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Analysis of Improving Learning Outcomes and Student Responses Taught Using HOTS Chemistry Teaching Materials Based on the Case Method on Solution Material

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Abstract

This research aims to analyze the improvement in student learning outcomes and the responses of students who are taught using HOTS (Higher Order Thinking Skill) teaching materials based on the case method in solution material. This research was conducted on students of the chemistry education study program in the chemistry department, FMIPA, Medan State University. Research sampling was carried out using purposive sampling and a sample class of PSPK 23 A was obtained. The research instrument used in this research used test instruments to analyze improvements in learning outcomes and non-test instruments to analyze students' responses to the teaching materials used. The analysis technique for improving learning outcomes is carried out using the N-Gain test and to analyze student responses using a percentage scale. Based on the analyzed learning outcomes data, it was found that the increase in learning outcomes for students in the "Medium" category was 74.286% and for those in the "Low" category was 25.714%. In line with this, data on the results of student responses to HOTS teaching materials based on the case method that was used gave a positive response with a percentage rate of 91.3% which was included in the "Very Good" response category.

Keywords: Teaching materials, HOTS, Case Method

Introduction

To make the nation's life more intelligent, improving the quality of education is very important for sustainable development in all aspects of human life. The national education system must always be developed by the needs and developments that occur at the local, national, and global levels (Mulyasa, 2006: 4). many things can be obtained through education, such as increasing insight (knowledge) and making someone more skilled in honing skills (hard and soft skills). So, it can also be said that education is training that is given from an early age (Neolaka & Grace, 2017). In 2023, the government implemented an independent learning curriculum that seeks to liberate or give teachers the freedom to use various teaching tools to suit the needs and characteristics of students. The learning process in the Merdeka Curriculum directs students to feel free to think, to innovate, to learn independently and creatively, and to learn for happiness (Daga, 2021).

The implementation of the independent learning curriculum directs us to develop students' high-level thinking skills to be able to face global competition. This HOTS capability is needed in the world of work in the future with increasingly tight global competition and requires someone to be able to solve problems quickly and precisely. Therefore, developing HOTS in learning is very important for students to face increasingly complex and dynamic global competition. This is also by research conducted by Mansilla & Jackson (2011) which revealed that students who can develop high-level thinking skills, such as analysis, synthesis, and evaluation will have the ability to solve complex problems and adapt to rapid environmental changes.

A supporting aspect of developing students' high-level thinking skills is the use of appropriate methods. One of the recommended methods is the case method. case method is a method that exposes students to real-life problems where learning stimulation is developed. Students are motivated to overcome difficulties that arise in the real world by using this learning strategy. Thus, students can think critically, analyze problems, and solve them using various sources (Salsabilla et al., 2014:2). This is in line with research conducted by Fatimah & Taufik (2022) that case method-based learning can influence students' level of understanding.

One chemical material that needs to be understood well is a solution. Soluble chemistry is the basic concept of solutions widely applied in human life, both in the world of health and the industrial world. Therefore, this solution material is very important for students to understand so that they can apply it as a solution for life.

Therefore, there is a need for an integrated application of HOTS questions with the case method to improve students' high-level thinking abilities. One solution is the application of HOTS chemistry teaching materials based on the Case Method in solution material. Based on this, the author conducted this research to provide a solution for developing students' high-level thinking abilities.

Research Method

This research was conducted using test and non-test instruments given to students who were the research samples. The test instrument is used to obtain data on improving learning outcomes and is analyzed using the N-Gain test with the following formula:

$$N\ Gain = \frac{Skor\ Posttest - Skor\ Pretest}{Skor\ Ideal - Skor\ Pretest}$$

(Hake, 2002)

with the following N-Gain score categories:

Table 1. N-Gain Value Category

N-Gain Value	Category
Tableg > 0,7	High
$0,3 \leq g \leq 0,7$	Medium
g < 0,3	Low

(Meltzer & David, 2002)

Non-test instruments are used to obtain student response data which will be analyzed using the following percentage scale:

Table 2. Student Response Categories

Percentage	Category
0% - 20%	Very less
21% - 40%	Not enough
41% - 60%	Enough
61% - 80%	Good
81% - 100%	Very Good

(Riduwan, 2012)

Result and Discussion

Results of Analysis of Improved Learning Outcomes

Based on the data obtained, the following data results were obtained:

