IMPLEMENTATION OF CASE-BASED LEARNING TO IMPROVE STUDENTS' HIGHER-ORDER THINKING SKILLS (HOTS) AT SMAN 1 PARIANGAN

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ABSTRACT

Low student motivation in learning, minimal student understanding of HOTS questions and lack of student learning outcomes for learning geography. Geography learning tends to be boring and meaningless, so learning objectives are not achieved. The weakness in geography learning is inadequate and monotonous learning models. Lecture-based learning models are often said to be less effective in geography learning. The study aimed to determine students' HOTS abilities after applying the case-based learning model to geography subjects at SMAN 1 Pariangan. Quantitative research type using experimental methods—Pre-test - Post-test control group design research design. The research population was all students of class XI geography Phase F SMAN 1 Pariangan 2024/2025 with 127 students. The research sample was class XI Geography 2 and class XI Geography 3 at SMAN 1 Pariangan. The sampling technique was purposive sampling. The sample in this study selected two classes, of which 1 class was used as an experimental class, namely XI Geo two and XI Geo three as the control group *Data collection techniques were observation, documentation and testing. The research instrument is an objective test question sheet (case study) with assessment according to the criteria of the higher order thinking skills (HOTS) category such as analyzing, evaluating, creating, thinking critically and solving problems.The data obtained from this study were analyzed with the help of IBM SPSS 30 for the T and N-gain tests. The results of this study obtained a Pre-test Experiment score of 51.17, Post-Test results of 82.77, while the control class had a Pre-Test score of 49.29 and a Post-test of 69.97. There was a significant increase in the Pre-Test and Post-Test of the Experimental Class. This shows that the application of Case Based Learning has a positive effect on improving students' high-level thinking skills (HOTS) in geography subjects at SMAN 1 Pariangan, which can be seen from the learning outcomes and learning activities of students.Keywords: Case Based Learning, Higher Order Thinking Skills (HOTS),Environmental Problems Material,Quality Education, Geografi Learning.*

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ABSTRAK

Rendahnya motivasi siswa dalam belajar, minimnya pemahaman siswa terhadap soal-soal HOTS dan kurangnya hasil belajar siswa untuk belajar geografi.

Pembelajaran geografi yang cenderung membosankan dan tidak bermakna, sehingga tujuan pembelajaran tidak tercapai. Kelemahan dalam pembelajaran geografi adalah penggunaan model pembelajaran yang tidak memadai dan monoton. Model pembelajaran berbasis ceramah yang sering kali dikatakan kurang efektif dalam pembelajaran geografi. Tujuan penelitian untuk mengetahui kemampuan HOTS siswa setelah diterapkannya model pembelajaran *case base learning* pada mata pelajaran geografi di SMAN 1 Pariangan. Jenis penelitian kuantitatif dengan menggunkan metode eksperimen. Desain penelitian pre test - Post-test control grup design. Populasi penelitian seluruh peserta didik kelas XI geografi Fase F SMAN 1 Pariangan 2024/2025 dengan 127 siswa. Sampel penelitian kelas XI Geografi 2 dan kelas XI Geografi 3 di SMAN 1 Pariangan.. Teknik pengambilan sampel yang digunakan adalah purposive sampling. Sampel dalam penelitian ini dipilih sebanyak dua kelas, yang mana 1 kelas dijadikan sebagai kelas eksperimen yaitu XI geo 2 dan XI geo 3 sebagai kelas kontrol.. Teknik pengumpulan data obsevasi, dokumentasi dan tes. Instrumen penelitian lembar soal tes berbentuk objektif (studi kasus) dengan penilaian sesuai kriteria kategori kemampuan higher order thinking skills (HOTS) seperti menganalisis, mengevaluasi, mencipta, berpikir kritis dan memecahkan masalah.Data yang diperoleh dari penelitian ini dianalisis dengan bantuan IBM SPSS 30 untuk uji T dan N-gain. Hasil Penelitian ini mendapatkan nilai Pre-test Eksperimen 51,17 hasil Post-Test 82,77 Sedangkan kelas kontrol memiliki nilai Pre-Test 49,29 dan Post test 69,97. Terjadinya kenaikan signifikan terhadap Pre-Test dan Postest Kelas Eksperimen. Hal Ini menunjukan bahwa penerapan *Case Based learning* berpengaruh positif dalam meningkatkan kemampuan berpikir tingkat tinggi (HOTS) siswa pada mata pelajaran geografi di SMAN 1 Pariangan dapat dilihat dari hasil belajar dan aktivitas belajar siswa.

