

APPLICATION OF THE HOTS-BASED SCIENTIFIC LEARNING APPROACH TO THE SCIENCE LEARNING OUTCOMES OF FIFTH GRADE ELEMENTARY SCHOOL STUDENTS

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Abstract

This study aims to determine the science learning outcomes of fifth grade students at SDN 57 Lubuklinggau after using a HOTS-based scientific learning approach. The method used is a quasi-experimental research method, with a pre-test-post-test group research design. The population in this study were all students of class V SDN 57 Lubuklinggau totaling 22 students who were the sample in the study. Data collection is done by giving a description of 6 questions. Data were analyzed using the z-test at a significant level of = 0,05. Based on the results of the post-test data analysis, it was found that zcount 5,50 and ztable 1,64 means Ho is rejected and Ha is accepted, meaning that the science learning outcomes of fifth grade students at SDN 57 Lubuklinggau after the implementation of the HOTS-based scientific learning approach are significantly complete. The average obtained is 77,65 and the percentage of the number of students who complete reaches 100%.

Keywords – HOTS; Learning Outcomes; Natural Science; Scientific Learning

1. Introduction

Education is one of the things that cannot be separated in human life (Sakti & Wahyudi, 2019:38). Education in general is a planned and systematic activity to create an environment and learning process that allows students to develop the potential and skills needed by students and the community (Sofyan, 2019: 3). Law Number 20 of 2003 concerning the National Education System (Musfah, 2017:9) Education is a conscious effort to create an environment and learning process so that students can actively develop their potential. Education is a series of lessons for students to make people more critical in thinking (Dwianti et al, 2021:675).

The teacher's role actually determines educational outcomes, but the problem that teachers often face is how the learning is delivered (Antarini et al, 2020: 7). Another common problem in education is the low absorption of students, especially in science subjects (Rahmawati & Dewi, 2019:29). This is because science learning is related to learning about nature systematically, so science is not only a collection of knowledge in the form of facts, but also a process of discovery (Rahmi, 2017:6).

According to Destya et al. (2017: 2) Science is a knowledge base consisting of a collection of facts, concepts, theories, and laws discovered through the scientific process. Scientific learning fosters students' scientific attitudes towards learning concepts, because scientific learning is a systematic collection of theories and their application is generally limited to natural phenomena that can be determined by scientific methods such as: Based on observable principles and processes, as observations and experiments, scientific attitudes are needed such as curiosity, open-mindedness, and honesty (Dahlia et al, 2019:11). Science studies natural phenomena and their contents, and requires scientific attitudes such as critical thinking and a sense of responsibility. The scientific learning process emphasizes more on direct experience in order to gain a scientific understanding of the natural environment (Dewi & Kristin, 2017:68).

Science learning is said to be successful if the learning objectives are achieved, this is evidenced by the learning outcomes. However, in reality there

are still schools that have low science learning outcomes and have not reached the specified KKM. This fact is based on the results of interviews that the researchers conducted on November 20, 2021 at SD Negeri 57 Lubuklinggau which obtained information from Mrs. Desy Irmayani as homeroom teacher for class V. It is known that in science learning, teachers still use the lecture method and learning is still teacher-centered (Teacher). Centered), students are not used to asking questions in the learning process, students are not accustomed to discussing in groups and collaborating with other students, and students are not accustomed to expressing opinions in learning, students' lack of enthusiasm in learning science and student learning outcomes are still low.

The teaching and learning process, the learning outcomes that are expected to be achieved by students and it is important for teachers to know, in order to plan teaching and learning activities appropriately (Kosilah & Septian, 2020:1142). The learning outcomes of fifth graders at SD Negeri 57 Lubuklinggau in science lessons mostly have not reached the Minimum Completeness Criteria (KKM). The fact that happened at SD Negeri 57 Lubuklinggau in carrying out learning only uses student books and teacher books, it is proven that the teacher only explains science material orally and only writes it on the blackboard, the teacher explains in the abstract, so it does not create concrete learning that in school so students find it difficult to absorb the material. This situation resulted in most students have not reached the KKM value that has been set by the school of 70.00. Out of 22 students, 15 students or 68.18% of students stated that they had not fulfilled the KKM, while 7 students or 31.82% had met the KKM.

