



MODELING METHODS EFFECT ON STUDENT'S MOTIVATION AND LEARNING OUTCOMES IN CHEMISTRY AT MA DARUL AMININ NW AIKMUAL

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ABSTRACT

The purpose of this study was to determine the influence of the use of modeling methods on students' motivation and learning outcomes in Chemistry at MA Darul Aminin NW Aikmual. The sampling technique used is a nonprobability sampling technique in the form of saturated sampling. The approach used is a quantitative approach, with a quasi-experimental type and a research design that is nonequivalent control group design with a pretest-posttest type. Based on the analysis of the N-Gain motivational score, the experimental class was 24.6251 (not effective), and the control class was 14.7795 (ineffective). Then, the N-Gain score of learning outcomes in the experimental class was 63.9940 (quite effective), and in the control class it was 46.0750 (less effective). Based on the hypothesis test, it can be concluded as follows, (1) there is no effect of the modeling method on students' motivation to learn chemistry at MA Darul Aminin NW Aikmual as evidenced by a sig value of $0.117 > 0.05$, (2) there is an effect of the modeling method on students' chemistry learning outcomes at MA Darul Aminin NW Aikmual is proven by a sig value of $0.000 < 0.05$, and (3) the influence of the modeling method on students' motivation and learning outcomes in chemistry at MA Darul Aminin NW Aikmual is proven by a sig value of $0.000 < 0.05$.

ABSTRAK

Tujuan dari penelitian ini adalah untuk mengetahui adanya pengaruh penggunaan metode pemodelan terhadap motivasi dan hasil belajar kimia siswa di MA Darul Aminin NW Aikmual. Teknik sampling yang digunakan adalah teknik *nonprobability sampling* berupa *sampling* jenuh. Adapun pendekatan yang digunakan adalah pendekatan kuantitatif, dengan jenis *quasi eksperimen* dan desain penelitian yaitu *nonequivalen control group design* jenis *pretest-posttest*. Berdasarkan analisis N-Gain *score* motivasi, pada kelas eksperimen sebesar 24,6251 (tidak efektif), dan pada kelas kontrol sebesar 14,7795 (tidak efektif). Kemudian, N-Gain *score* hasil belajar pada kelas eksperimen sebesar 63,9940 (cukup efektif), dan pada kelas kontrol sebesar 46,0750 (kurang efektif). Berdasarkan uji hipotesis disimpulkan sebagai berikut, (1) tidak adanya pengaruh metode pemodelan terhadap motivasi belajar kimia siswa di MA Darul Aminin NW Aikmual dibuktikan dengan nilai sig $0,117 > 0,05$, (2) adanya pengaruh metode pemodelan terhadap hasil belajar kimia siswa di MA Darul Aminin NW Aikmual dibuktikan dengan nilai sig $0,000 < 0,05$, dan (3) adanya pengaruh metode pemodelan terhadap motivasi dan hasil belajar kimia siswa di MA Darul Aminin NW Aikmual dibuktikan dengan nilai sig $0,000 < 0,05$.

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INTRODUCTION

Chemistry is a branch of science that is classified as natural science (IPA) which studies natural phenomena, especially regarding structure, composition, properties, changes in matter, dynamics and energy which involves skills and reasoning. Chemistry seeks answers to the questions of what, why, and how of these natural phenomena (Nurwanti, 2014). Many students think that chemistry is one of the most difficult subjects, so students quickly get bored and tired of studying it. Teachers play a very important role in increasing students' desire or motivation to learn. Student learning motivation is low, whatever strategies or methods teachers use in learning will not be able to improve student learning outcomes.

Kompri (2016) states that motivation is a change that occurs within a person which is characterized by feelings and reactions to achieve a goal. The function of motivation in the learning process is to encourage students to be active, each person's behavior is caused by encouragement that arises from within which is called motivation. Motivation in learning can be said to be the overall driving force within students which gives rise to learning activities, so that the goals desired by the learning subject can be achieved (Prasetya, 2018). Students who have received high and appropriate motivation will be more enthusiastic and active in their learning activities to achieve the goals they want to achieve (Budiarawan, 2019). Motivation also has two factors in general, namely internal and external. Internal factors are factors that come from within students such as intelligence, interests, talents, emotions, physicality and attitudes. External factors are factors that originate from conditions outside the student's self,

including family, school and society (Djarwo, 2020). Characteristics of motivation in learning include; Diligently facing tasks, Resilient in facing difficulties, Shows interest, Prefers to work independently, Can defend his opinion and can solve problems. (Sardiman, 2007).