Kata Kunci: *Case Based Learning,Higher Order Thinking Skills* (HOTS), Permasalahan Lingkungan, Kualitas Belajar, Pembelajaran Geografi

A. Introduction

One of the main pillars in preparing for the future is education, which always focuses on preparing students to succeed. Therefore, developing educational facilities is one of the essential factors to ensure a future full of opportunities and challenges. For humans

Education is a vital necessity. Through effective education, society can become independent by finding solutions to its everyday problems. Education enables individuals to achieve their maximum potential. Given the importance of education in the 21st century, society needs to develop quality human resources, a strong sense of self-esteem, the ability to work, creativity, effective communication skills, and a commitment to lifelong learning (Nursito, 2000.

The quality of education is the primary focus in efforts to enhance human resource development. Quality education can be achieved through various means, including formal and informal education, as well as improvements in the learning

process. Equal and adequate access to education is also essential. High-quality education emphasizes the establishment of clear standards and the processes required to achieve them. These standards involve careful planning, monitoring, and continuous improvement throughout the entire educational system (Hartini et al., 2025)Education is the foundation of a nation, and practical education will produce citizens who contribute to its longevity. As stated in Article 3 of the 2003 Law Number 20 on National Education, skills, character, and civilization are essential for educating the nation, fostering personality, and developing individuals who are healthy, knowledgeable, capable, creative, independent, democratic, and responsible. One of the primary functions of education is to transfer knowledge from one generation to the next. However, due to the complexity of human nature, education today cannot fully explain or present learning materials in their entirety (Munandar & A. Rahman, 2022).

Learning can be defined as the process of teaching students or facilitating their learning. The goal is to help students engage with their environment, design activities, and create learning experiences that enable them to initiate, experience, and apply knowledge. Ultimately, students will develop knowledge, attitudes, and skills in this context, allowing them to actively participate in the learning process. Student learning activities involve both physical and mental engagement (Humaira, 2020

Higher Order Thinking Skill (HOTS) is a way of thinking that is higher than memorizing or retelling what others have told. Implementing HOTS in the independent curriculum aims to improve critical thinking skills, creative thinking, arguing, constructing explanations, and making decisions in complex situations (Rukminingsih et al., 2023).. According to Nofrion, et.al (2018) HOTS learning is characterized by; 1) Analysis, Evaluation and Creation, 2) Logistic Reasoning, 3) Consideration and Critical Thinking, 4) Problem Solving and Creative Thinking In its study, HOTS applies Bloom's taxonomy, namely C1 (Knowledge), C2 (Comprehension), C3 (Application), C4 (Analysis), C6 (Evaluation) In its study, HOTS applies Bloom's taxonomy, namely C1 (Knowledge), C2 (Comprehension), C3 (Application), C4 (Analysis), and C6 (Evaluation) (Karimaliana et al., 2024). Higher-order thinking skills (HOTS) are those at the Bloom taxonomy level in the cognitive domain, which ranges from C4 to C6. At levels C4-C6, students must be able to analyze, evaluate, and create. However, in reality, today, students still lack in several things, including conducting investigations, using media and procedures, understanding complex information, theory, analysis, and problem-solving. So, it is necessary to implement HOTS by fulfilling several indicators, which include problem-solving, critical

thinking, creativity, the ability to detect problems, obtain and evaluate relevant information, and then choose and implement solutions by problem-solving. Implementing HOTS aims to improve critical thinking skills, improve students' thinking patterns for problem-solving, and enable them to make decisions in complex situations.

