub>2</sub>

Source: Sugiyono, 2014 <sup>[15]</sup>

Information.

E : Experimental Group

K : Control Group

X : Given treatment with the Discovery Learning Model

- : No treatment given

Q<sub>1</sub> : Post-test results for the Experimental Group

Q<sub>2</sub> : Post-test results for the Control Group

The experiment was carried out at SMA Negeri 1 Baturiti which is located on Jl. Peraan, Peraan, District. Baturiti, Kab. Tabanan Province Bali. Considerations for taking place in conducting this experiment include: The school has implemented the Merdeka Curriculum, Facilities and Infrastructure are adequate and able to support learning, The population and sample size are appropriate. Apart from that, geography learning at SMA N 1 Baturiti has never implemented the discovery learning model. The research object only examines critical thinking skills as an implication of implementing the Discovery learning model in geography learning. Judging from the subject, this research only involved geography teachers (1 person) and class XII IPS students at SMA N 1 Baturiti (3 classes with 109 students). This research sample consisted of two classes (Experimental Group

Class XII IPS 3/37 students and Control Group Class XII IPS 1/35 students) using a simple random sampling technique after first carrying out an equality test.

Collecting data in this research use the experimental group used observation sheets with indicators according to the syntax. The measurement uses a Likert Scale with a score range of 1-4 which is then standardized to a value of 100. The validity of the instrument uses expert judges which is analyzed using Gregory (2000)<sup>[16]</sup> model with results of 0.80-1.00 (very high) and the reliability of the instrument uses Cronbach's Alpha (Azwar, 2016<sup>[17]</sup>).

### 3 Result and Discussion

#### 3.1 Application of the Discovery Learning Model in Geography Learning

The application of the Discovery Learning Model in learning was carried out in the odd semester of the 2022/2023 academic year with the main topic being Village Structure and Spatial Patterns. Before implementation, teachers received special direction in implementing the Discovery Learning Model in geography learning. This material is relevant to the existence of SMA Negeri 1 Baturiti which is located in a rural area. The values obtained from the observations made can be seen in Table 1.

**Table 1.** The Score of Applying the Discovery Learning Model in Learning

No.	Learning Activities	Observation Aspect	Interpretation Scores	
			Score	Criteria
(1)	(2)	(3)	(4)	(5)
1.	Learning Preparation	Learning Planning	89	Very good
2.	Preliminary Learning Activities	Preparation of Teaching and Learning Activities	86,5	Very good
3.	Core Learning Activities	Mean	84.67	Very good
		<i>Stimulation</i>	89	Very good
		<i>Problem Statement</i>	85	Very good
		<i>Data Collection</i>	78	Good
		<i>Data Processing</i>	82	Good
		<i>Verification</i>	89	Very good
4.	Activities close learning	Mean	85	Very good
		Conclude and reflect	88	Very good
		Evaluation	87	Very good
		Enrichment	80	Good
		Closing learning	85	Very good
<b>Mean Total</b>			<b>86,88</b>	<b>Very good</b>

**Source:** Results of primary data processing

Table 1 shows that the teacher's application of the Discovery Learning model in geography learning is categorized as 'very good'. However, if you look at a number of aspects observed, there are three aspects that are categorized as 'good' criteria. This means that there are still things that need to be perfected in implementing the Discovery Learning model in geography learning. The value achieved cannot be separated from the teacher's ability to design and implement the design.

Teachers in preparing learning plans have paid attention to the flow to outline Learning Outcomes (learning competencies that students must achieve in each phase) into operational and concrete learning objectives. The formulation of learning objectives includes competency and scope of material. These learning objectives are then sequenced into a flow of learning objectives as a series of learning objectives that are arranged logically according to the learning sequence from the beginning to the end of a phase.

Implementing the plans that have been prepared, the teacher begins by opening the lesson, which is then continued with the core learning activities. In the Stimulation stage, the teacher provides learning stimulation through video shows related to village spatial structures and patterns, which is then continued by asking students about components related to analyzing spatial structures and patterns. Then each group (there were 3 groups) that had been formed was asked a number of questions that addressed the structure and spatial pattern of the village in question. At the Problem Statement stage, the teacher provides the opportunity for each group to discuss in an effort to identify problems which are then used as questions to find answers regarding the arrangement and arrangement of space that reflects the function, activities and interactions of the village community, both influenced by natural factors and social as well as the arrangement and use of space (land) for certain purposes.

