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Analysis of the Use of Gasing Method on the Ability to Understand Physical Concepts

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Abstract. *This research aims to evaluate the use of the spinning top method in improving students' ability to understand physics concepts. The spinning top method, which involves active and interactive learning through physical demonstrations, is used as an alternative approach in teaching physics. This research involved students as research subjects and was carried out by comparing learning outcomes between the group that received training using the gasing method and the control group that used the conventional method. Data was collected through physics concept understanding tests before and after the intervention, as well as through classroom observations. Data analysis was carried out to evaluate the effectiveness of the spinning top method in increasing students' understanding of physics concepts. It is hoped that the research results can provide valuable insight for educational practitioners in developing more interactive and effective learning strategies in the context of physics learning.*

Keywords: *Gasing Method, understanding physics concepts, active learning, interactive, method effectiveness*

INTRODUCTION

The results of observations in the field show that physics lessons still do not receive a positive response from students. Physics is considered less interesting for some students because there are many formulas that have to be memorized, symbols and calculations that make students dizzy. [11] [12] . When the teacher asked what had been explained, only a few people raised their hands to answer, the others just listened silently. These are several factors that cause physics learning to be less than optimal which can be seen from students' lack of understanding of physics concepts regarding the material. Therefore, teachers or lecturers as one of the main components in the learning process are expected to be able to optimize the way of learning and develop reasoning power or explore students' thinking patterns, so as to encourage students to participate in discovering physics concepts.

One method that can be used in learning is by applying the top method. This method can create a fun and enjoyable learning atmosphere in the teaching and learning process. Based on research conducted by [1] , by applying the Gasing method, students' attention to learning increases and using the Gasing physics method can help explain a natural phenomenon that cannot be witnessed or researched directly . The top method can also be collaborated with other methods such as inquiry and discopery learning. The inquiry and *discovery learning method* is packaged in the top learning technique (easy, fun and fun) able to change the paradigm of learning difficult physics. Apart from that, from the results of evaluations carried out and observations of the results through interviews after the activity ended, students and teachers were of the opinion that physics learning which was packaged on a discovery basis and equipped with simple experimental tools was able to increase students' and teachers' learning and teaching motivation. [2].

LITERATURE REVIEW

1.1. Understanding Learning

Learning as a concept of gaining knowledge is widely embraced in practice. Teachers act as instructors who try to provide as much knowledge as possible and students actively collect or receive it. This learning process is dominated by memorization activities. Students have learned if they have memorized the things they have learned. Of course, this kind of understanding of learning is essentially inadequate. We need to understand that acquiring knowledge and efforts to increase knowledge is a small part of the activity towards a complete personality. Learning can also be interpreted as a process of understanding something to develop from initially not knowing to knowing.

Learning objectives are actually many and varied. Explicit learning goals are sought to be achieved with instructional actions, commonly called instructional effects, which usually take the form of knowledge and skills. Meanwhile, learning objectives as a result that accompanies instructional learning objectives are commonly called nurturant effects. These take the form of critical and creative thinking skills, open and democratic attitudes, acceptance of other people, and so on. This goal is a logical consequence of students "living" (*living in*) a particular learning environment system. In principle, as quoted in [3] , learning is a process of changing behavior which is a form of experience or the result of interaction between students and their environment. Learning can also be said to be an activity carried out consciously and deliberately to make it easier for students to gain more

concrete knowledge through research, experimentation and measurement to find the relationship between reality and what exists in nature such as facts, values, skills or desired results so that behavior can be achieved. student behavior improves [4].

1.1.1. Concept Understanding

Gagne said that a person has learned a concept if he can deal with objects or events as a group, class, class or category. So a student is said to have understood a concept if he has been able to recognize and understand the same characteristics, which are the characteristics of the concept being studied, and has been able to make generalizations about the concept. This means that students have understood the existence of certain concepts or certain events but are general in nature.

