IMPLEMENTATION OF CASE BASED LEARNING TO IMPROVE HIGHER ORDER THINKING SKILLS (HOTS) OF STUDENTS OF SMAN 1 TILATANG KAMANG

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ABSTRACT

This study aims to determine the effect of Case Based Learning application to improve Higher Order Thinking Skills (HOTS) of SMAN 1 Tilatang Kamang students. This research uses Quasy Experiment method with quantitative approach and this research design uses Pre-test - Post-test Control Group Design. The study population was class X students in the 2024/2025 academic year with a total of 245 students from 7 classes. The research sample consisted of class X.E5 as the control class and class X.E3 as the experimental class selected using purposive sampling technique. Data collection techniques include observation, documentation, and tests. The results showed the average Pre-test of the experimental class was 43.01 and Post-test was 75.07, while the control class obtained Pre-test 40.13 and Post-test 62.99. There was a significant increase in the experimental class. The Paired Sample T-Test test results show a significance level (sig) of 0.001. Because this significance value is smaller than 0.05, Ho is rejected and Ha is accepted.

Keywords*: Case Based Learning, Higher Order Thinking Skills (Hots), Hidrosfer, Quality Education, Geografi Learning*

ABSTRAK

Penelitian ini bertujuan untuk mengetahui pengaruh penerapan Case Based Learning untuk meningkatkan Higher Order Thinking Skills (HOTS) siswa SMAN 1 Tilatang Kamang. Penelitian ini menggunakan metode Quasy Experiment dengan pendekatan kuantitatif dan desain penelitian ini menggunakan Pre-test - Post-test Control Group Design. Populasi penelitian adalah siswa kelas X tahun pelajaran 2024/2025 dengan jumlah 245 siswa dari 7 kelas. Sampel penelitian terdiri dari kelas X.E5 sebagai kelas kontrol dan kelas X.E3 sebagai kelas eksperimen yang dipilih menggunakan teknik purposive sampling. Teknik pengumpulan data meliputi observasi, dokumentasi, dan tes. Hasil penelitian menunjukkan rata-rata Pre-test kelas eksperimen 43,01 dan Post-test 75,07, sedangkan kelas kontrol memperoleh Pre-test 40,13 dan Post-test 62,99. Terdapat peningkatan signifikan pada kelas eksperimen. Hasil uji Paired Sample T-Test menunjukkan taraf signifikansi (sig) sebesar 0,001. Karena nilai signifikansi ini lebih kecil dari 0,05, maka Ho ditolak dan Ha diterima.

Kata Kunci: *Case Based Learning, Higher Order Thinking Skills (Hots),* Hidrosfer, Kualitas Belajar, Pembelajaran Geografi

A. Introduction

Education is the central pillar in building a nation. Quality education will produce a superior next generation. In Indonesia, the concept of education applied today is the result of the thoughts of Ki Hadjar Dewantara, now known as the "Father of National Education" (Pranoto, 2017). Based on Law No. 20/2003 on National Education, Article 3 states that the purpose of education is to develop skills, form character, and valuable national civilization to educate the nation's life and produce individuals who have personality, health, knowledge, skills, creativity, independence, and democratic and responsible nature (Republika, Indonesia, 2003). Along with the rapid development of information technology, education in Indonesia must adapt to changing times. In the context of the Industrial Revolution 4.0, information and communication technology is developing very quickly, so the education sector, which plays an important role, must be able to improve the abilities and skills of human resources to compete in this digital era (Anwar, 2022).

The 21st century is an era full of challenges, which necessitates profound changes in the education system. High-quality teachers are needed to improve students' knowledge, skills, equality and achievement (Baedhowi, 2018).

In order to face the challenges of this century, every individual must have abilities that are in accordance with the demands of the times. Educators need to teach students hard and soft skills so they are ready to face the world of work and compete globally (Safitri, 2022). 21st-century learning does not only prioritize basic skills such as reading and memorization, which are still dominant in many schools in Indonesia (Pantiwati & Husamah, 2014). More important abilities to be possessed by the younger generation are the ability to think critically and creatively and the skills to solve everyday problems (Anwar, 2022). 21st-century learning demands the development of skills known as the 4Cs: Communication, Collaboration, Critical Thinking and Problem-Solving, and Creativity and Innovation (Arnyana, 2019). The development of these skills aims to achieve the five levels of education launched by UNESCO, namely Learning to Know, Learning to Do, Learning to Be, Learning to Learn, and Learning to Live Together (Yuni Astuti, 2021, in Faiza et al., 2024). By integrating 21st-century skills, learning should focus on higher-order thinking Skills (HOTS).

