

THE DESCRIPTION OF STUDENTS LEARNING DIFFICULTIES IN REACTION RATE MATERIALS

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Abstract: Reaction Rate is material that high school students study in class XI MIPA in odd semesters. In this material, as much as 77.64% of SMAN 16 Padang class XI MIPA students have yet to achieve the minimum criteria set. It indicates that students have learning difficulties. Learning difficulties are failures in achieving learning goals characterized by low learning outcomes. This study aims to determine the percentage of students who experience learning difficulties for each indicator on the material reaction rate and determine the factors that cause learning difficulties experienced by students in terms of learning methods. This research is a type of descriptive research. The sample for this research was students in class XI MIPA 3 at SMAN 16 Padang in the 2022/2023 academic year, which consisted of 36 people. The research instruments used were two-tier multiple-choice diagnostic tests, questionnaires, and interviews. The data analysis used is descriptive, namely analyzing and providing an understanding of the data in the form of numbers so that an overview can be given in an orderly, concise, and clear manner. The results of this study stated that students of SMAN 16 Padang experienced learning difficulties in tar material with a high category. The highest difficulty level is found in the 3rd indicator (Explaining the effect of surface area on the rate of reaction), which is equal to 83.33%. Learning difficulties experienced by students are caused by ineffective learning methods, such as making study schedules and carrying them out, reading and taking notes, repeating material, concentrating, and doing assignments.

Keywords: *Learning Difficulties, Reaction Rate Material, Diagnostic Test, Two-Tier.*

INTRODUCTION

Learning is a business process carried out by someone to get a new attitude towards a better attitude. In reality, students often need help to achieve learning goals or get changes in behavior as expected. In this case, students experience learning difficulties in achieving learning goals [1].

Learning difficulties are failures in achieving learning goals that are signaled by low learning achievement (the value obtained is less than the predetermined standard of minimum completeness criteria), resulting in failures in achieving learning goals.

Minimum completeness criteria are made to improve the quality of education, which will later be used as a reference by each subject teacher, including in chemistry subjects [2].

Most students still think that chemistry is a difficult subject. This was because chemistry consisted of abstract concepts and required mastery of mathematical operations and a strong memory [3]. Therefore, students are required to have the ability to understand concepts and apply understanding of mathematical operations. Understanding the concept is a very important aspect of learning because students can develop their abilities in each subject matter by understanding the concept. Students' understanding of concepts has an effect on students' ability to solve problems.

When learning to read and write, academic

learning challenges are situations that are very common. Students who study in school and obtain learning outcomes below their real academic capacity are reported to have this impairment [4].

Based on the results of distributing questionnaires and interviews with chemistry teachers at SMAN 10 Padang, SMAN 5 Padang SMAN, and SMAN 16 Padang, it can be seen that the reaction rate material could be clearer for students to understand. Of the three schools, SMAN 16 Padang has the highest percentage of students who receive daily assessments under the KKM. It can be seen from the results of the daily evaluation of atomic structure material in the 2021/2022 school year, which has an average score below the KKM that has been set, which is 78.

77.64% of class XI MIPA students at SMAN 16 Padang still need help to reach the Minimum Completeness Criteria (KKM) standard set, which is 78 in the daily assessment of reaction rates. It indicates that students experience learning difficulties in thermochemical material, so student learning outcomes are low / below the KKM. However, it still needs to be made clear which indicators these students experience difficulties.

Even though they have been given remedial by the teacher, students in everyday life still get learning achievements that still need to follow the previously set goals. There may be students who master these prerequisites. Such students are classified as having learning difficulties [5].

Therefore, researchers are interested in researching which indicators are considered difficult by students and the causes of these difficulties from the factors of how students learn. One effort to find out the difficulties of students to what extent the material being taught can be understood is by giving a diagnostic test.

One effort to find out the difficulties of students to what extent the material being taught can be understood is by giving a diagnostic test. The diagnostic test is one of the tests needed to find out the weaknesses of students so that, based on these weaknesses, appropriate treatment can be carried out [6]. To find out the factors that cause students' learning difficulties in terms of learning methods, namely by giving questionnaires and interviews.

Related research that has discussed students' learning difficulties in chemistry learning includes. The results of this study found that students had learning difficulties in skills in counting [7].

