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The Influence of the Problem Based Learning Model on Student Interest and Learning Outcomes

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Abstract: *This research aims to (1) determine the effect of using the Problem Based Learning model on student learning outcomes in reaction rate material (2) knowing the effect of using models Problem Based Learning on students' learning interest in reaction rate material. The population of this study were all students of class XI MIPA SMAN 14 Medan. The sampling technique was carried out random sampling, namely class XI MIPA 3 as an experimental class with 34 students. The results obtained are the average value of the experimental data class pretest and posttest is 37.50 and 79.85, which means it is higher than the minimum completeness criteria (KKM) value, namely 75. Data from the normality and homogeneity tests obtained normal distribution and homogeneous data. The results of the hypothesis test were carried out using one sample t-test at the significance level $\alpha = 0.05$, earned value t_{count} 2.403 > t_{table} 1.692 with sig. (2 tailed) 0.022 < $\alpha = 0.05$ so Ha is accepted and H0 is rejected. Students' interest in learning in the experimental class obtained an average score of 77.02 with high criteria of 47.1% and medium criteria of 52.9%.*

Keywords: *Problem Based Learning; Learning Outcomes; Interest to Learn; Reaction Rate*

INTRODUCTION

Education is a very important thing in life. Through the educational process students will be educated and formed according to their skills. Education is said to be successful if educational goals can be achieved. The aim of education is to change the mindset of students and instill noble morals in these students. To achieve this goal is needed something process, namely the learning process (Badariah et al., 2022).

In the 21st century, the development of modernization and globalization has had a tremendous impact. One of the transmitted effects is to guarantee students to identify, understand and solve problems around them independently. One of the impacts of modernization and globalization felt by Indonesian society is the low thinking ability of students. The results of the international PISA research show that Indonesian students have very low literacy levels in reading, mathematics and science. They only occupy the bottom 10 of 65 countries (Panggabean et al., 2022).

Chemistry learning is one of the natural sciences subjects which studies phenomena related to everyday life. Chemistry is the study of matter and its

properties, changes in matter and the energy that accompanies these changes. In the context of education, chemistry is classified as a subject that is difficult to understand (Basri, 2013). In the chemistry teaching and learning process, the use of teaching models greatly determines student interest and success. The use of inappropriate teaching models is a factor in the difficulty of learning chemistry for students. They feel that what they learn is not related to everyday life. Chemistry is abstract and requires student activity in solving various problems in problems related to chemistry (Priliyanti et al., 2021).

Many factors influence the level of learning achievement obtained by a student, both from themselves (internal) and from outside themselves (external), including internal factors in the form of student interest in learning. Interest in learning is proven to have a big influence on student learning achievement, because if the learning material studied is not in accordance with students' interests, students will not learn as well as possible, which results in students being reluctant to learn and not getting satisfaction from the lesson (Ansori et al., 2017).

Based on the results of interviews with chemistry teachers at SMA Negeri 14 Medan, they said that students were less able to master lessons that were closely related to calculations, one of which was reaction rate material. Students also still experience difficulties in understanding chemical concepts, in this case it has an impact on student learning outcomes, especially in the reaction rate material, many of which are still below the KKM (Minimum Completeness Criteria), namely 75. This is because there is a lack of interest in learning and the teacher-centered learning process will tends to make students less interested and enthusiastic in learning.

PBL (Problem Based Learning) is a learning concept that helps students to improve the skills needed in the current era of globalization. This learning model presents a real problem for students as the beginning of learning, then it is solved by investigation and applied using a problem-solving approach. In this case, students are actively faced with complex problems in real situations (Hotimah, 2020).

There are several studies that support this research, such as research by Saragi & Dalimunthe (2022) that the learning outcomes and learning interests of students who are taught using the learning model Problem Based Learning using power-point media is higher than what is taught conventionally. (Hsu et al., 2016) explained that this PBL learning model was able to improve student learning outcomes. According to Asvifah & Wahjudi (2019) explains that the application of the learning model Problem Based Learning (PBL) is able to increase student learning outcomes. This is in line with research conducted by (Nisak & Sari (2013) regarding the application of learning model Problem Based Learning (PBL) is able to increase student learning activities. Apart from that, in research carried out by (Narmaditya et al., 2017) explains that using the PBL learning model can improve student learning achievement.

In previous research, research results stated that the application of PBL had an effect on students' scientific literacy abilities in the three domains of learning outcomes. The high level of scientific literacy ability is caused by the model applied which stimulates students to be active and critical in getting solutions to problems (Pasiri, 2023). Likewise, research conducted by (Zakiyah & Ulfa (2018) shows that there is an increase in student learning outcomes by using the PBL learning model in chemicals in everyday life.