The Merdeka Curriculum also emphasizes comfortable, active, independent, characterful, meaningful, and independent learning, all of which are reflected in HOTS-based learning, including in geography subjects (Wahyuni, 2024). To achieve the educational goals set by the Government of Indonesia and respond to the demands of 21st-century education that have been mentioned, the Merdeka Learning Curriculum was implemented to replace the 2013 Curriculum that was previously in effect. This curriculum is

a comprehensive approach that offers a variety of opportunities for intracurricular learning. The Merdeka Curriculum gives students time to deeply understand concepts, develop their skills, and achieve set goals. In addition, this curriculum aims to expand access to education in Indonesia by providing diverse intracurricular learning (Wicaksono, 2023).

Implementing the Merdeka Belajar Curriculum in Indonesia is a step toward meeting the demands of 21st Century Learning Skills that UNESCO has proclaimed. The essence of the Merdeka Belajar Curriculum is a curriculum that includes intracurricular learning activities carried out according to a predetermined schedule and duration. This curriculum is expected to provide sufficient time for students to understand concepts in depth and strengthen their skills (Kemdikbud, 2023). With the Merdeka Belajar Curriculum, school learning can be HOTS-based and integrate 21st Century Learning Skills, including 4C (Communication, Collaboration, Critical Thinking and Problem Solving, and Creativity and Innovation). Higher Order Thinking Skill (HOTS) is a higher way of thinking than simply memorizing or retelling what others have told. The application of HOTS in an independent curriculum aims to improve critical thinking skills, creative thinking, argumentation, composing explanations, and making decisions in more complex situations (Rukminingsih, et al., 2023). According to Nofrion, et al. (2018) *High Order Thinking Skills (HOTS)* allow students to interpret, analyze or manipulate information, which can be seen from their ability to analyze, synthesize and evaluate learning materials. Higher-order thinking skills rely on memory and critical and creative thinking skills. One effective method to improve students' higher-order thinking skills is exposing them to problems they have never encountered before, which will encourage the development of higher-order thinking processes (Sekar, 2023).

Based on the results of observations made by the author at SMA N 1 Tilatang Kamang, it was found that students' critical and analytical thinking skills in analyzing complex geographical problems are still very low; this is due to the dominant use of conventional learning methods at school. In the geography learning process, teachers use the lecture method more often, with explanations that are sometimes too fast and do not allow students to digest the material in depth. In addition, the material presented is often repeated, causing boredom among students. As a result, some students lose focus and some even feel bored and sleep during the lesson. Also, the lack of students' understanding of HOTS questions makes learning less effective in stimulating students to think at a higher level. As a result, student learning outcomes in geography subjects are not optimal. Geography learning tends to be boring, so learning objectives are not achieved. The weakness in geography

learning is inadequate and monotonous learning models. Moreover, in the 21st century, the ability to learn, especially in understanding HOTS questions, is needed to improve critical thinking, creative thinking, and the ability to solve problems in everyday life. This shows the need for a more varied and interactive learning approach so students can be more actively involved in the learning process. Geography learning that tends to be boring is a factor that hinders the achievement of learning objectives. In this 21st-century era, understanding HOTS questions is needed to improve the ability to think critically and creatively and solve everyday problems.

To overcome these problems, researchers propose a solution by applying the Case Based Learning (CBL) learning model at SMA N 1 Tilatang Kamang. Daryanto (2014) states that problem-based learning is an approach that presents contextual problems to stimulate students to be more active in learning. Meanwhile, according to Tan (2003) and Rusman (2017), problem-based learning is an innovation in the learning process. In this model, students' thinking skills are genuinely optimized through structured groups or teamwork so that students can hone tests and develop their thinking skills continuously. The Case Based Learning (CBL) model has several advantages: (1) Students can identify and relate cases or issues to new situations. (2) Students can develop analytical skills, collaborate, and communicate effectively. (3) Students are more actively involved in the learning process. (4) Case-based learning helps develop students' skills in working in groups, speaking, and critical thinking (Dewi & Hamid, 2015).