It is expected that the implementation of HOTS-based learning in schools, especially in geography subjects, is currently adjusted to 21st-century learning, namely being able to improve abilities, skills or abilities, and attitudes that students must achieve as a result of the planned learning process. However, the reality is based on observations at SMAN 1 Pariangan, which is located on JL. Ujung Ganting, Jorong, Simabur, Kec. Pariangan, Tanah Datar Regency, West Sumatra, where geography learning still requires special attention due to students' low motivation, minimal understanding of HOTS questions and lack of student learning outcomes for learning geography. Geography learning tends to be boring and meaningless, so learning objectives are not achieved. The weakness in geography learning is inadequate and monotonous learning models. The lecture-based learning model is often said to be less effective in geography learning (Wahyuni, 2024). If this continues to be implemented, the school's geography learning objectives will not be achieved. Moreover, in the 21st century, understanding HOTS questions is very much needed to improve critical thinking skills, creative thinking, and problem-solving problems in everyday life. I propose a solution to overcome this by implementing the Case Based Learning (CBL) learning model in geography learning at SMAN 1 Pariangan. Daryanto (2014) said that problem-based learning is a learning approach that presents contextual problems to stimulate students to learn. Meanwhile, (Tan, 2003; Rusman, 2017) stated that problem-based learning is an innovation in learning because, in problem-based learning, students' thinking skills are genuinely optimized through a systematic group or teamwork process so that students can empower, hone, test, and develop their thinking skills continuously. This case-based learning (CBL) model has several advantages: (1) Students can express cases or issues and use cases they connect to new situations. (2) Students can develop analysis, collaboration, and communication skills. (3) Students are more involved in the learning process. (4) With case-based learning, students can develop group learning, speaking, and critical thinking skills (Trianto, 2011). By using the Case Based Learning (CBL) learning model, students will easily use their basic skills or generic science skills in solving or solving cases given by educators about petroleum material in the learning process through group discussions according to the steps of the Case Based Learning (CBL) model, as well as students'

understanding of the concept of learning material will be maximized which is marked by students' activeness in solving cases through group discussions, where the teacher only functions as a facilitator and moderator in the discussion process so that students freely and freely develop their abilities in solving factual cases presented by educators (Dewi, 2015). So the Case Based Learning (CBL) model emphasizes that an educator, in carrying out teaching, must bring up activities, namely focusing teaching on the relationship between facts and providing new understanding to students, encouraging students to analyze, interpret, and practice the information obtained and encouraging students to exchange ideas with other students (Trianto, 2011)

This theory is proven by (al., 2020), which states that the form of learning in the 21st century can be implemented through the application of the Case Based Learning Model because critical thinking skills in geography learning are an essential ability that students must possess because they are related to the ability to assess a phenomenon spatially. Critical thinking skills are one of the important points that must be achieved in geography learning so that students can see, analyze and then describe existing phenomena.

Based on the description above, the researcher is interested in conducting research on "Implementation of Case-Based Learning to Improve Students' Higher Order Thinking Skills (Hots) at SMAN 1 Pariangan" to increase students' knowledge so that material about Environmental Problems can be conveyed well and enjoyably.

B. Research Methods

This research approach uses a quantitative approach and an experimental method. The design of this study uses a pre-test-post-test control group design. The population of this study was all students of class XI Geography Phase F SMAN 1 Pariangan 2024/2025, with 127 students. The sampling in this study was class XI Geography 2 and class XI Geography 3 at SMAN 1 Pariangan. The sampling technique was purposive sampling. The sample in this study selected two classes, of which 1 class was used as an experimental class, namely XI Geo two and XI Geo three as the control group *Data collection techniques were observation, documentation and testing.* Data collection techniques were observation, documentation and testing. The data obtained from this study were analyzed with the help of IBM SPSS 30 for the T and N-gain tests.

C. Results and Discussion

Results

Hypothesis Test

1. N-gain Tes

The N-Gain test was conducted to provide a general overview of the increase in learning outcomes between before and after learning in

the class. The gain test was conducted on the pretest and posttest of the experimental class. In this study, the researcher processed the data using SPSS 27.