The HOTS-based scientific learning approach is a learning process that involves students directly and student-centered learning, namely observing, asking, trying, reasoning, and communicating can create concrete learning. Through scientific-based learning, it can provide direct experience to students so that learning is not limited to mastering the material but also the discovery process.

The assessment instrument that will be used as a measuring tool to determine student abilities as evidenced by learning outcomes should also be guided by the level of Bloom's taxonomy thinking. Based on the 2013 curriculum demands that students have higher order thinking skills (HOTS), the teacher can provide HOTS-based test questions to train students. HOTS-based test questions can help students develop higher-order thinking skills. The ability in question is the ability to think critically, reflectively, creatively, and metacognitively (Kristanto & Setiawan, 2020:370-371).

Information obtained through the fifth grade teacher of SD Negeri 57 Lubuklinggau, the assessment instrument which is usually made for daily tests or grade promotion assessment questions is still in the realm of C1 to C3, there are C4 but not many. This is because in making HOTS questions the teacher is not used to it so that they only insert one or two HOTS questions among other questions. The use of appropriate learning approaches and HOTS-based assessment instruments makes students better understand the learning material and can complete student learning outcomes.

Science was first introduced by American science education at the end of the 19th century, with an emphasis on formal experimental methods that lead to scientific facts (Rohandi in Ghozali, 2017: 3). Conceptually, learning or scientific approach leads to a humanitarian model, learning that provides space for students to develop according to their intellectual potential (Musfiqon & Nurdyansayah, 2015:40). The scientific approach or science learning is intended to provide understanding to students in recognizing, understanding various materials using a scientific approach, that information can come from anywhere and anytime (Pohan, 2020:20).

Based on the description and explanation above, it is necessary to conduct research to solve learning problems and student learning outcomes. Then the researcher will conduct a research with the title "Application of HOTS-Based Scientific Learning Approach to Science Learning Outcomes for Fifth Grade Students of SD Negeri 57 Lubuklinggau".

2. Method

This research was conducted at SD Negeri 57 Lubuklinggau having the address at Jalan Kutilang Rt. 01 Marga Mulya Village, South Lubuklinggau District II. The research implementation time is in the even semester of the 2021/2022 academic year with the aim of knowing the science learning outcomes of fifth grade students. The steps of this research include; Identifying problems during preliminary studies, reviewing literature, determining samples, making research instruments, conducting instrument trials, conducting pre-tests, applying HOTS-based scientific learning approaches, conducting post-tests, and analyzing post-test data.

The research method used is an experimental research method, namely a quasi-experiment with a pre-test-post-test group research design. The experimental research method is a quantitative research method, used especially if researchers want to conduct experiments to find the effect of independent variables or certain treatments on the dependent variable under controlled conditions (Sugiyono, 2019:110).

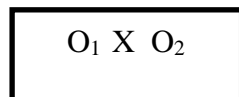


Figure 1. Pre-Experimental One Group Pretest-Posttest

Information :

O₁ : Pre-Test

X : Application of HOTS-Based Scientific Learning Approach

O₂ : Post Test

a. Research Population

The population in this study were all fifth grade students of SD Negeri 57 Lubuklinggau for the academic year 2021/2022, totaling 22 people consisting of 13 male students and 9 female students. The sample in this study were all members of the population, namely all fifth grade students of SD Negeri 57 Lubuklinggau.

b. Sampling Technique

The sampling technique in this study used a saturation technique, namely a sampling technique that showed the saturation value of the sample. Saturated sample is also often interpreted as a sample that is already at its maximum, because adding any amount will not change the representativeness of the population. Thus, the samples in this study were all members of the population, namely all fifth grade students of SD Negeri 57 Lubuklinggau.

c. Data Collection Technique

Data collection techniques in this study are: 1). Tests are used to assess and measure student learning outcomes, especially cognitive learning outcomes relating to mastery of teaching materials or materials in accordance with what has been taught. The test questions in this study were in the form of essays or descriptions, totaling 10. 2). Documentation, photos and videos as accurate evidence were used to obtain data during the research. 3). Interviews are activities carried out to collect data in the form of information from a resource person by asking questions.

d. Data Analysis

The data analysis technique used in this study uses quantitative techniques. The data analysis technique has several stages, namely, determining the normality test of the data and the z-test. Normality test is used to test the assumption of normality of a data. Data is normally distributed as a requirement for analysis using parametric statistics (Lestari & Mokhammad, 2017: 254). Indicators of success in this study if student learning outcomes with learning activities experience completeness by obtaining a value in accordance with the KKM that has been set at 70.

