

ARTICLE

## Determinants of Learning Difficulty on Student Learning Outcomes

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### ABSTRACT

This research is a type of descriptive research. The research aims to describe learning difficulties and reveal the factors that cause learning difficulties experienced by class XI MIPA SMA Adabiah 2 Padang in the academic year 2022/2023, totaling 20 people in the Buffer Solution material. This research was carried out using a diagnostic test instrument in the form of an essay that was valid and tested for reliability. Apart from that, this research also gave questionnaires to find out the causes of students' learning difficulties, both from internal factors and external factors. Data analysis used is descriptive analysis. The results of this study indicate that students experience learning difficulties in the buffer solution material in class XI MIPA 1 SMA Adabiah 2 Padang is in the fairly high category (55.3%) with the factors causing learning difficulties in the form of prerequisite material, namely chemical equilibrium (30.5 %). Internal causative factors are interest in learning (50.7%), talent (54%), motivation (48.8%), and study habits (52.2%). External causal factors that influence the form of teaching aspects of the teacher (55.2%), short time for chemistry lessons (60%), and school facilities (57%), environmental factors that influence the family environment (53.5%), and social environment by (61%).

### ARTICLE HISTORY

**Submission:**

**Received:**

**Accepted:**

**Citation:**

**Keywords:** Buffer Solutions, Learning Difficulties, Diagnostic Tests, Questionnaires

## 1. Introduction

Learning difficulties are students who cannot learn well, a determining factor in learning difficulties due to disturbances in the learning process that affect student learning outcomes. According to (Sanjiwani, 2018) factors that can lead to learning difficulties are intelligence factors, psychological factors where psychological factors such as interest, motivation, and talents of the students themselves, as well as environmental factors including family, friends, and communities that are less supportive in the learning process. study.

However, in reality students have difficulty learning chemistry because learning chemistry is difficult, mathematical, and complex. Students must understand the basic concepts in chemistry lessons. Concepts in the complex make students think that chemistry is a difficult lesson. Like the buffer solution material, students must understand the previous material related to the buffer

solution. This is reinforced by the research of Yunitasari, et al (2013) that supporting concepts are complex material, so many students do not understand the material.

Based on the results of the interview and filling out the questionnaire which was carried out on November 4 2021 with the chemistry teacher in class XI SMAS Adabiah 2 Padang, the Adabiah 2 High School teacher said that many students only completed 31-50%, because information was obtained that students had difficulty with the buffer solution material because the buffer solution material is almost similar to the salt hydrolysis material. Due to the complex buffer solution material, students have not been able to apply the acid-base mixture problem to calculate the pH of the buffer. Some of these factors cause learning disabilities in students and reduce achievement.

## 2. Methodology

This type of research is descriptive research using a qualitative approach. The population in this study were all class XI MIPA SMA Adabiah 2 Padang. The sample in this study were 20 students in class XI MIPA 1. This research was conducted in January 2023 in class XI MIPA 1 for the 2022/2023 academic year. The sampling technique used was purposive sampling. The research instruments used were diagnostic tests and questionnaires. Where in the closed questionnaire there are 4 answer choices that have been provided. The data analysis technique used in this research is descriptive qualitative analysis by determining the learning outcomes and level of student understanding to determine the level of learning difficulty. The percentage (%) of learning difficulties can be determined using the following formula.

$$P = \frac{\text{total score}}{\text{maximum score}} \times 100\%$$

$$\%K = 100\% - P$$

Information :

P = the percentage of students who do not experience learning difficulties for each item indicator

%K = percentage of students who have learning difficulties for each item indicator.