Table 1. Experiment Class Pretest Posttest N-gain Test

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
NGain_Score	35	,14	1,00	,6532	,22901
NGain_Persen	35	14,29	100,00	65,3210	22,90088
Valid N (listwise)	35				

Based on the table above, the average NGain score is 0.6335. In the range of score values 0.6532, it is in the medium value category, which means its effectiveness is moderate. Then, for NGain per cent, the average value obtained is 65.32. This value in the category of effectiveness interpretation in the form of a percentage is in the range of 56-75, which means that the use of a method or a treatment is quite effective.

Table 2. N-Gain Test of Control Class and Experimental Classes

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
NGain_Score	69	-,50	1,00	,5672	,31206
NGain_Persen	69	-50,00	100,00	56,7207	31,20570
Valid N (listwise)	69				

Meanwhile, the pretest and posttest values of the experimental class and control class show that the average NGain score is 0.5672. The range of score values 0.5672 is in the medium value category, meaning its effectiveness is moderate. Then, for the main percentage, the average value obtained is 56.72; this value in the category of effectiveness interpretation in the form of a percentage is in the range of 56-75, which means that the use of a method or a treatment is quite effective.

2. T Test

Hypothesis testing is carried out after normality and homogeneity tests are conducted. Hypothesis testing can be used. This study hypothesises that applying the Case Based Learning learning model affects students' higher-order thinking (HOTS) at SMAN 1 Pariangan. The hypothesis test used in this study is a parametric statistical test, namely the Paired Sample T-test on the IBM

SPSS 27 application. It compares the average of 2 related/paired groups with both samples receiving two treatments. The following are the results obtained from the Paired Sample T-test

Table 3. Experimental Class T Test

Paired Samples Test

		Paired Differences					t	df	Significance	
					95% Confidence Interval of the Difference					
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			One-Sided p	Two-Sided p
Pair 1	Preeks - PostEks	-31,743	13,066	2,209	-36,231	-27,254	-14,372	34	,000	-31,743

Table 4. Experimental Class T-Test Statistics

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PretesEks	51,20	35	12,333	2,085
	PosttestEks	82,94	35	11,125	1,880

Ha: The average score of students using the Case Based Learning (CBL) learning outcome test is higher than that of students using other models.

Ho: There is no difference in the average score of the learning outcome test of students using the Case Based Learning (CBL) learning model

The basis for decision-making is based on the calculated t value with the t table

If t table > t count, then Ho is accepted and Ha is rejected.

If t table < t count, then Ho is rejected, and Ha is accepted.

Based on the table about the t-test (paired sample t-test) above shows a significant difference between the results before and after the Case Based Learning (CBL) learning model. To see the t-table value is based on the level of significance.

If the significance> 0.05, then Ho is accepted.

If the significance < 0.05, then Ho is rejected.

Based on the table, it shows that the significance is 0.000 < 0.05. Ho is rejected, and Ha is accepted, meaning that the hypothesis states that there is a significant difference before and after implementing the Case Based Learning model in improving students' higher-order

thinking Skills (HOTS) in Pariangan 1 High School.

Table 5. T-test of Control Posttest and Experiment Posttest

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Nilai	Equal variances assumed	,536	,466	-4,409	67	,000	-12,590	2,856	-18,290	-6,890
	Equal variances not assumed			-4,401	65,509	,000	-12,590	2,861	-18,303	-6,877

The hypothesis test used in the table above is the independent sample t-test used to determine whether there is a difference in the average of two unpaired samples. The main requirement in the independent sample t-test is that the data is usually distributed and homogeneous (not absolute). From the analysis of the normality test and the homogeneity test, the conclusion is that the data is usually distributed and homogeneous. Based on the test results displayed in the table above, the Sig. (2-tailed) value is 0.000 <0.05, so it can be concluded that there is a significant difference before and after the implementation of the Case Based Learning model in improving the higher-order thinking Skill (HOTS) of students at SMAN 1 Pariangan.