Table 3. Data from Analysis of Improved Student Learning Outcomes

Nomor Data	Post-Pre	Skor Ideal-Pre	N Gain	Kategori
1	15	50	0,300	Medium
2	20	60	0,333	Medium
3	20	50	0,400	Medium
4	20	55	0,364	Medium
5	15	45	0,333	Medium
6	30	60	0,500	Medium
7	25	75	0,333	Medium
8	10	55	0,182	Low
9	20	45	0,444	Medium
10	20	60	0,333	Medium
11	20	65	0,308	Medium
12	20	65	0,308	Medium
13	20	60	0,333	Medium
14	15	55	0,273	Low
15	25	60	0,417	Medium
16	25	80	0,313	Medium
17	10	55	0,182	Low
18	15	35	0,429	Medium
19	10	60	0,167	Low
20	25	60	0,417	Medium
21	20	60	0,333	Medium
22	35	70	0,500	Medium
23	20	75	0,267	Low
24	20	55	0,364	Medium
25	20	65	0,308	Medium
26	20	55	0,364	Medium
27	15	75	0,200	Low
28	30	75	0,400	Medium
29	15	55	0,273	Low
30	35	60	0,583	Medium
31	15	65	0,231	Low
32	30	65	0,462	Medium
33	10	60	0,167	Low
34	25	60	0,417	Medium
35	25	50	0,500	Medium

Based on the data above, it can be concluded that the average student learning outcomes have increased but only fall into the "medium" and "low" categories. In improving student learning outcomes, the "medium" category dominates, namely around 74.286%, and the "low" category around 25.714%.

There may be no increase in learning outcomes in the "high" category because it is caused by several factors, including students not being used to facing HOTS questions which lead them to reason longer than the questions they usually encounter. Apart from that, students still have to learn more to be able to provide solutions to the problems they face so that in the future they will be able to develop their high-level thinking abilities.

Results of Student Response Analysis

The results of the analysis of the student response data obtained are shown in the graphic image as follows:

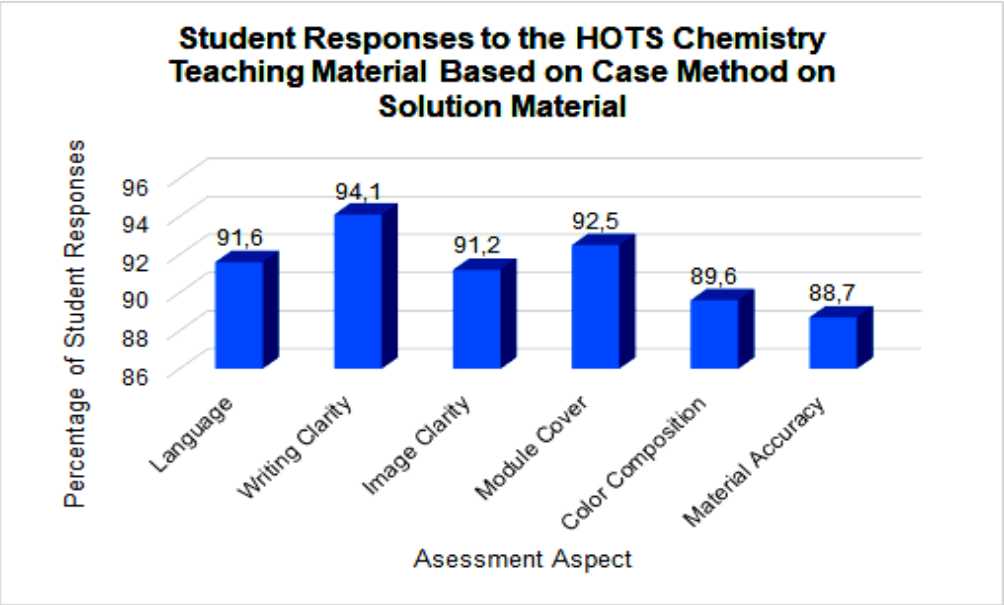

Figure 1. Student Responses to the HOTS Chemistry Teaching Material Based on Case Method

Based on the data obtained in the graphic image above, in the language aspect, students gave a very good response with a percentage of 91.6%. In the aspect of clarity of writing, students gave a positive response with a percentage of 94.1% that the teaching materials developed met the requirements for clarity in writing and were easy to read and understand. In the aspect of image clarity, the same response was also obtained with a percentage of 91.2, which is included in the very good category because students can better understand the content of the teaching materials developed by observing the existing and clear images in the teaching materials. Apart from that, the aspect of module cover, color composition, and material accuracy respectively received positive responses from students with a percentage of 92.5%; 89.6 %; and 88.7% were included in the good response category to the teaching materials developed. When all aspects are averaged, a percentage level of 91.3% is obtained which is included in the very good response category.

Conclusion

Based on the research results that have been obtained, it can be concluded that: 1) the average student learning outcomes have increased, including the "medium" category by 74.286% and the "low" category by 25.714%, where the increase in student learning outcomes that dominates is the category "medium" 2) Student responses to Higher Order Thinking Skill (HOTS) chemistry teaching materials based on the Case Method in Solution Material obtained an average percentage level of 91.3% which is included in the very good response category.

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