According to Bloom in Fadhilah (2016), learning outcomes include cognitive, affective and psychomotor abilities. The cognitive domain is knowledge (knowledge, memory), comprehension (understanding, explaining, summarizing, examples), application (applying), analysis (elaborating, determining relationships), synthesis (organizing, planning, forming new buildings), and evaluation (judging). The effective domains are receiving (receiving attitude), responding (giving a response), valuing (value), organization (organization), characterization (characterization). Learning outcomes are the level of success of students in learning lessons at school which is expressed in scores obtained from test results regarding a number of certain subject matter (Susanto, 2013). The factors that influence learning are classified into two groups, namely internal factors and external factors. Internal factors are factors that exist within the individual who is learning, while external factors are factors that exist outside the individual (Kurniawan, 2017).

Motivation and learning outcomes are two things that are closely related, when someone has high motivation in learning, the learning results that person gets will be better. Conversely, if motivation is low the learning outcomes obtained will be less. High motivation to learn is reflected in perseverance that is not easily broken in achieving success even though faced with

various difficulties. Students who have received high and appropriate motivation will be more enthusiastic and active in their learning activities to achieve the goals they want to achieve (Budiariawan, 2019).

Based on the results of observations carried out at the MA Darul Aminin NW Aikmual School, the teaching and learning process experienced a problem, namely (1) learning in schools still uses teacher-centred methods such as lectures, so that it cannot fully activate students and there is a lack of interaction between students and Teachers like asking questions so that students tend to be passive and lack interest in participating in learning. (2) students' lack of motivation to learn is proven during the learning process in the classroom, students quickly feel sleepy and bored. (3) low student learning outcomes, as evidenced by the odd semester UAS scores for chemistry subjects for class (0%). (4) students rarely carry out practical activities due to the lack of availability of facilities and infrastructure at school such as tools or chemicals. In this research, one way that can be used to overcome this is by applying the modeling method.

According to Trianto (2008), the modeling method is a method developed based on the principle that a person can learn through observing other people. There are two underlying reasons why modeling methods are applied in learning. First, to change student behavior through observation. By observing the teacher carrying out activities such as demonstrations or experiments, students can imitate the behavior (steps) in carrying out activities as exemplified. Second, to encourage student behavior regarding what is learned, strengthening and weakening barriers. Then Sumiati & Asra (2007), stated that the modeling method is an example in learning. Students will more easily

understand and apply the learning process and results if the teacher is able to present them in model form, not just verbally. Students will be able to observe and imitate what the teacher does.

Bandura in Fitriyati (2012) states that in the modeling method, there are four very important phases, namely the attention phase, retention phase, reproduction phase and motivation phase. The aim of the modeling method is to teach counseling about behavior that is in accordance with what they want to change and can influence traits and values as well as teaching social skills through Symbolic modeling. Using this modeling method, students can imitate the behavior they see according to their environment. The advantage of the modeling method is that it makes it very easy for students to absorb learning material. Learning activities will be designed through observation involving modeling and imitation processes because they are in accordance with the characteristics of students' emotional development, social and mental adaptation. The disadvantage of the modeling method is that it takes quite a long time because students need to master the material and competencies that will be imitated, so it requires a lot of practice (Melania, 2022).

This modeling method can be used to improve abilities and change the learning process which was originally very monotonous to become more interesting. By giving the teacher a direct demonstration to the students, the students will not get bored. So, students will of course be more motivated if the teacher conducts learning in an interesting way that can attract students' attention to study harder and of course they will like chemistry subjects. Apart from that, this modeling method can help students more

easily understand and master the material presented by the teacher in class. So that it can improve student learning outcomes for the better. The results of previous research that are relevant to this research, such as those conducted by Abdul Rahman Bumolo, show that modeling has a positive and significant influence on student learning motivation. Then Fitriati (2012), by applying the modeling method can improve the learning outcomes of class IV students at SD Negeri 2 Karangjati, Banjarnegara Regency.