Table 6. T-test statistics for control posttest and experimental posttest

Group Statistics

	Kelas	N	Mean	Std. Deviation	Std. Error Mean
Nilai	Posttest_Kontrol	34	70,35	12,572	2,156
	Posttest_Eksperimen	35	82,94	11,125	1,880

It can be seen in the table above that there is an average or mean value in the posttest of the experimental class of 82.94 and 70.35 in the posttest control class. This value can be interpreted as the average of the experimental class being higher when compared to the average of the control class. So, there is a significant difference before and after implementing the Case Based Learning model in improving students' higher-order thinking Skills (HOTS) at SMAN 1 Pariangan. The conclusion of the hypothesis above shows that the average learning outcomes of students using the Case Based Learning learning model are 82.94 while for conventional learning methods are 70.35

Discussion

In this study, case-based Learning can improve students' high-

level thinking (HOTS), as reflected in student learning results during the research process, which is adjusted to the previously designed question instrument. High-level thinking skills (HOTS) are measured using objective questions that have previously been adjusted to high-level thinking indicators. High-level thinking is generally called High Order Thinking Skills (HOTS). Krulik, Rudnick, and Milou divide thinking activities into 4: recall essential, critical, king and creative thinking. The assessment of high-level thinking (HOTS) is measured using high-level thinking indicators put forward by Benjamin S. Bloom in 1956, known as Bloom's Taxonomy; then this theory was revised by Bloom's students, namely Krathwohl and Anderson. Krathwohl and Anderson changed the taxonomy to remembering C1, understanding C2, applying C3, analyzing C4, evaluating C5 and creating C6 (Sumaji. S, 2021).

The improvement of high-level thinking indicators (HOTS) is implemented with the help of the Case Based Learning learning model as stated by Simbolon, D.H (Wospakrik et al., 2020) Case. Based Learning is a practical and engaging learning approach involving students in active and creative discussions on real-life events (contextual) through case studies to develop students' reasoning and problem-solving skills. The designed question instrument illustrates the improvement of students' high-level thinking (HOTS) using the Case Based Learning learning model. Before the question instrument is given to the sample class, the questions are first tested in a class outside the sample. Validity and reliability tests are carried out so that out of 40 questions, 33 questions are declared valid. So, from 33 questions, a cognitive level of HOTS questions was obtained, with 30% of cognitive level C3 questions, 40% of cognitive level C4 questions, and 30% of cognitive level C5 questions.

Based on the high-level thinking (HOTS) indicators, it is known that the experimental class is superior to the control class. This can be seen from the average test score of students in the experimental class, 82.77, and the control class, 69.97. Differences in treatment in the learning process cause this difference. The case-based learning model is applied in the experimental class, and in the control class, teacher-centred Learning is applied. According to Wulan et al. (2024), the Case Based Learning learning model can also help students improve their high-level thinking skills through case analysis; students can identify problems, evaluate various solutions, and make the right decisions so that the application of Case Based Learning can make students more interactive and contextual has increased student learning participation. They are more enthusiastic and interested in being involved in the learning process. According to Dimyati and Mudjino in Fitriani (2021: 279), student learning participation includes willingness, willingness to listen, and participation in the learning process. So, to increase student learning participation in class, the Case Based Learning learning model was applied to the experimental class. Based on three types of student participation models, student participation in model 1 with the level of student participation in the experimental class tends to be in the "Medium" category, with a percentage of 50%, while in the high category, with a percentage of 18%, then for student participation

in model 2 from 35 students, the level of student participation is in the limited category with a percentage of 41% and moderate at a percentage of 38%, which means that during Learning they have good involvement in understanding the material. Based on the student participation model, the type of student learning in geography subjects in the experimental class is the Collaborative Initiator type with a percentage of 35%, which means that they actively participate in discussions, work together in groups, and encourage their friends to be involved in learning. Meanwhile, 24% of students are classified as Initiator Dominators, which shows that they tend to dominate learning activities in discussions and group decision-making.