By applying the Case Based Learning (CBL) learning model, students will more easily use basic skills or science generic skills to solve or solve cases given by the teacher related to Hydrosphere material in learning. This process is done through group discussions that follow the steps of the CBL model. Students' understanding of the learning material will also be maximized, which can be seen from their activeness in solving cases through group discussions. In this case, the teacher acts as a facilitator and moderator, allowing students to develop their abilities in solving the factual cases presented (Dewi & Hamid, 2015). Thus, the CBL model emphasizes the role of educators in teaching that focuses on the relationship between facts and providing new understanding to students. Educators are also tasked with motivating students to analyze, interpret, and apply the information obtained and encouraging them to exchange ideas with classmates (Dewi & Hamid, 2015).

B. Research Methods

This research uses the Quasi Experiment method with a quantitative approach. Quasi Experiment was chosen because it always involves a control group in research (Sugiyono, 2016). The research location was at SMA Negeri 1 Tilatang Kamang, a public high school located on Jalan

Raya Pekan Kamis, Nagari Koto Tangah, Tilatang Kamang District, Agam Regency, West Sumatra 26152. This research was conducted in accordance with the lesson schedule. The population in this study were class X students of SMA N 1 Tilatang Kamang in the 2024/2025 school year, consisting of 7 classes with a total of 245 students. The research sample consisted of two classes, namely classes X E3 and X E5, which were selected using purposive sampling technique. This technique is used to determine samples based on certain considerations (Sugiyono, 2016). In this study, class X.E5 was designated as a control class consisting of 34 students and used a conventional learning model, while class X.E3 as an experimental class consisting of 33 students, was treated with a case-based learning model and HOTS questions.Data collection techniques through observation, documentation and tests. A test is a series of questions or exercises and an application tool used to measure skills, intelligence knowledge, abilities or talents individuals or groups possess (Arikunto, 2010). In this study, two tests were conducted, namely the pre-test and post-test, which was the initial test given to students in the experimental class to know the learning outcomes of students before the application of treatment. While the post-test is the final test which aims to determine the improvement of student learning outcomes after the treatment application in the experimental class. The data obtained from the post-test will be processed statistically to identify patterns and trends. The analysis process includes grouping data based on research variables, creating frequency distribution tables, and calculating relevant statistics. Statistical tests carried out normality test, homogeneity test, hypothesis testing using paired sample t-test and N-gain test.

C. Results and Discussion

Results

1. Hypothesis Test

Hypothesis testing is done After conducting normality and homogeneity tests, hypothesis testing can be used. This study hypothesises that applying the Case Based Learning learning model affects the Higher Order Thinking (HOTS) of students at SMA N 1 Tilatang Kamang. The hypothesis test used in this study is a parametric statistical test, namely the Paired Sample T-test on the IBM SPSS 27 application, because it is used to compare the average of 2 related/paired groups with both samples getting two different treatments. The following are the results obtained from the Paired Sample T-test test

Ho: The average value of student learning outcomes tests using the Case-Based learning model is the same.

Ha: The average test scores of students using Case Based Learning are higher than those using other models.

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

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

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

Table 1. Experimental Class T Test

Paired Samples Test									
		Paired Differences							
					95% Confidence Interval of The Differences				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	Pretest-Posttest	-32.152	13.189	2.296	-36.828	-27.475	-14.004	32	<,001

Table 2. Experimental Class T-Test Statistics

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	43.00	33	9.307	1.620
	Posttest	75.15	33	13.549	2.359

Based on the table about the t-test (paired sample t-test) above, it shows a significant difference between the results before and after using the Case Based Learning (CBL) learning model. To see the t-table value, it 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.

The table above shows that the significance of 0.001 <0.05 then Ho is rejected. 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 the Higher Order Thinking Skill (HOTS) of students at SMA N 1 Tilatang Kamang, Agam Regency.

Table 3. 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	1.309	.257	-3.983	65	<,001	-12.181	3.058	-18.288	-6.074
	Equal variances not assumed			-3.973	62.524	<,001	-12.181	3.066	-18.309	-6.053

The hypothesis test used in the table above is the independent sample t test, which is 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 be normally distributed and homogeneous. From the analysis of the normality test and the homogeneity test, the conclusion is

that the data is normally distributed and homogeneous.

Based on the test results displayed in the table above, the Sig. (2-tailed) of 0.001 <0.05, it can be concluded that there is a significant difference between the group that uses the Case Based Learning model and the group that does not use the model.