RESEARCH METHODS

The type of research used is descriptive research. Descriptive research is a form of research that aims to describe or describe existing phenomena [8]. The sample in this study was 36 students in class XI MIPA 3 at SMAN 16 Padang. This research was conducted in the odd semester of the 2022/2023 school year at SMAN 16 Padang.

One of the methods that can be used to identify learning difficulties in students is to use diagnostic tests. A diagnostic test is a test to detect the presence or absence of signs in learning (understanding concepts, misconceptions, not understanding concepts) [9].

The instrument used in this study was a diagnostic test sheet (two-tier multiple choice), questionnaire sheets, and interview sheets. Previous researchers made the instrument in this study. Students are considered to understand a concept they are learning when the answer is correct and the reason is correct [10].

Students who experience misconceptions are students who have the right answer but give the wrong answer or have the wrong answer but have the right answer. Students needing help understanding the concept have wrong answers and reasons [11].

The diagnostic test given to students is in the form of two-level or multiple-choice questions, which consists of 20 questions to represent four learning indicators namely, the 1st indicator) explains the effect of concentration on the rate of reaction; 2) explains the effect of temperature on the reaction rate; 3) explains the effect of surface area on the rate of reaction; 4) explains the effect of the catalyst on the rate of reaction. Questionnaire data given to students is measured by five indicators of external factors affecting students' learning difficulties, namely how students learn. Interview

data were obtained from several students who had learning difficulties and represented five indicators. From the data from the diagnostic test results, it can be seen that the percentage of students who have learning difficulties per learning indicator, that is, using the percentage calculation (%) to find out the number (%) of students who have learning difficulties in each indicator with the following formula:

$$\%K = \frac{\text{Student Answered incorrectly}}{\text{All The Student}} \times 100\%$$

Information:

%K = Percentage of students with learning difficulties for each item indicator [12].

The interpretation of students' learning difficulties is based on the criteria put forward by Arikunto [13] as in Table 2 below.

Table 2. Criteria Of Student's Learning Difficulties

Criteria	Percentage (%)
Very high	81 – 100%
High	61 – 80%
Fairly high	41 – 60%
Low	21 – 40%
Fairly low	0 – 20%

[13]

Then, grouping the results of students' answers from the level of understanding based on the diagnostic test questions. The answers given by students were categorized into four categories, as seen in Table 3.

Table 3. Results of Questionnaire Analysis of the Causes of Student Learning Difficulties

Type of Student Answers	Explanation	Category
T-T (True-True)	Answer both levels of questions correctly	Understand
T-F (True-False)	Answer correctly on the first level and answer incorrectly on the second level.	Misconception
F-T (False-True)	Answer wrong on the first level and answer correctly on the second level	Misconception
F-F (False-False)	Answered incorrectly at both levels of the question	Do not Understand

[14]

Questionnaire data measurements used a Likert scale, including always, often, sometimes, rarely, and never. The informant chooses the answer by giving a checklist in one of the columns. The answers to each questionnaire item can be given a certain score [15], as in Table 4.

Table 4. Scores for Questionnaire Item Criteria

Criteria	Score (+)	criteria	Score (-)
Always	5	Always	1
Often	4	Often	2
Sometimes	3	Sometimes	3
Seldom	2	Seldom	4
Never	1	Never	5

[15]

RESULTS AND DISCUSSION

Based on the provision of diagnostic tests, the most difficult indicator, according to students, was the third indicator, amounting to 83.33% in the very high category. The percentage of student diagnostic test answer categories is shown in Figure 1.

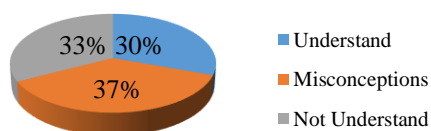


Figure 1. Categories of Student Answers

The results of the data in Figure 1 show it can be said that students in class XI MIPA 3 SMAN 16 Padang experience learning difficulties because the percentage of students who experience learning difficulties, namely students who have misconceptions and do not understand concepts, is higher (69.58%) than students who understand the concept (30.56%).

The learning difficulties are experienced by students in the 1st indicator. The learning difficulties experienced by students were still difficult to distinguish examples between the system and the environment, which was 53.33% in a fairly high category. The difficulties experienced by students in this learning indicator are caused because students do not understand the concept, which results in frequent inverses regarding the effect of concentration on the reaction rate, where the greater the concentration, the greater the number of particles involved in a reaction so that collisions are likely to occur.