(Sriningsih & Mohammad, 2015)

The percentage of learning difficulties can be interpreted according to Arikunto (2010) which can be seen below.

criteria	Percentage (%)
Very High	81-100%
High	61-80%
High enough	41-60%
Low	21-40%
Very low	0-20%

Closed questionnaire data analysis was carried out by comparing the total score obtained by respondents with a score of 100% so that the results can be expressed in percent. The data is processed using the formula

$$P = \frac{\sum F}{\sum N} \times 100\%$$

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Information:

P : Percentage

$\sum F$  : Respondent's answer score

$\sum N$  : Total Score

(Riduwan, 2011)

### 3. Results and discussion

#### 3.1 Research result

##### *Description of Research Data*

Based on research that has been conducted on class XI MIPA students at SMA Adabiah 2 Padang, two data were obtained, namely the form diagnostic test and questionnaire data. The diagnostic test was tested on 20 class XI MIPA 1 SMA Adabiah 2 Padang students for the 2022/2023 school year.

Furthermore, in collecting the questionnaire, the students filled it out by checking one of the options in the questionnaire. This questionnaire was given with the aim of knowing the causes of learning difficulties experienced by students and internal and external factors. The internal factors consist of aspects of students' interest in the buffer solution material, students' aptitude in the buffer solution material, student motivation, and students' study habits in the buffer solution material. Likewise with external aspects which also consist of aspects of teaching teachers, study time, school facilities, family environment and social environment. Each aspect of this questionnaire consists of several indicators which then each indicator consists of several item questions to be answered by students. The questionnaire used has 4 categories, namely strongly disagree (STS), disagree (TS), agree (S), and strongly agree (SS) as seen from positive scores based on a Likert scale ranging from 1 to 4, and negative scores from 4 until 1.

##### *Results of Analysis of Student Answers on Diagnostic Test Questions*

Data analysis in determining the percentage of students' learning difficulties on diagnostic test questions in the form of a buffer solution material description was given to students who had studied the material, namely class XI MIPA 1 SMA Adabiah 2 Padang. The buffer solution material consists of 2 learning indicators. Low or high levels of learning difficulties experienced by students were determined by giving 23 essay questions consisting of 70 sub-questions as shown in Appendix 2. The research results obtained were presented in a table in the form of the percentage of student answers for each item.

Table 1. Percentage of student answers for each item

Question number	Knowledge	% answer	Category
1.1	solution stoichiometry	30	Low
1.2	reaction equation	5	Very low
1.3	ionization reaction	20	Very low
1.4	buffer solution	55	High enough
1.5	chemical equilibrium	38	Low
1.6		75	High
1.7	buffer solution	65	High
1.8		75	High
1.9	chemical equilibrium	10	Very low
1.10	buffer solution	75	High
1.11		75	High

Question number	Knowledge	% answer	Category
2.1	solution stoichiometry	15	Very low
2.2		20	Very low
2.3	reaction equation	20	Very low
2.4	ionization reaction	20	Very low
2.5	buffer solution	26	Low
2.6	chemical equilibrium	20	Very low
2.7		45	High enough
2.8	buffer solution	5	Very low
2.9		5	Very low
2.10	chemical equilibrium	0	Very low
2.11	buffer solution	86	Very high
2.12	buffer solution	86	Very high

The percentage of students' answers to each item was grouped based on the sequence of students' knowledge development in mastering the buffer solution material starting from the stoichiometry of the solution to the buffer solution material.

Based on the data in table 4, it can be seen that students of class XI MIPA 1 SMA Adabiah 2 Padang experience high learning difficulties in the 2nd indicator (2.11 and 2.12), namely calculating the pH of a buffer solution when a little acid and a little base are added by 86% in the category of difficulty very high, whereas in the 1st indicator (1.10 and 1.11) calculating the pH of the buffer solution students had difficulty of 75% in the high category. So that the level of learning difficulty obtained in the buffer solution material is equal to 55.3% with a fairly high category.

For the prerequisite material which is the inhibiting material in learning the highest buffer solution, namely chemical equilibrium of 30.5% in the low category, then for stoichiometric material it is 21.7% in the low category. Based on table 4, it can be concluded that students in class XI MIPA 1 SMA Adabiah 2 Padang have learning difficulties in the buffer solution material and the prerequisite material is a factor causing learning difficulties in the buffer solution material, namely chemical equilibrium and chemical stoichiometry.