Table 4. T-test statistics for control posttest and experimental posttest

Group Statistics					
	Kelas	N	Mean	Std. Deviation	Std. Error Mean
Nilai	Posttest_Kontrol	34	62.97	11.422	1.959
	Posttest_Eksperimen	33	75.15	13.549	2.359

The table above shows that the posttest of the experimental class has an average or mean value of 75.15 and 62.97, respectively. This value can be interpreted as the average of the experimental class being higher than the average of the control class.

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 SMA N 1 Tilatang Kamang, in the conclusion of the hypothesis above shows that the average learning outcomes of students using the Case Based Learning learning model are 75.15 while for conventional learning methods are 62.97.

2. N-gain Test

Table 5. Experiment Class Pretest Posttest N-gain Test

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
NGain_Score	33	.08	1.00	.5673	.22145
NGain_Persen	33	7.69	100.00	56.7280	22.14539
Valid N (listwise)	33				

The N-Gain test was conducted to provide an overview of the improvement in learning outcomes between before and after learning in the experimental class, the gain test was carried out on the experimental class prettest and posttest, in this study researchers used IBM SPSS 27 to process the data.

Based on the table above, it can be seen in the experimental class, the average score is 0.5673. In the score value range 0.5673 is in the medium value category which means that the effectiveness is moderate. Then for Ngain percent, the average value obtained is 56.72, this value in the category of interpretation of effectiveness in the form of percent is in the range of 56 - 75, which means that the use of a method or a treatment is quite effective.

Table 6. NGain Test of Control Class and Experimental Classes

	Descriptive Statistic				
	N	Minimum	Maximum	Mean	Std. Deviation
NGain_Score (Kontrol)	34	-.36	.72	.3715	.20015
NGain_Persen (Kontrol)	34	-35.56	71.60	37.1527	20.01480
NGain_Score (Eksperimen)	33	.08	1.00	.5673	.22145
NGain_Persen (Ekperimen)	33	7.69	100.00	56.7280	22.14539
Valid N (listwise)	67				

Based on the table above, it can be seen that the pretest and posttest scores between the control class and the experimental class, it can be seen that the average N-Gain score for the control class is 0.3715. Based on the range of N-Gain scores (0.3 - 0.7), this value is included in the “medium” category. Meanwhile, the average N-Gain score for the experimental class was 0.5673, which was also in the “moderate” category.
When viewed from the N-Gain in percent form, the control class obtained an average of 37.15. Based on the category of interpretation of the effectiveness of N-Gain in percent form, this value is in the range of 40 - 55, which means “less effective”. Meanwhile, the experimental class has an average N-Gain percent of 56.72, which is in the range of 56 - 75, so it is categorized as “quite effective”.

Discussion

In this study, the application of Case Based Learning can improve students' higher order thinking (HOTS), reflected in the previously designed question instruments. The ability to think at a high level (HOTS) is measured using objective questions that have previously been adapted to the indicators of high-level thinking. High-level thinking is generally called High Order Thingking Skills (HOTS). Krulik, Rudnick, & Milou divide thinking activities into 4: recall thinking, basic thinking, critical thinking, and creative thinking. The assessment of high-level thinking (HOTS) is measured using the indicators of high-level thinking put forward by Benjamin S. Bloom in 1956, known as Bloom's Higher Order Thinking. Bloom in 1956 which is known as Bloom's Taxonomy, then this theory was revised by Bloom's students, Anderson and Krathhwohl. Anderson and Krathhwohl changed the taxonomy to remembering C1, understanding C2, applying C3, analyzing C4, evaluating C5 and creating C6 (Anderson and Krathhwohl, 2001 in Panjaitan & Silalahi, 2022).

The improvement of high-level thinking (HOTS) indicators is applied with the help of the Case Based Learning learning model proposed by Simbolon, D.H. (Wospakrik, 2020). Case Based Learning is an effective and interesting learning approach by involving students to be active and creative in the discussion of real life events (contextual) through case studies to develop students' reasoning

