



Effectiveness of Writing A Scientific Report "Testing Antacid Drugs That Can Neutralize Stomach Acid" for Critical Thinking Skills for Class VIII Junior High School

Furry Aprianingsih^{a*}, Makrina Tindangen^b, Susilo^c

^{a,b,c}Dept. Biology, Mulawarman University, Kalimantan Timur, Indonesia

^aEmail: furrymulawarmanuniversity@gmail.com

^bEmail: makrina_tundangen@yahoo.co.id

Abstract

Science learning is directed at increasing students' understanding and students' skills in analyzing phenomena that occur in the surrounding environment with the concept of science material. In reality, there are still many science learning processes in schools that do not pay enough attention to this. Preparation of scientific reports can be integrated into learning in the 21st century which supports improving critical thinking skills. The human digestive system material is material related to problems that occur around students and must be clarified in learning so that students' critical thinking skills improve. This research aims to improve students' critical thinking skills in compiling scientific reports through Integrated Science learning. Based on the results of this analytical research, it shows that some teachers already know the indicators of critical thinking skills according to the level of questions but rarely use them because of time constraints.

Keywords: Integrated Science; Critical Thinking; Scientific Report.

Received: 8/21/2023

Accepted: 9/26/2023

Published: 10/8/2023

* Corresponding author.

1. Introduction

In the opinion of several experts quoted by [3], critical thinking is a directed and clear process used in mental activities such as solving problems, making decisions, persuading, analyzing assumptions, and conducting scientific research. Critical thinking is the skill of having an opinion in an organized way. In learning to improve students' thinking skills, teachers know what things must be done, but teachers rarely apply them. This is related to learning tools where teachers themselves get learning tools in the form of lesson plans, teaching materials, worksheets and media from books, the internet, articles, teacher forums instead of making them yourself to suit students' needs. Critical thinking needs to be integrated into learning in the 21st for supports the cultivation of critical thinking skills. Critical thinking is needed to solve complex problems in everyday life caused by the rapid development of technology and social movements. Teachers must teach these thinking skills to students so that they can be equipped to become successful citizens in the future. Educational progress also measures the quality of a country. A nation is said to be advanced if it has good quality education, so that the quality of critical thinking is really needed to meet the ever-increasing challenges in life [1]. The human digestive system material is basic material related to everyday life and this material will always be studied until the next school level. This is very risky if material about the human digestive system that is related to daily life cannot be understood because it will affect students' critical thinking skills and students' learning outcomes. Based on the scope of the subject of the human digestive system, not only students, but teachers are required to be able to understand the concept rather than just memorize it. An effort to reduce conceptual errors in understanding the subject of the human digestive system is by creating learning tools that are able to improve students' critical thinking skills by referring to problems in the subject of the digestive system that are related to everyday life, so that it is easy for students to understand and the process can be formed. enjoyable learning by creating a positive response from students.

Based on this background, the researcher tried to develop scientific report writing to improve the critical thinking skills of class VIII SMP students with material on the human digestive system which was packaged easily to understand to support the material so that it could become a learning resource in creating a variety of learning.

2. Method

This research is included in development research or Research and Development (R&D), especially in Educational Research and Development which is applied to train students' critical thinking skills. As stated by Sugiyono [2], Research and Development research is a research method used to produce certain products and test the effectiveness of these products. Development (Research and Development) is a research method used to develop or validate products used in education and learning that have been created.

This development research procedure uses Borg and Gall's research. The procedural development model was chosen because researchers just have to follow the steps contained in the procedural model. The ten stages of the Borg and Gall development research model can be seen in the following picture