So theoretically the problem of student interest and learning outcomes can be overcome with an effective, efficient and enjoyable learning model, namely the model Problem Based Learning because this model can deliver students to new knowledge and concepts that students did not know before. PBL with a scientific approach focuses on change to make students think critically. Model Problem Based Learning has advantages, one of which is that it makes it

easier for students to master the concepts studied in order to solve real world problems. So, by implementing this model, it is hoped that it can make students more focused in the learning process and improve student learning outcomes.

LITERATURE REVIEW

Problem Based Learning

The Problem Based Learning (PBL) model encourages students to think critically and analytically to solve a problem. The PBL model emphasizes student-centered learning. This allows students to learn more things (Hotimah, 2020). The PBL structure has five steps: (1) orienting students to the problem; (2) organizing students to learn; (3) direct both individuals and groups investigate; (4) create and present work; and (5) examine and assess the approach taken solve the problem (Roza & Damanik, 2022).

The benefits of the PBL learning model are: (1) Students remember and understand the open material better; (2) Can improve and focus more on relevant abilities; (3) Encourage students to think critically; (4) Can develop work teamwork, leadership, and social skills; and (5) Can motivate students to be more proactive in learning (Rasyid et al., 2022). The PBL model has several disadvantages, are: (a) Not many teachers are able to teach students problem solving; (b) Requires high costs and a long time; (c) Difficult to integrate students' out-of-school activities; and (d) Learning success depends on student discipline (Hayun & Syawaly, 2019).

Learning Outcomes

Learning outcomes are the results given to students in the form of assessments after following the learning process by assessing students' knowledge, attitudes and skills with changes in behavior (Nurrita, 2018). In general, it can be defined that learning outcomes are students' self-assessment and changes that can be observed, proven and measurable in abilities or achievements experienced by students as a result of learning experiences and also reveal that learning outcomes can describe students' abilities after what they know and learn. Furthermore, Robert Gagne believes that student learning outcomes are divided into five categories, namely verbal information, intellectual skills, motor skills, attitudes and cognitive strategies (Nurhasanah & Sobandi, 2016).

Interest in Learning

Students' interest in learning is shown by several indicators, namely interest in the benefits of learning, efforts to understand learning material, reading textbooks, asking questions to the teacher in class, asking friends, and working on questions given by the teacher (Kartika, et al., 2019).

Interest indicators according to Safari (2003), there are several indicators used to measure students' interest in learning, namely: (a) attention (b) interest (c) enjoyment (d) involvement.

METHODS

The research carried out was quantitative research using quasi-experimental methods. A quasi-experiment is research that approaches a real experiment (Sugiyono, 2015). This research was carried out from October 2023 to February 2024. The population of this research was all students in class XI MIPA. The sampling technique is carried out using techniques Random Sampling, namely randomly selecting class XI MIPA-3 with a total of 34 people as the experimental class.

The design used by researchers is one group pretest-posttest design. The research instrument is in the form of multiple choices which have been prepared based on indicators in the cognitive aspect totaling 20 questions. Data collection is carried out by implementation pretest and posttest, questionnaires and documentation. Data pretest and posttest obtained in the form of quantitative data on learning outcome scores and then analyzed using software *SPSS 22.0* for Windows. In detail the research design can be seen in Table 1.

Table 1. Research design

Class	Pretest	Treatment	Posttest
Experiment	T_1	X	T_2

Information:
X   : Use of models Problem Based Learning
T_1 : Giving initial test (pretest) before being treated
T_2 : Giving final test (posttest) after being given treatment

RESULT AND DISCUSSION

Data from research This is obtained from the results of the pretest and posttest in the experimental class, namely the pretest is given before the learning process begins or before treatment is given to determine students' initial abilities and the posttest is given at the end of learning or after treatment is given to determine student learning outcomes after being given treatment. By learning with a model Problem Based Learning Student learning outcomes increased and students' interest in learning was high with an average pretest score of 37.5 and for posttest The average value obtained was 79.8. As well as high student interest, data obtained from the average student score was 77 in the high category. Based on the results obtained, the average value can be described pretest and posttest students in diagram form as follows.
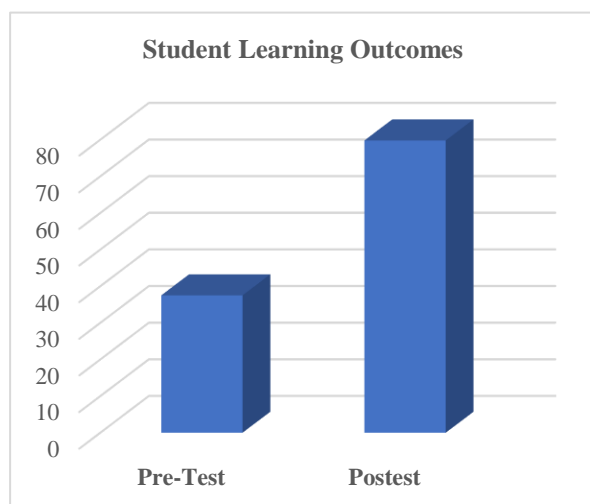