3. Result and Discussion

The study began with testing the instrument in a high class. The instruments in this study were test questions in the form of essays or descriptions, totaling 10 questions. Based on the results of the calculation of the 10 questions

given, only 6 questions were eligible to be used in the study. 6 questions that meet the requirements to be used in the study will be a means of collecting pre-test and post-test data. The data on the results of students' scores in the initial conditions (Pre-Test) or before the action is taken is presented in the form of table 1.

Table 1. Pre-Test Calculation Results

N	\bar{x}	S	the highest score	lowest value	students complete
22	66,29	14,59	92	50	7 Students

Based on table 1. It can be seen that students who scored more than or equal to the KKM were 7 students (31,82%) and those who scored less than the KKM were 15 students (68,18%). The highest pre-test score was 92 and the lowest score was 50 with an average (\bar{x}) overall score of 66,29. Descriptively, it can be concluded that the initial abilities of fifth graders at SD Negeri 57 Lubuklinggau before the implementation of science learning by applying the HOTS-based scientific learning approach have not been completed. The recapitulation of post-test research data calculations for fifth grade students of SD Negeri 57 Lubuklinggau after the implementation of science learning by applying the HOTS-based scientific learning approach can be seen in table 2.

Tabel 2. Post-Test Calculation Results

N	\bar{x}	S	the highest score	lowest value	students complete
22	77,65	6,5	92	71	22 Students

In table 2 above, it can be seen that students who scored more than 70 or above the KKM were 22 students (100%) this indicates that all students have completed. The average value obtained by students is 77,65. Descriptively, it can be concluded that the final ability of the fifth grade students of SD Negeri 57 Lubuklinggau after the implementation of science learning by applying the HOTS-based scientific learning approach is in the complete category. When compared with the pre-test data, the average score obtained by students increased by 11,36. In the pre-test there were only 7 students (31,82%) who completed and in the

post-test there were 22 students (100%) who completed the science learning by applying the HOTS-based scientific learning approach.

Normality test is used to determine normal or abnormal data. So this study used the normality test with the χ^2 (Chi Squared) fit test. Based on the provisions of statistical calculations regarding the normality test of data with a confidence level of $\alpha = 0,05$, if $\chi_{Count}^2 < \chi_{table}^2$ then it is stated that the data is normally distributed, if $\chi_{Count}^2 \geq \chi_{table}^2$ then the data is not normally distributed (Supardi, 2016:138) . The complete calculation results can be seen in table 3.

Table 3. Normality Test

Test	χ_{Count}^2	Dk	χ_{table}^2	Information
Final test	4,9446	5	11,070	Normal

Based on the table above, the provisions of the normality test using the χ^2 test post-test count is $4,9446 < \chi_{table}^2$ is 11,070, then the statistical distribution of 22 fifth grade students of SD Negeri 57 Lubuklinggau in science learning is declared to be normally distributed. After knowing that the data is normally distributed, it can be continued with hypothesis testing. The complete calculation recapitulation can be seen in table 4.

Table 4. Hypothesis Test

Test	z_{Count}	z_{table}	Information
Final Test	5,50	1,64	$z_{hitung} > z_{tabel}$ Ha accepted

Furthermore, z_{hitung} is compared with z_{tabel} with $\alpha = 5\%$, and z_{tabel} is 1,64. This means that $z_{hitung} \geq z_{tabel}$ so that H_0 is rejected and H_a is accepted. Thus, based on the calculation of student learning outcomes, the hypothesis proposed in this study can be accepted as true, so it can be concluded that the science learning outcomes of fifth grade students of SD Negeri 57 Lubuklinggau after the HOTS-based scientific learning approach were significantly completed. This is supported by research conducted by Magdalena Chori Rahmawati & Naomi

Dias Laksita Dewi (2019) with the title "Combination of Scientific and Environmental Approaches and Their Influence on Science Learning Outcomes of Elementary School Students". The results of the research conducted by the researcher found that the application of learning that combines scientific and environmental approaches has a significant influence on the achievement of learning outcomes for fifth grade elementary school students.