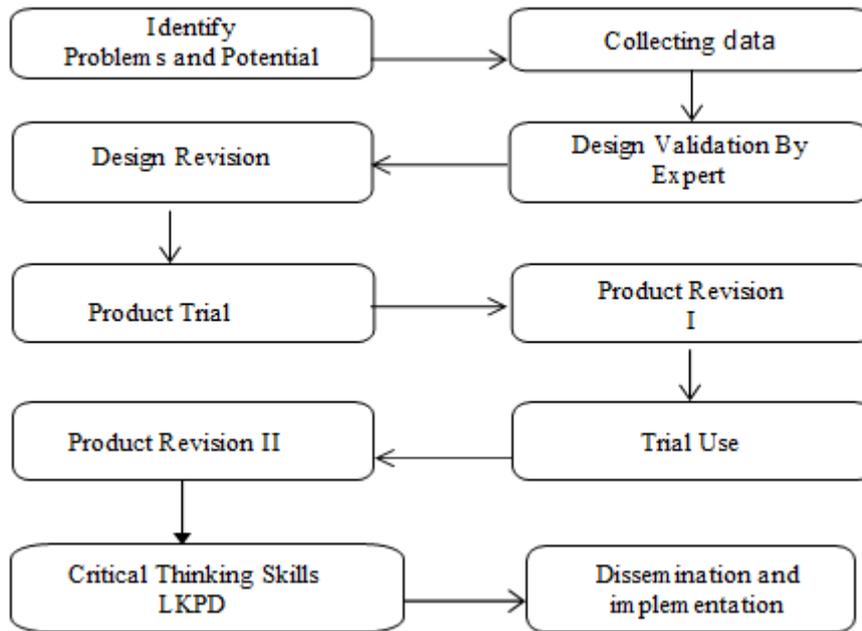


Figure 1: Research Procedure, adapted from the Borg and Gall Research and Development Model.

Analysis of the effectiveness of the media developed uses data obtained from the pretest and posttest results. Analysis of students' pre-test and post-test scores takes the form of gain score analysis and comparison of the post-test with the Minimum Completeness Criteria (KKM) scores. The gain score analysis of the students' pretest and posttest scores is based on Hake's opinion , which is as follows:

$$\langle g \rangle = \frac{S_{post-Spre}}{S_{maks-Spre}}$$

The symbol $\langle g \rangle$ is the gain score value obtained. The level of gain score obtained is categorized into three categories, namely high ($\langle g \rangle > 0.7$), medium ($0.3 \leq \langle g \rangle \leq 0.7$) and low ($\langle g \rangle < 0.3$) Learning is said to be effective if the gain score is at a medium or high level. If the gain score is at a medium or high level, it means that the learning media has a positive influence on student learning outcomes. Learning effectiveness is determined based on the results of parametric testing data analysis. The parametric test was carried out through an independent sample t-test using SPSS statistics 24 on the post test results. The independent sample t-test was used to determine whether there was a difference in the average learning effectiveness of the two samples, namely the experimental class and the control class. The basis for decision making is:

- a. If the Sig (2-tailed) value is < 0.05 , then there is a significant difference between the experimental class and the control class.
- b. If the Sig (2-tailed) value is > 0.05 , then there is no significant difference between the experimental class and the control class.

Before carrying out the independent sample t-test, a homogeneity test and normality test are first carried out using the SPSS statistic 20 program. If the data in the two samples is normally distributed and homogeneous

then an independent sample t-test can be carried out. Furthermore, to support the learning effectiveness data, researchers reviewed the average learning outcomes and the percentage of complete learning outcomes. Completion of classical learning is declared successful if the percentage of students who complete the study or students who get a score ≥ 75 is greater than or equal to 75% of the total number of students. This agrees with Muslich, M. that the ideal learning completeness for each indicator is 0-100%, with a minimum ideal criteria limit of 75%. To calculate the percentage of classical learning completeness, the formula is used:

$$T = \frac{\sum \text{students have completed learning}}{\sum \text{all students}} \times 100 \%$$

A. Definition stage At this stage

LPKD is validated by experts so that the assessment obtained is accurate according to the validator's competence. The results of the summary of the validation assessment of the LPKD to improve students' critical thinking skills are in accordance with the table with a result of 91.39%, which is very valid.

Table 1: LPKD Assessment Sheet for Experts.

No	Assessment Description	Assessment Score				
		0	1	2	3	4
1.	Completeness of student worksheet components (LPKD) in accordance with the LPKD systematics in 2013 curriculum				√	
2.	Accuracy in writing identity in accordance with the 2013 curriculum				√	
3.	Suitability of learning instructions with learning objectives on the main topic of the human digestive system				√	
4.	Suitability of basic theory/learning materials with learning objectives on the main topic of the human digestive system					√
5.	Suitability of supporting information with basic theory/learning material on the main topic of the human digestive system					√
6.	Suitability of presentation of material content with information supporting the basic material of the human digestive system					√
7.	Conformity of work steps with objectives learning on the main material of the human digestive system					√
8.	Suitability of discussion materials with learning objectives on the main topic of the human digestive system					√
9.	Accuracy in the formulation of study instructions				√	
10.	Accuracy of the formulation of the basic theory/main learning material of the human digestive system					√
11.	Accuracy of formulating work steps for the human digestive system					√
12.	Accuracy in the formulation of discussion material on the subject matter of the human digestive system					√
Total Rating:						
Notes :						
The assessment scale is between 0-4 with the following assessment						
Assessment criteria		Skor				
If there isn't		0				
If wrong		1				
If it is incomplete, inaccurate or inappropriate		2				
If it is complete, correct or appropriate but the language is not good		3				
If complete, the components of the student worksheet (LPKD) in accordance with the KTSP include (School Identity, objectives		4				

B. Design Stage At this stage

LKPD to improve students' critical thinking skills that have been validated by experts. The following is the LKPD used and adapted to critical thinking indicators

LKPD

Testing Antacid Drugs That Can Neutralize Gastric Acid

Objective:

Proving that drugs containing antacids can neutralize stomach acid.