and skills in solving the problems at hand. The increase in students' higher order thinking (HOTS) using the Case Based Learning learning model is reflected in the question instruments that have been designed. Before the question instrument was given to the sample class, the questions were first tested on classes outside the sample, then the validity and reliability tests were carried out so that out of 40 questions, 31 questions were declared valid. So that from 31 questions there is an acquisition of the cognitive level of HOTS questions with 23% of C3 cognitive level questions, 45% of C4 cognitive level questions, and 32% of C5 cognitive level 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 value of the student test in the experimental class 75.07 and the control class 62.99. This difference is due to differences in treatment in the learning process. The experimental class applied the Case Based Learning model and the control class applied teacher centered learning. According to (Wulan et al., 2024) the Case Based Learning learning model can also assist students in improving 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 to listen and participate when following the learning process. So that to increase student learning participation in the classroom, the Case Based Learning learning model is applied in the experimental class. Based on 3 types of student participation models, it was found that student participation in model 1 with the level of student participation in the experimental class tended to be in the “Moderate” category, with a percentage of 44%. In contrast, in the high category with a percentage of 19%, then for student participation in model 2 of 33 students, it was found that the level of student participation was in the limited category with a percentage of 30% and moderate at a percentage of 36%, which means that during learning they have good involvement in understanding the material. Based on the student participation model, it is found that the type of student learning in geography in the experimental class is in the Collaboration Initiator type with a percentage of 33%, which means they actively participate in discussions, work together in groups, and encourage their friends to get involved in learning. Meanwhile, 18% of students are classified as Dominator Initiators, which shows that they tend to dominate in learning activities in discussions and group decision making.

Applying the Case Based Learning model in the experimental class provides a maximum increase in understanding compared to the control class. This is because the syntax in the model supports students to be active and creative in solving the problems at hand. These steps include orienting the problem, participating in solving cases in groups, developing discussion findings, determining 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 Nurlaili, (2022) Case Based Learning is a learning model that trains students to investigate and solve problems from events/cases given through the use of case-based learning models.

The results showed an effect of applying Case Based Learning model on students' higher order thinking skills (HOTS). The Case Based Learning model is a learning model that creates an effective learning atmosphere, where the educator's job is only as a facilitator and directs students to find solutions and solutions to existing problems. This is in line with the opinion expressed by Tyas et al., (2022) that the Case Based Learning learning model is an effective model that is 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 then this model can also be used to develop higher order thinking and find new solutions from a solved topic.

In group discussions, students are tasked with analyzing the 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 encountering a problem or case, so that students easily make observations of daily 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 the contextual thinking skills of students are even better. In addition, the ability to discuss students becomes better after the HOTS-based Case Based Learning learning model, so students are more active in discussing solving problems or cases given (Arianto & Fauziyah, 2020).

This research shows that applying the Case Based Learning model affects students' higher order thinking skills (HOTS) in geography. This is because high-level thinking skills use the syntax of a case-based learning model that can train students' ability to analyze cases. By the syntax of the Case Based Learning model according to Azzahra, (2017) there are 7 stages of Case Based Learning, namely the stage of determining the case, analyzing the case, finding independently information, data and literature, students determine the steps to solve the case, making conclusions from the answers that have been discussed, presenting and evaluating. Each stage will involve

various aspects of higher order thinking skills (HOTS) such as providing logical arguments and decision making to find the right solution to train students' level thinking skills.

The learning process using conventional models is a learning model that focuses on teachers and textbooks that mostly seem monotonous. This makes students feel bored, causing drowsiness and loss of concentration during the learning process. as expressed by Firmansyah (Rahman 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 an activity that makes students feel happy and comfortable participating in the learning process.

Based on the description above, it can be concluded that applying the Case Based Learning model can improve students' high-level thinking skills (HOTS) in geography learning at SMA N 1 Tilatang Kamang. This is reinforced by research conducted by Nugroho, et.al (2024) showing the results that Case Based Learning affects students' higher-level thinking skills in class VII of SMPN 1 Tapung Hulu where the test results of higher-level thinking skills in the experimental class are higher than the control class. In line with the results of research conducted by Jamilah, et al., (2024) which shows the results that the application of Problem Based Learning has an effect on the success of learning and obtains a positive response from students, this is evidenced by the average student score in the experimental class higher than the control class. based on the learning outcomes obtained by students, it can be known that using Case Based Learning in the learning process can improve students' higher-level thinking skills based on cooperation and active roles by teachers and students to achieve the learning goals. Based on this, it can be concluded that applying the Case Based Learning model can improve students' Higher Order Thinking Skills in geography subjects at SMA N 1 Tilatang Kamang.

D. Conclusion

Based on this research, it can be concluded that the application of Case Based learning has an effect in improving the higher order thinking skills (HOTS) of SMA N 1 Tilatang Kamang students.

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