#### *Results of Analysis of Student Answers on the Questionnaire Sheet*

Based on table 4 data, it can be seen that 55.3% of students had difficulty learning chemistry in the buffer solution material. The questionnaire was administered to find out the causes of learning difficulties from internal and external factors which consisted of 28 questions representing each aspect.

Based on table 4 data, it shows that the factors causing student learning difficulties in the buffer solution material are internal factors, namely due to a lack of student aptitude for the buffer solution material, lack of interest and poor learning methods, such as not repeating lessons after learning is complete and studying only during exams come. Meanwhile, external factors from the aspect of the teacher's way of teaching are influenced by the teacher's way of teaching which is too fast, unclear, only uses the lecture method which makes learning monotonous and boring, and the teacher does not use interesting media in learning. Furthermore, on the aspect of study time, namely short hours of chemistry lessons, it becomes difficult for students to understand the material for buffer solutions, on aspects of the school environment, namely dirty classrooms, on aspects of the family environment, a busy home atmosphere makes it difficult to concentrate on studying at home, and on environmental aspects. socially influenced by peers. The indicator that was at least implemented by students of class XI MPA 1 SMA Adabiah 2 Padang was on the motivational aspect of 48.8% with the criterion of disagreeing.

Factor	Aspect	Percentage
Internal factors	Interest	50,7%
	Talent	54%
	Motivation	48,8%
	study habits	52,5%
External factors	How to teach teachers	55,2%
	study time	60%
	School facility	57%
	Family environment	53,5%
	Social environment	61%
	Average	54,7%

### 3.2 Discussion

In this study, it was possible to identify the level of learning difficulties experienced by students of class XI MIPA 1 SMA Adabiah 2 Padang on each indicator of the buffer solution material through a diagnostic test and to reveal the factors causing student learning difficulties using diagnostic tests and questionnaires.

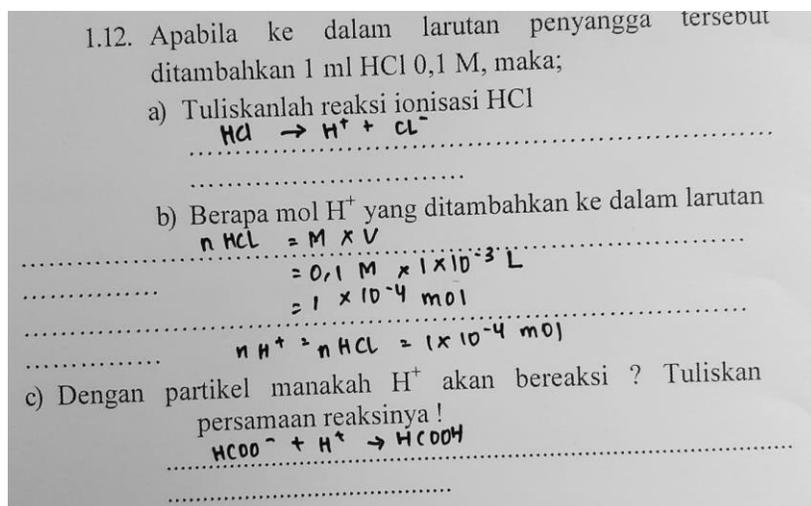
#### *Student Learning Difficulty Level for each learning indicator*

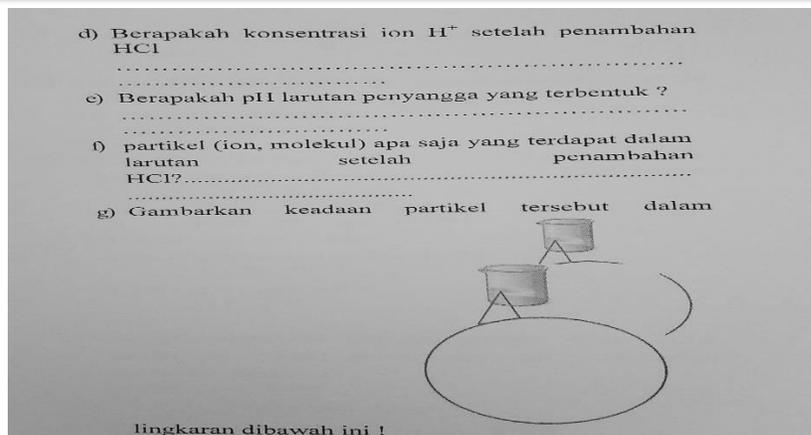
The buffer solution material consists of 2 learning indicators. Based on table 3 it can be seen that students have learning difficulties in the buffer solution material with a fairly high average learning difficulty. The order of students' learning difficulties in the buffer solution material is the 1<sup>st</sup> indicator (47.5%) with a fairly high category, then the 2<sup>nd</sup> indicator (29%) with a low category.