The implementation of learning using a HOTS-based scientific learning approach is carried out in three face-to-face meetings. The first meeting was held on April 7, 2022, researchers introduced themselves so that researchers and students could have a good relationship. Then, the researcher conveys the learning material to be studied to students, then the researcher provides stimulation by presenting an image of the material to be studied. Then, the researcher and the students together analyze the images that have been observed. The researcher gave the opportunity for students to ask a question, which was then the researcher divided the students into several study groups and asked to read the reading material in order to stimulate students' curiosity. Next, the researcher explains/explains the material by conducting experiments to find out the difference between groundwater and surface water in front of the class. Then, students and their group mates were given the task to record the results of the experiment which then each representative of each group presented the results in front of the class.

The first meeting, the researcher experienced difficulties and found obstacles. Students have not been able to adjust to learning activities. Most of them do not understand or understand their task in the group. Many students find it difficult to communicate with their friends in finding solutions to the problems that have been given. There are students who are individualists who tend to prefer to do their own group assignments, there are also students who tend to be passive in expressing their opinions in groups.

The obstacles that occurred during the learning process at the first meeting slowly began to decrease. The second meeting was on April 8, 2022,

students had begun to understand their respective duties in groups so that good communication was established between one student and another, as well as between teachers and students. Indeed, there are some students who still do not carry out their duties well, but other students in the group help their theme so that the problems given can be solved. Students become more daring to express their opinions both in groups and in front of the class.

The third meeting which was held on April 9, 2022, students have understood their duties well, in learning activities students feel more happy and actively learn and have opinions. At this meeting the researcher also invited students to make posters about keeping the river clean. Many of the students began to experience cognitive changes, it can be seen from students who began to think critically by asking unexpected questions during teaching and learning activities such as "why is sea water salty while water in wells is not" this indicates a change at the cognitive level students who lead to a critical student mindset.

The final test (Post-Test) was held on April 11, 2022 after participating in learning using a HOTS-based scientific learning approach or after carrying out treatment activities or giving treatment using a HOTS-based scientific learning approach. The final test (Post-Test) was conducted to determine students' abilities after the HOTS-based scientific learning approach was applied to learning activities. The tests given to students relate to science learning on theme 8 sub-theme 2 (Environmental Change). In this post-test activity, students are assigned to work on test questions in the form of essays totaling 6 (six) questions. After all students have finished working on it, then the researcher gives an assessment of the science work of the fifth grade students of SD Negeri 57 Lubuklinggau, it turns out that the average value of the final test (Post-Test) of students after using the HOTS-based scientific learning approach increased to 77,65. The magnitude of the increase from pre-test to post-test was 11,36. This is because the HOTS-based scientific learning approach does not only focus on how to develop students' competence in conducting observations and experiments, but how to develop knowledge and thinking skills so that they can support creative activities in

innovating or working (Pahrudin & Pratiwi, 2019:58). The learning process can also train students to dare to express their opinions. Students are also trained to be responsible, respect the opinions of others, and dare to express their opinions in front of the class.

Based on the discussion above, data on the number of students who scored more than 70 (completed) in the post-test (final test) were 22 students (100%) and the score was less than 70 (unfinished), namely 0 students (0 %). The highest value is 92 and the lowest is 71. The overall average (\bar{x}) value of the post-test data, based on the calculations, obtained (\bar{x}) = 77,65, $s = 6,5$ and X^2 Count post-test is 4,9446 < χ^2 table is 11,070, then the statistical distribution of 22 fifth grade students of SD Negeri 57 Lubuklinggau in science learning is stated to be normally distributed. Furthermore, z_{hitung} is compared with z_{tabel} with $\alpha = 5\%$, it is obtained that $|z|_{hitung}$ is 5,50 and $|z|_{tabel}$ is 1,64.

4. Conclusion

Based on the results of research and discussion, the average value of the pre-test results was 66,29 and the number of students who achieved the Minimum Criteria (KKM) was 7 students (31,82%). Meanwhile, the average value of the post-test results was 77,65, and students who achieved the Minimum Completeness Criteria (KKM) were all students of class V as many as 22 students or 100%, and obtained z_{Count} 5,50 and $z_{(table)}$ 1,64 then, $z_{count} > z_{table}$ means H_0 is rejected and H_a is accepted so that the hypothesis in this study is accepted, meaning that the learning outcomes in science learning for fifth grade students of SD Negeri 57 Lubuklinggau after the implementation of the HOTS-based scientific learning approach are significantly completed.

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