Figure 1. Graph of average student learning outcomes

Based on data obtained, for data on student learning outcomes, the average value was obtained pretest of 37.5 and the average value posttest amounting to 79.85. From the learning outcome data that has been obtained, it shows that the model Problem Based Learning has an influence on student learning outcomes. Where student learning outcomes are higher than the minimum completeness criteria (KKM) value. This is in accordance with what was stated by (Purba & Munzirwan, 2022), that the chemistry learning outcomes of students who are taught using the learning model Problem Based Learning making student learning outcomes increase, namely higher than the Minimum Completeness Criteria (KKM) value set at 70. For student interest data, an average value of 77.02 was obtained. With a percentage of high criteria of 47.1%, medium of 52.9% and low of 0%. From the learning interest data that has been obtained, it shows that the model Problem Based Learning has an influence on students' interest in learning. Like previous research, Saragi & Dalimunthe (2022) stated that the learning outcomes and interest in learning of students taught using the learning model Problem Based Learning higher than that taught conventionally.

The result of the value pretest- posttest then a prerequisite test is carried out. The first test is the normality test using Shapiro-Wilk with the help of SPSS 22.0 for Windows software. The results of the normality test can be seen in Table 2.

Table 2. Research data normality test results

Learning Outcomes	Shapiro-Wilk			Information
	Statistic	df	Sig.	
Pretest	.940	34	.061	Normal Data
Posttest	.940	34	.061	Normal Data

From the calculation results test the normality of the research data above, it can be concluded that the research data is declared normal with a sig value of 0.061, which means it is greater than the significance level $\alpha = 0.05$, so it has met the requirements for further testing, namely the homogeneity test using Levene Test. The results of the homogeneity test can be seen in Table 3.

Table 3. Research data homogeneity test results

Levene Statistic	df1	df2	Sig.
.927	1	66	.339

Based on the data in the table obtained a sig value of 0.339 > 0.05 (α), so it can be concluded that the research data is declared homogeneous so that it meets the

requirements for hypothesis testing. Hypothesis testing is carried out using tests One Sample t Test by using the program SPSS *22.0* for windows with significant level α = 0.05, if obtained the result is sig < α (0.05) then Ha accepted and H0 is rejected vice versa. Test result data hypothesis can be seen on Table 4.

Table 4. Research data hypothesis test results

Class	t_{count}	t_{tabel}	df	Sig (2-tailed)	Information
Experiment	2.403	1.692	33	.022	H_a Accepted

From the results obtained namely t_{count} > t_{table} (2.403 > 1.692), then H_0 is rejected and H_a accepted. With sig. (2-tailed) obtained 0.022 which is smaller than α = 0.05, so H_a is accepted and H_0 is rejected. This means that there is an influence on the use of the model Problem Based Learning on student learning outcomes on reaction rate material. This shows that the t_{count} > t_{table} namely 2.403 > 1.692, then the H_0 hypothesis is rejected and the H_a hypothesis is accepted, which means there is an influence of the model Problem Based Learning on student learning outcomes. The N-Gain value is 0.67 so it is included in the medium category, because it's on $0.30 \leq$ N-Gain ≤ 0.70. It is proven that students' chemistry learning outcomes are taught using model Problem Based Learning in the reaction rate material, namely in the sub-chapter the factors that influence the reaction rate make student learning outcomes increase.

CONCLUSION

Based on the research results and discussion above, it can be concluded that: there is an influence model use Problem Based Learning on student learning outcomes in the reaction rate material which can be known from the results of data analysis obtained at a significant level of α= 0.05 t_{count} amounted to 2.403 and t_{table} amounting to 1.692. Because t_{count} > t_{table} then H_0 is rejected and H_a is accepted. Then, there is the influence of the use of model Problem Based Learning towards students' interest in learning about reaction rate material which can be seen from the average result of 77.02 which can be described in the high category.

With the rapid changes and developments in science and technology, it is also necessary to develop quality and superior human resources to be able to compete in the era of globalization. Through PBL, students are required to be skilled at asking and expressing opinions, finding relevant information, looking for various alternative ways to get solutions and determining the most effective way to solve problems. In this PBL model activity, students are encouraged to optimize high-level reasoning abilities.

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