#### a) First indicator

From the research data it is known that the 1st indicator is categorized as a level of difficulty in the fairly high category with a difficulty percentage of 47.5%. Based on the results of students' answers, it can be seen that there are still many students who do not understand the learning on this indicator, this indicator consists of 11 questions with 32 sub-questions. Students experience difficulties in calculating the pH of an acid buffer solution and describing the state of the particles.

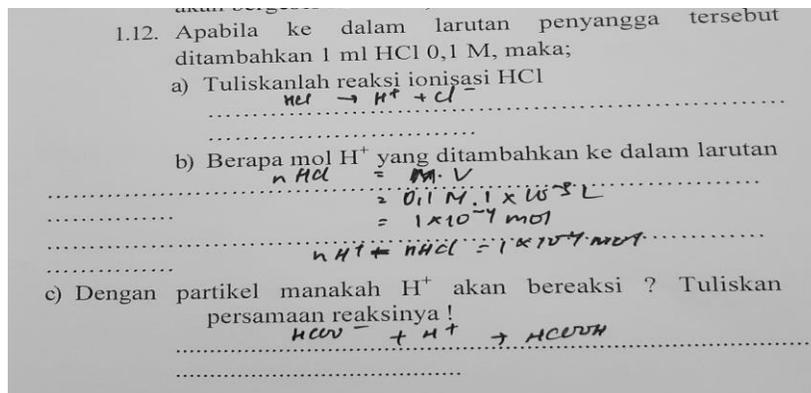
Figure 1. Student answers do not understand





From the students' answers, it can be seen that students had difficulty answering questions 1.10 d; 1.10e; 1.10f; 1.10 g because the student did not give the answer as required by the question. Students are able to determine the  $H^+$  particles that will react but it can also be seen that in the question of the concentration of  $H^+$  ions students are not able to calculate the concentration of  $H^+$  ions in the problem. Based on the students' answers to questions 1.10 d-g the students did not give any answers, so it was categorized that students did not understand the lesson. From the answers it can be concluded that students have difficulty calculating the concentration of  $H^+$  ions, calculating the pH of the buffer solution (in question 1.10 e) so that many students do not understand learning.

Figure 2. Answers students understand



d) Berapakah konsentrasi ion  $H^+$  setelah penambahan HCl

$HCO_3^- + H^+ \rightarrow H_2CO_3$   
 $5 \times 10^{-3} \quad 1 \times 10^{-4} \quad 5 \times 10^{-3}$   
 $1 \times 10^{-4} \quad 1 \times 10^{-4}$

e) Berapakah pH larutan penyangga yang terbentuk?

$4,9 \times 10^{-3} \quad 5,1 \times 10^{-3}$   
 $1 \times 10^{-4} \quad 5,1 \times 10^{-4}$   
 $4,9 \times 10^{-3} \quad 5,1 \times 10^{-4}$   
 $= 4 - \log 1,87 = 3,73$   
 $pH = -\log [H^+] = 3,73$

f) partikel (ion, molekul) apa saja yang terdapat dalam larutan setelah penambahan HCl?

$HCO_3^- \quad H_2CO_3 \quad H^+ \quad OH^- \quad H_2O$   
 $Cl^- \quad Na^+$   
 $= 3,73$

g) Gambarkan keadaan partikel tersebut dalam

SOAL 2

2

lingkaran dibawah ini!