In the Data Collection stage, the teacher distributes the Bangli Baturiti Tabanan Village Area Map to each group. Students are asked to analyze the map to find information from the questions that have been prepared previously. Based on this information, the activity continues to the Data Processing stage to process and analyze the information obtained in order to determine the structure and spatial pattern of Bangli Village. However, unfortunately, topographic maps are not included, so the morphology of the area is difficult to analyze and nearest neighbor analysis cannot be carried out.

At the Verification stage, the results of the processing and analysis carried out are then confirmed and carefully examined. Next, each group can connect with the initial question, so that the answers can explain the spatial structure and arrangement in Bangli Village which reflects the functions, activities and interactions of the village community, both influenced by natural and social factors as a basis for determining the Spatial Structure of Bangli Village and explains the arrangement and use of space (land) in Bangli Village for certain purposes. In the Generalization stage, each group presents the conclusions they have produced. Spatially, Bangli Village is an agricultural village phenomenon with wetland rice farming activities in the southern part (relatively flat physiographic area) and plantations in the northern part (more complex physiographic area). The village settlement pattern is centered on banjar centers with long roads. Scattered settlements are only found in the upper area with a complex physiographic area.

In closing, the teacher and students summarize the learning that has been done and reflect. Evaluation is carried out only with regard to students' understanding of the structure and spatial patterns of the village. Before the lesson closes, students are given enrichment by pointing out a number of references that can be used.

### 3.2 Student's Critical Thinking Skills

Student's critical thinking skills are measured through a HOTS-based multiple choice test with 25 questions. In general, the average score of student's critical thinking skills with the application of dicoverly learning model in geography learning is within the good criteria. Table 02 shows a comparison of students' Critical Thinking Skills scores between the experimental group that applied and the control group that did not apply the Discovery Learning Model in geography learning.

**Table 2.** Students' Critical Thinking Skills in Experimental Groups and Control Group

No.	Interval	Criteria	Critical Thinking Skills			
			Experimental Groups		Control Group	
			N	%	N	%
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1.	84 – 100	Very good	5	13,51	1	2,86
2.	68 – 83	Good	11	29,73	3	8,57
3.	52 – 67	Enough	17	45,95	23	65,72
4.	36 – 51	Not enough	4	10,81	6	17,14
5.	20 – 35	Very less	0	0	2	5,71
<b>Total</b>			<b>37</b>	<b>100,00</b>	<b>35</b>	<b>100,00</b>
Highest Score			98		95	
Lowest Score			50		35	
Mean			72,19		62,20	
Range			48		50	
Standard Deviation			9,64		9,10	

Source: Results of primary data processing

Table 2 shows that there is a difference in the average Critical Thinking Skills of students between the experimental group and the control group. The experimental group was in the 'good' criteria, while the control group was in the 'fair' criteria. The highest and lowest values also show that the experimental group is higher than the control group. The proportion of students' Critical Thinking Skills scores that were in the 'very good and good' criteria in the experimental group was also higher than in the control group. However, if we look at the standard deviation, the control group is smaller, which means that the variation in the Critical Thinking Skills scores of students in the control group is more even than in the experimental group.

The results presented indicate that the application of the Discovery Learning Model in geography learning has been able to develop students' Critical Thinking Skills. However, this implication needs to be proven through statistical analysis, which in this case uses one-way analysis of variance (F test). Prerequisite tests for data analysis showed that the data was normally distributed ( $0.077 > 0.050/\text{klp. Experiment}$  and  $0.054 > 0.050/\text{klp. Control}$ ) and homogeneous ( $0.072 > 0.05/\text{klp. Experiment}$  and  $0.085 > 0.05 \text{ klp. Control}$ ).

The proof of this difference is significant, so it can be stated that the application of the Discovery Learning Model in geography learning has positive implications for developing students' critical thinking skills.

#### 4 Conclusion

In closing, it can be concluded that: (1) The Discovery Learning Model can be applied in geography learning by geography teachers at SMA Negeri 1 Baturiti Tabanan with 'very good' criteria, and (2) The Discovery Learning Model has significant implications for students' critical thinking skills by There is a significant difference in students' critical thinking skills between the experimental class and the control class, F value = 86.899 ( $p < 0.05$ ). Looking at the process during the research, it is important to develop connectivism in an educator through training in implementing learning models that create interactive, student-centered and meaningful learning.

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