Concepts are abstract ideas, understood by students through several experiences and through definitions or direct observations, thus effective learning is through experience. In the learning process a person interacts directly with the learning object using all his senses. Likewise, concepts can be learned by seeing, hearing, discussing and thinking about various examples [6].

Brunner views that a concept has 5 elements, and someone is said to understand a concept if he knows all the elements of that concept, including:

a. Name
b. Examples both positive and negative
c. Characteristics, both basic and not
d. Range of characteristics.
e. Rule.

Based on Bloom's cognitive domain, understanding is the second level. Comprehension is defined as the ability to absorb the meaning of the material or material being studied. The comprehension aspect is an aspect that refers to the ability to understand and grasp a concept and interpret the meaning of material. This aspect of understanding concerns a person's ability to capture the meaning of a concept in his own words. Based on Bloom's categories, understanding can be divided into three categories, namely:

1. Translating

The first activity at the level of understanding is the ability to translate. This ability is related to students' ability to translate abstract conceptions into a symbolic model, making it easier for students to learn a concept. There are several abilities in the translation process, including:

a. Translating one abstraction to another abstraction.
b. Translating a symbolic form into another form or vice versa.
c. Translation from one form of speech to another

2. Interpret (*interpretation*)

This capability is broader than translating. Interpreting is the ability to recognize and understand the main idea in a communication. There are several abilities in the interpreting process, including:

a. Ability to understand and interpret various readings deeply and clearly.
b. The ability to distinguish justification or refutation of a conclusion illustrated by data.
c. Ability to interpret a variety of social data.
d. The ability to make appropriate limitations (qualifications) when interpreting data.

3. Extrapolate (*extrapolation*)

This type of understanding ability has a higher level than other types of understanding. This type of understanding ability requires higher intellectual abilities, such as making studies about the possibilities of what will happen. Some abilities in the extrapolation process include:

a. Ability to draw conclusions and make explicit statements.
b. Ability to draw conclusions and state them effectively (recognize data limits formulate accurate conclusions and defend hypotheses).
c. The ability to insert one piece of data in a set of data is seen from its trend.
d. The ability to foresee consequences and a form of communication is described.
e. The ability to be sensitive to factors that can make predictions inaccurate.
f. The ability to differentiate the value of a judgment and a prediction.

According to Dahar, concepts are categories that we give to stimuli in our environment. Concepts provide an organized schema to provide relationships within and between categories. Concepts are the basis for higher mental processes to formulate principles and generalizations.

Understanding concepts is the ability to grasp meanings such as being able to express material presented in a form that is more understandable, being able to provide interpretations and being able to apply them [7].

1.1.2. Top Method

This method teaches how to think with a logical approach and almost no formulas, but is still based on basic physics concepts. Students do not need to memorize physics formulas. Students only need to understand how to

multiply, divide, add and subtract. So, the point of Gasing physics is to make physics easy, fun and enjoyable. The learning stages are briefly as follows:

Table 1 Stages of the Gasing Learning Method

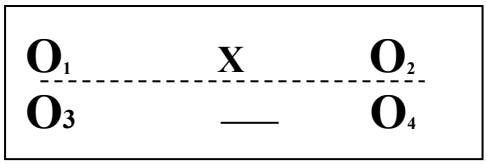
Stages	Teacher activity
Stage 1 Simple dialogue	The teacher begins learning by having a simple dialogue with students about the material to be studied. From this dialogue, it is hoped that students can provide their opinions, so that a close relationship arises between S and R.
Stage 2 Imagine or fantasize	The teacher helps students to imagine events related to the material being studied.
Stage 3 Present examples of questions in a relevant manner	The teacher provides exercises in the form of simple questions that only use mathematical formulations in the form of addition, subtraction, multiplication and division. This aims to strengthen mastery of mathematics student.
Stage 4 Presenting material in depth	The teacher gives physical meaning after the students feel capable of doing all the simple questions.
Stage 5 Provide a variety of questions	The teacher again gives questions, but they are more varied, these questions can be in the form of story questions.