Applying the case-based learning model in the experimental class can increase understanding more optimally than in the control class. This is because the syntax in the model supports students in being active and creative in solving the problems they are facing. These steps include orienting the problem, solving cases in groups, developing discussion findings, determining the problem-solving and communicating solutions. Case-based Learning makes students work in groups to solve a problem/case. This is in line with the opinion of Syafira (2022; 55) Case. Based Learning is a learning model that trains students to investigate and solve problems from events/cases through case-based learning models. The study's results showed that the application of the Case-based learning model influenced students' high-level thinking skills (HOTS). The case-based learning model is a learning model that creates an effective learning atmosphere, where the teacher's task is only to facilitate and direct students to find solutions to existing problems. This is in line with the opinion expressed by (Tyas et al., 2020); the Case-based learning model is an effective model applied in Learning because this model is in the form of an explanation of a particular problem, event, or situation. Students are tasked with finding alternative solutions, and this model can also be used to develop high-level thinking and find new solutions to a topic that is solved. In group discussions, students are tasked with analyzing arguments obtained by observing and understanding the problems given. By using the HOTS-based Case Based Learning (CBL) learning model, students are more active in finding new ideas when they encounter a problem or case, so that students can easily observe everyday events, it is easier to find facts, use experience, apply knowledge, apply the relationship between material and facts. This makes students more adept at finding information through the facts they have found. Thus, students' contextual thinking skills are even better. In addition, students' discussion skills improved after the HOTS-based Case Learning model was implemented, so students were more active in discussing and solving problems or cases given (Fauziyah H. N et al., 2020).

This study shows that applying the case-based learning model affects students' high-level thinking skills (HOTS) in geography subjects. This is because high-level thinking skills use the syntax of a case-based learning model that can train students' abilities in analyzing cases. According to the syntax of the Case Based Learning learning model, according to Azzahra (2017), there

are seven stages of Case Based Learning learning, namely the stage of determining cases, analyzing cases, independently finding information, data and literature, students determining steps to solve cases, making conclusions from the answers that have been discussed, making presentations and evaluations. At each stage, various aspects of high-level thinking skills (HOTS) will be involved, such as providing logical arguments and decision-making in finding the right solution to train students' high-level thinking skills.

The learning process using a conventional model (lecture) is a learning model that emphasizes teachers and textbooks, most of which seem monotonous. This makes students feel bored, causing drowsiness and loss of concentration during the learning process. As expressed by Firmansyah (Rahma et al., 2022), the boredom experienced by students during the learning process makes it difficult for students to concentrate on understanding the material presented by the teacher. Thus, the learning process must have elements of activity that make students feel happy and comfortable following the learning process.

Based on the description above, applying the Case Based Learning model can improve students' high-level thinking skills (HOTS) in geography learning at SMAN 1 Pariangan. This is reinforced by research conducted by Nugroho et al. (2024), showing the results that Case Based Learning affects students' high-level thinking skills in class VII of SMPN 1 Tapung Hulu, where the test results showed that high-level thinking skills in the experimental class were higher than the control class. In line with the results of research conducted by Jamilah et al. (2024), which showed that the application of Problem-Based Learning affected learning success and obtained a positive response from students, this was evidenced by the average score of students in the experimental class being higher than the control class. Based on the learning outcomes obtained by students, it can be seen that applying case-based learning to the learning process can improve students' high-level thinking skills based on cooperation and active roles by teachers and students in achieving learning objectives. Based on this, applying the Case Based Learning model can improve students' higher-order thinking Skills in geography subjects at SMAN 1 Pariangan.

D. Conclusion

Based on the study results, students in the experimental class who used the case-based learning model obtained higher average scores than those in the control class who still used conventional learning methods. The success of this model is highly dependent on the synergy between students and teachers in the learning process, where the teacher acts as a facilitator who guides students to develop critical thinking, communication, and teamwork skills. Overall, the results of this study confirm that implementing case-based learning can be an innovative learning strategy that contributes to improving the quality of education, especially in geography subjects, which can be seen from the learning outcomes and learning activities of students at SMAN 1 Pariangan.

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