In Figure 2 it can be seen that the student's answers are in accordance with the answer key, the student's answers in accordance with this answer key are categorized that the student understands the lesson. But not many students were able to answer question 1.10 correctly. So that the level of not understanding occurs in students who are higher than those who understand.

**b) Second indicator**

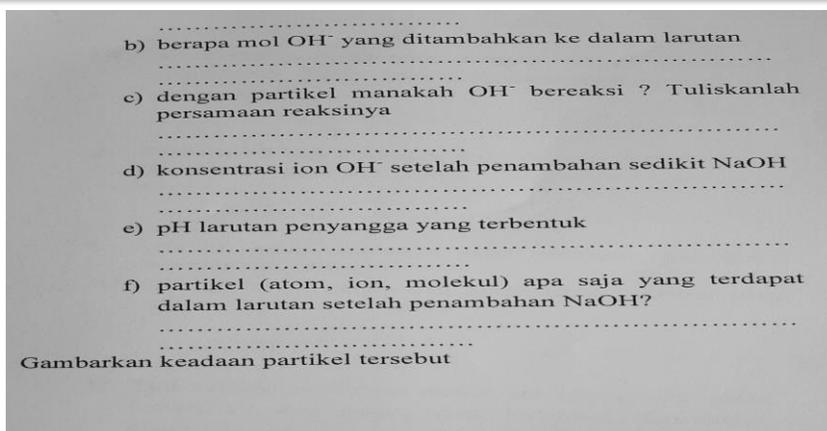
Based on the research data it is known that in the buffer solution material students experience low difficulty, namely 29% in the low category. This indicator consists of 12 questions with 32 sub questions. Based on the students' answers, it can be seen that there are still many students who do not understand the second indicator. This is evidenced by the number of students who have difficulty answering question number 2.12 as shown in the picture below.

Figure 1. Student answers do not understand

2.12. Apabila kedalam larutan ditambahkan 10 ml NaOH 1 M, tentukanlah;

a) reaksi ionisasi NaOH

$NaOH \rightarrow Na^+ + OH^-$



In the questions it is known that students are unable to answer, this is evidenced by the number of student answers that are blank in question 2.12. In Figure 4 it can be seen clearly that students did not make the answers required by the questions given. Furthermore, in Figure 4 it can be seen that students were only able to answer question 2.12 a correctly and take the correct steps according to the answer key.

#### *Causes of learning difficulties from internal and external factors*

To identify the causes of learning difficulties from internal and external factors, it was carried out by distributing questionnaires to students of class XI MIPA 1 SMA Adabiah 2 Padang. There are 28 questionnaire items that represent every aspect of the internal and external factors that cause learning difficulties. Based on data from the results of the questionnaire can be seen in Appendix 12. Based on the results of the questionnaire analysis of the causes of student learning difficulties in Appendix 12 it can be seen from the internal factors that greatly affect learning difficulties, namely the talent aspect of 54% with the criterion of disagreeing answers which means students do not have talent on the buffer solution. Whereas the external factors that greatly affect learning difficulties are the aspect of study time by 60% with the agreed criterion indicating that the short hours at school make it difficult for students to understand the buffer solution material.

#### 4. Conclusion

Based on the research that has been done, it can be concluded that students' learning difficulties in the buffer solution material in class XI MIPA 1 Padang are at a fairly high level, namely 55.3%. With the highest percentage of learning difficulties, namely in the 2nd indicator (2.11 and 2.12), namely calculating the pH of a buffer solution when a little acid and a little base is added by 86% with a very high difficulty category, while in the 1st indicator (1.10 and 1.11) calculating the pH of the buffer solution students have difficulty of 75% with the high category. The factors that cause learning difficulties in the buffer solution material are seen from internal factors, namely interest (50.7%), talent (54%), and students' motivation in learning the buffer solution material (48.8%), as

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well as study habits (52, 5%). From external factors, namely the aspect of teacher teaching (55.2%), chemistry class hours (60%), aspects of school facilities (57%), and family environment (53.5%), and social environment (61%) .

### Acknowledgements

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