[8] [5]

2. RESEARCH METHODOLOGY

3.1 Research design

The design of this research is Quasi Experimental using " *Nonequivalent control group Design* " which is expressed in the following pattern:



[9]

3.2 Data collection

The data collection technique used in this research is to give a test using an instrument that was previously tested to determine its validity and reliability. Next, the instrument is analyzed to determine validity using biserial correlation using equations

$$\gamma_{pbi} = \frac{M_p - M_t}{S_t}\sqrt{\frac{p}{q}}$$

To determine the consistency of the instrument used, its reliability must be determined. The reliability level criteria are as follows:

Table 2Criteria for Item Reliability Levels

Value Range	Category
> 0.800 - 1.000	Tall
> 0.600 - 0.800	High enough
> 0.400 - 0.600	Currently
> 0.200 - 0.400	Low
0.000 - 0.200	Very low

The number of valid items is then calculated for test reliability using the Kuder Richardson – 20 (KR-20) formula as follows.

$$r_{11} = \left(\frac{n}{n-1}\right)\left(\frac{S^2 - \sum pq}{S^2}\right)$$

[10]

RESULTS AND DISCUSSION

4.1 Research result

The categorization of physics concept understanding test results uses a five-point scale, namely very low, low, medium, high and very high. Data from research on the implementation of the GASING method on students' ability to understand concepts is presented in table form as follows:

Table 3frequency distribution of categories of understanding physics concepts

Score Intervals	Category	Experiment		Control	
		Frequency	Percentage (%)	Frequency	Percentage (%)
0 – 3	Very low	0	0	0	0
4 – 7	Low	1	2.94	2	6.45
8 - 11	Currently	8	23.53	11	35.48
12 - 15	Tall	2 3	67.65	17	54.84
16 - 20	Very high	2	5.88	1	3.22

Table 3 above shows the comparison of understanding of physics concepts between the control class and the experimental class. Based on the table above, it is known that the frequency distribution is in the low to very high category and each class does not have a very low category. The highest frequency distribution for the control class and experimental class was in the high category, 23 students got scores in the range 12-15 for the experimental class and 17 students got scores in the range 12-15 for the control class. Thus, it can be concluded that the understanding of physics concepts in the experimental class is in the high category, while the understanding of physics concepts in the control class is in the medium category. This shows that there are differences between the two classes.

Table 4Data on Variance in Understanding Physics Concepts

Class	Number of Samples	Standard Deviation	Variance
Experiment	34	2.46	6.08
Control	31	2.29	5.26

Based on table 4 above, it is known that the standard deviation value for the experimental class is greater than the standard deviation value for the control class. This shows that the application of the method in the experimental class is more effective than in the control class. This difference can also be seen in the scores resulting from understanding physics concepts in the average score, where the average score for the experimental class is 13.03 and the average score for the control class is 11.73. From the description above, it can be stated that learning physics using the Gasing method is better than learning physics using conventional methods.

3. CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the analysis carried out, it can be concluded that applying the top method can foster students' ability to understand physics concepts. The experimental class that uses the spinning top method is in the high category, while the control class that uses the conventional method is in the medium category.

In connection with the discussion of the results of research that has been carried out, it is known that learning using the Gasing method has an effect on students' understanding of physics concepts , so it is highly recommended that physics teachers start implementing the Gasing physics learning method to improve the quality of teaching.

Thank-you note

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NOMENCLATURE

r_1	=	overall test reliability
p	=	the proportion of subjects who answered the item correctly
q	=	proportion of subjects who answered an item incorrectly (q = 1-p)
$\sum pq$	=	the number of multiplications between p and q
n	=	many items
S	=	standard deviation of the test (standard deviation is the root of the variance)
γ_{pbi}	=	Biseral correlation coefficient
M_p	=	The average score of subjects who answered correctly for the item whose validity was sought.
M_t	=	Average total score
S_t	=	Standard deviation of the total score
P	=	The proportion of students who answered correctly
q	=	Proportion of students who answered incorrectly (q = 1 - p)