METHODS

This research uses a quantitative approach which is experimental research. This type of research is a quasi-experimental type (Quasi experimental), namely a type of research that involves two classes, there is an experimental class and a control class. The population in this study was all 33 students in class XI MIA. The sampling technique used is a nonprobability sampling technique in the form of saturated sampling. Saturated sampling is used because all members of the population are used as research samples. In this research, the type of design used is the pretest-posttest nonequivalent control group design method. In the research there were two groups or classes, some were given treatment and some were not. The experimental class is the class that is given treatment, while the control class is the class that is not given treatment. The variables in this research are one independent variable and two dependent variables. The independent variable is the modeling method, and the dependent variable is motivation and learning outcomes. To measure learning outcome variables with a multiplechoice test of 20 questions and a non-test in the form of a questionnaire with

25 statement items. Testing the validity of questions and questionnaires uses expert validity.

The data analysis technique used is N-Gain score. The normalized gain test (N-Gain) was carried out to determine the increase in student motivation and learning outcomes after being given treatment according to the category (Arikunto, 2015). Then, for the analysis prerequisite test, the first test used is the normality test. The purpose of this test is to find out whether the data taken is normally distributed data or not. The test used is the Shapiro-Wilk test. The conditions in the test are that if $\text{sig} > 0.05$ then the data is normally distributed, and if $\text{sig} < 0.05$ then the data is not normally distributed. Second, namely the Generalized linear model (GLM) using the box's test, namely the homogeneity of the variance-covariance matrix in a multivariate manner. The homogeneity criterion is if $\text{sig} > 0.05$ then testing can continue. Third, test the equality of variance covariance matrices using the Levene's test statistic, namely to test the homogeneity of variances. The significant criterion is if the sig test result is > 0.05 , then H_0 is stated that the variance-covariance matrix has the same variance and is homogeneous. Next, hypothesis testing in the research that has been carried out uses non-parametric tests with the types of tests used being the Mann-Whitney test and the Kruskal Wallis test. The test criteria are if the sig value is > 0.05 then H_0 is accepted, and H_a is rejected. On the other hand, if the sig value is < 0.05 then H_0 is rejected and H_a is accepted (Quraissy, *et al.*, 2021).

RESULT AND DISCUSSION

The results of the data description can be seen in tables 1 and 2 below:

Table 1. Output Description of Motivational Data for Experiment Class and Control Class

Description of Learning Motivation Results Data					
	N	Minimum	Maximum	Mean	Std. Deviation
Experimental Pretest Motivation	15	54	89	72,48	9,628
Experimental Posttest Motivation	15	75	87	81,39	4,005
Motivation Pretest Control	18	65	82	74,03	5,523
Posttest Motivation Control	18	72	86	78,27	4,271

Table 2. Output Description of Learning Results Data for Experiment Class and Control Class

Description of Learning Outcome Data					
	N	Minimum	Maximum	Mean	Std. Deviation
Experimental Pretest Learning Results	15	25	70	45,33	14,450
Experimental Posttest Learning Results	15	65	90	80,67	6,510
Control Pretest Learning Results	18	15	70	40,83	13,959
Control Posttest Learning Results	18	60	80	69,44	4,817

Normalized N-Gain Test

The N-Gain test is used to find out whether the two classes are effective or not after being given treatment, namely a modeling method to increase motivation

and learning outcomes in the learning process. The results of the N-Gain score calculation can be seen in the following output Table 3:

Table 3. N-Gain Score Calculation Results

No	Experimental Class		Control Class	
	N-Gain Score		N-Gain Score	
	Motivation	Learning outcomes	Motivation	Learning outcomes
Mean	24,6251	63,9940	14,7795	46,0750
Min	60,34	80,00	39,02	64,71
Max	-55,00	41,67	-10,34	16,67
Criteria	Ineffective	Effective enough	Ineffective	Less effective

Hypothesis testing**Table 4. Mann Whitney Test of Student Cognitive Learning Results**

	Test Statistics ^a	
	n_Gain Motivational Univariate	n_Gain Univariate Learning Outcomes
Mann-Whitney U	91,000	27,500
Wilcoxon W	262,000	198,500
Z	-1,591	-3,894
Asymp. Sig. (2-tailed)	,112	,000

a. Grouping Variable: Class

Table 5. Kruskal Wallis Test

Test Statistics ^{a,b}	
	n_Gain
Kruskal-Wallis H	41,504
df	3
Asymp. Sig.	,000

a. Kruskal Wallis Test
b. Grouping Variable: Class

Based on the test on the first hypothesis, the results obtained from the sig analysis of motivation data were 0.117 or 0.117 > 0.05, so that H₀ was accepted and H_a was rejected. This means that there is no

influence of the modeling method on students' chemistry learning motivation at MA Darul Aminin NW Aikmual. Learning using this modeling method can help students to increase student learning

motivation and help teachers to evaluate student learning outcomes effectively. In learning using this modeling method, the teacher provides a lesson by showing students examples of the material clearly, realistically, and directly demonstrated in front of them, then students will imitate what has been exemplified. In this way, the teacher plays a very important role as a facilitator in learning. This is in accordance with the opinion of Ralate (2016) that teachers give examples of certain activities (demonstrations) in front of students according to prepared scenarios. Students observe the teacher's skills in this activity by imitating what has been demonstrated.