Tools and materials:

1. Beaker	3. Water	5. Antacid medication
2. Teaspoon	4. Vinegar Acid	6. Litmus Paper



Figure 2: LKPD. Testing Antacid Drugs That Can Neutralize Gastric Acid.

Table 2: Critical thinking LKPD observation table.

Observation Table	
Identification of problems	Write down the problems you find in the discourse above! (BK 1) Then write down the cause of the problem in the form of a question that focuses on the problem in the article! (BK 2)
Establishing a Temporary Answer	How do you think stomach acid can rise into the esophagus? Make a hypothesis for the problem (BK 3)
search for relevant data	Search for relevant data Search for data by reading from books, the internet with valid sources with group friends! How does GERD impact a person's health? (BK 4) What is the solution if someone has GERD? (BK 5)

Now you have to start paying attention to the health of your digestive system and the intake of good nutrition for the body.

A balanced diet with daily activities and a regular eating pattern is one way to maintain the health of your digestive system. After answering the LKPD about GERD and doing a practicum testing antacid drugs that can neutralize stomach acid, then make a scientific report with your group!

C. Development Stage

The results of the analysis obtained from both classes, both classes were declared normal and can be seen from the results of the pretest posttest for both classes attached in the table, namely with significant results for the limited test pretest 0.107, limited test posttest 0.80, control class pretest 0.65, posttest control class 0.20 and it can be concluded that it is significant > 0.05. After knowing the normality data, the paired test will then be carried out.

Based on the paired test attached to the table, the output pair 1 obtained a significant value of $0.000 < 0.05$ and the output pair 2 obtained a significant value of $0.000 < 0.05$ so it was concluded that there was a difference in the average pretest and posttest learning outcomes in the trial class and control class.

After knowing the normality results, a homogeneity test was then carried out with significant results > 0.05 as attached in the table.

Next, data analysis was carried out using the independent t test. The analysis uses the independent t test. The effectiveness of the independent t test is also used to test the effectiveness of skills.

The test results using the t test in the Product Trial show that the posttest scores of the control class and trial class have an influence on improving students' critical thinking skills in the learning process.

This is proven by the t value of $0.000 < 0.05$ according to the following table.

Table 2: Effectiveness Test Results for Critical Thinking Skills Using Problem Based Learning (PBL) Product Trial Devices.

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Hasil Kognitif Berpikir Kritis	Equal variances assumed	2,708	,108	9,016	38	,000	19,000	2,107	14,734	23,266
	Equal variances not assumed			9,016	34,230	,000	19,000	2,107	14,718	23,282

Source : Research Result 2021

Problem Based Learning (PBL) devices can also have an impact on learning effectiveness in the experimental class as evidenced by the N-gain score of 0.77 (high category) and in the control class it is 0.50 (medium category).

3. Conclusion

The LKPD improves critical thinking skills in compiling scientific reports for class VIII students which have been developed and proven to be effectively used in learning activities, this can be seen from the increase in score gain in students' critical thinking skills by 0.76

4. Suggestion

Teachers can use the LKPD Testing Antacid Drugs That Are Capable of Neutralizing Gastric Acid to improve critical thinking skills in compiling scientific reports at school as an alternative learning during the pandemic, but this must be adjusted to the needs of students and the conditions at school.

References

- [1] Hairun,M,dkk. 2020. Analysis and Design of PBL-Based Mathematics Student Worksheet to Improve Critical Thinking Skill. Universal Journal of Education Research 8(8):3310-3322
- [2] Sugiyono. 2011. Statistik Untuk Penelitian. Alfabeta:Bandung.
- [3] Yoswita,Fertika Dwi. 2013. Pengaruh Model Pembelajaran Problem Based Learning (PBL) Terhadap Kemampuan Berpikir Kritis Siswa (Kuasi Eksperimen) Pada Siswa Kelas VII Semester Genap SMP N 26 Bandar Lampung Tahun Pelajaran 2012/2013 (Materi Pokok Pengelolaan Lingkungan). Tersedia(online) Diakses di <http://digilib.unila.ac.id>