The second indicator, the learning difficulties experienced by students, is 64.44% in the high category. The problems experienced by students

include the lack of understanding of the effect of temperature on the rate of reaction, especially students who are often confused in understanding kinetic energy and activity energy, where the relationship between the effect of temperature on kinetic energy and the rate of reaction the higher the temperature, the greater the kinetic energy so that it is greater or equal to the energy activation, and the rate of reaction increases. It is also because the students are not careful in answering questions in order of reactions from the fastest to the slowest.

The third indicator is students experience learning difficulties of 83.33% in the very high category. The problems of students in this learning indicator are caused because students do not understand the relationship between the influence of the surface area of the touch area and the rate of reaction in which students answer the wrong answers, but when they fill in the reasons for the answers given are correct, which is the wider the surface area. Touching the reacting substances will make it easier for effective collisions to occur, which cause chemical reactions to occur, thereby accelerating the reaction rate.

The 4th indicator, the learning difficulties experienced by students, is 77.22% in the high category. Students' difficulties in this learning indicator are caused because students distinguish between activator catalysts and inhibitor catalysts. It isn't easy to understand which catalyst functions to accelerate the reaction rate and which catalyst slows down the reaction rate. Students find it difficult to read or analyze the contents of the graph, so the answers and reasons given are not appropriate.

Students still need to understand the factors influencing the reaction rate, as seen by their responses. Students struggle with the material's abstract nature because the reaction rate is an abstract chemical term [16].

Additionally, because there are so many resources to study chemistry, students need to be able to schedule their studies effectively [17].

In the questionnaire research, the results of the questionnaire data analysis showed that the factors causing students' learning difficulties in the reaction rate material were due to the students needing to repeat the subject matter and practice questions on the reaction rate material that had been studied. The results of the questionnaire distribution analysis can be seen in Table 5.

The 3rd indicator, namely repeating the subject matter, is the indicator that students do the least, affecting the learning process and causing the students' grades to be low. It follows the results of questions and questionnaires, where the most difficult learning indicator is the third indicator regarding surface area to reaction rate, and the highest cause of learning difficulties is that students do not repeat material.

Table 5. Result of the Questionnaire on the Cause of Learning Difficulties

Indicators	Percentage (%)	Average	Criteria
Scheduling and implementation	49.41%	2	Sometimes
	54.71%	3	Sometimes
	47.06%	2	Seldom
	58.82%	3	Sometimes
	52.35%	3	Sometimes
Read and take note	48.82%	2	Seldom
	45.29%	2	Seldom
	45.88%	2	Seldom
	45.29%	2	Seldom
	55.88%	3	Sometimes
Repeating Study Materials	49.41%	2	Seldom
	53.53%	3	Sometimes
	52.94%	3	Sometimes
	38.24%	2	Seldom
Concentration	54.71%	3	Sometimes
	54.12%	3	Sometimes
	43.53%	2	Seldom
Carry out a task	50.59%	3	Sometimes
	47.65%	2	Seldom
	64.71%	4	Always

The results of this study are reinforced by the statement, that repeating has a big influence on sticking into one's brain with repetition (review) of material that has yet to be mastered so that it will remain embedded in one's brain [18]. It is necessary to provide time to repeat and understand the material being repeated fully.

Students need to know how to learn effectively because the success of students can be achieved well if these students know how to learn effectively [19].

If students have found a way of learning according to themselves, then learning activities will be easily carried out by these students so that students can achieve learning outcomes [20].

CONCLUSION

This study concludes that students of SMAN 16 Padang experience learning difficulties in the reaction rate material, with a high category of 69.58%. The difficulty level of students in the 1st indicator explains the effect of concentration on the reaction rate of 53.33% in a fairly high category; the second indicator namely explaining the effect of temperature on the reaction rate of 64.44% with a

fairly high category; on the 3rd indicator, namely explaining the effect of surface area on the reaction rate of 83.33% with a very high category; on the 4th indicator, namely explaining the effect of the catalyst on the reaction rate of 77.20% with a very high category. Learning difficulties experienced by students are caused because students still need to carry out effective learning methods, including making schedules and implementing them, reading and making notes, repeating subject matter, concentrating on learning, and doing assignments.

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