Based on the results of statistical data analysis, it was found that the modeling method had no effect on learning motivation in the experimental class. This indicates that there is a mismatch between theory and the results of the research conducted. Another factor that causes H_0 to be accepted in this research is time. Learning in the experimental class takes place in the first hour and before going home. According to Slameto (2010) learning conditions also influence students' learning motivation. If students study when their bodies are tired, for example during the day, they will have difficulty receiving lessons. Likewise, students in the control class tend to be more passive when the learning process takes place. This is because the learning methods used by teachers are enough to make students feel bored quickly so that they lack interest in learning chemistry which is considered difficult, making the class atmosphere very monotonous.

In the second hypothesis, the results of the sig data analysis of learning outcomes were obtained, namely 0.000 or $0.000 < 0.05$, so that H_0 was rejected and H_a was accepted. This means that there is an

influence of modeling methods on student chemistry learning outcomes at MA Darul Aminin NW Aikmual. The modeling method in learning is that the teacher helps students to understand a concept, whether in the form of objects, ideas, processes and events. Stimulating learning in the classroom can be done by teachers or students, so that through this modeling students can practice and imitate the teacher. This is also supported by Bandura's theory which states that learning through observation is a type of learning that plays an important role in the development of a child's personality. So, most human behavior is studied observationally through modeling, so that by seeing how other people behave, new concepts will emerge that are believed to be the right way to act.

Based on the results of research conducted in the experimental class, the results obtained were that there was a significant influence of the modeling method on students' chemistry learning outcomes. This is in line with research conducted by Nasution (2017) which states that high and quality student learning outcomes can result from a quality learning process as well. To produce a quality learning process, a teacher needs the ability to apply learning methods that suit class needs. Thus, improving student learning outcomes in schools can be implemented by using appropriate learning methods. Apart from that, in the experimental class there are practicum activities carried out using the modeling method so that students can understand the lesson clearly and realistically so that the learning results obtained are very good. In contrast to the control class, practical activities were not carried out so that the learning results obtained were quite good, although some were still below the average value. Finally, in the third hypothesis, the results obtained

from the analysis of sig data on motivation and student learning outcomes were 0.000 or $0.000 < 0.05$, meaning that H_0 was rejected and H_a was accepted. This proves that the final value of the analysis data for the two variables when tested in a multivariate manner is not too different. So that significant results were obtained between the independent variable and the dependent variable and this means that there is an influence of the modeling method on students' motivation and chemistry learning outcomes at MA Darul Aminin NW Aikmual.

In calculating the N-Gain score, the motivation obtained for the experimental class was 24.6251 or 25%, this is in the ineffective category. Meanwhile, in the control class, it was obtained at 14.7795 or 15%, which was included in the ineffective category. So, it can be seen that for student learning motivation after being given treatment the results are that the modeling method is not used effectively. This is because students still don't really understand how the modeling method works clearly. Students still answer instrument statements carelessly without reading in detail. Then for learning outcomes, in the experimental class it was obtained at 63.9940 or 64%, this is in the quite effective category. Meanwhile in the control class it was 46.0750 or 46%, included in the less effective category. So, it can be seen that for learning outcomes after being given treatment, this modeling method is quite effective.

CONCLUSION

In the first hypothesis, the results showed that there was no influence of the modeling method on students' chemistry learning motivation at MA Darul Aminin NW Aikmual, proven by the results of data analysis with a sig value of 0.117 or $0.117 > 0.05$. Then for the second hypothesis, the

results obtained were that there was an influence of the modeling method on students' chemistry learning outcomes at MA Darul Aminin NW Aikmual, proven by the results of data analysis with a sig value of 0.000 or $0.000 < 0.05$. The third hypothesis obtained is that there is an influence of the modeling method on students' motivation and chemistry learning outcomes at MA Darul Aminin NW Aikmual, proven by the results of data analysis with a sig value of 0.000 or $0.000 < 0.05$.

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