
Analysis of the Try Out Problem for the National Examination of Natural Sciences Physics Type HOTS

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Abstract

This research's aim is to know about HOTS questions of Physics in try out of National Examination and HOTS's students of Junior High School Muhammadiyah 1 Wonosobo. The research type was descriptive research, and the research used analysis technique. This technique is done by analyze question documents and students' answer sheet of trying out of Physics National Examination HOTS students of Muhammadiyah 1 Wonosobo junior high school. The subjects in this study were students of class IX Muhammadiyah 1 Wonosobo junior high school in the academic year 2019/2020 with 126 students. The data obtained in the form of a percentage of HOTS type questions and the percentage of students absorption of the results of working out the try out problem. Based on the analysis of the data that has been done, obtained by the category of HOTS is 23.5%, namely in the C4 aspects and the absorption of students by 28.5% with the category is not good. Therefore, it can be concluded that type of HOTS questions in the tryout of Physics National Examination has poor distribution.

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INTRODUCTION

Education today is one of the basic needs for every human being. In Indonesia the implementation of education is in accordance with the philosophy of the Pancasila and the 1945 Constitution which functions to develop abilities, make the characteristic, and dignified national civilization and develop the potential of students to become human beings who believe in and have faith in God Almighty, have noble, healthy, knowledgeable, capable, be creative, be independent, and be a democratic and responsible citizen (Wijaya *et al.*, 2020).

These developments become the focus in education to be achieved to the maximum. Especially the development of students' thinking skills that are currently being activated so that they can become good skills. These skills are thinking skills that are the most important thing to help students' brain activity in understanding and remembering lessons. Learning ability that is always instilled and trained to students will foster a thinking skill. This skill can be used by students to solve problems in daily life with the knowledge they have (Bakry & Md Nor Bakar, 2015).

These thinking skills in science learning are the main goals, such as critical thinking, reasoning, and reflective skills. These skills are included in higher order thinking skills (HOTS) (Gulistan Mohammed Saido *et al.*, 2015). The ability needed to shape students' higher-order thinking skills is the ability to think analytically and creatively to solve a problem or referred to as critical thinking. This ability is important in learning natural science which is one of the requirements for mastering science and technology (Kadri & Rahmawati, 2015). According to Bloom's revised taxonomy, HOTS cognitive aspects include analyzing, evaluating, and creating (Indriani *et al.*, 2021).

These aspects will train students in clearly differentiating idea, be able to solve problems, construct explanations, hypothesize, and understanding complex things more clearly (Pamungkas Stiyamulyani & Sri Jumini, 2018). In addition, through critical thinking learning students are expected to be able to integrate abilities such as observation, analysis, reasoning, assessment, and decision making (Pratama & Prastyaningrum, 2016).

HOTS are quite a hot topic in the world of education. One of them was in the discussions of the Science Teachers Meeting of Natural Sciences at Wonosobo Regency Junior High School who were always looking for ways to find solutions to improve students' high-level thinking skills. This is based on the weaknesses students aren't thinking skills seen in the results of the national science exam from the last three years has decreased. This decrease can be seen from the average IPA grades of SMP Wonosobo

Regency namely from the 2015/2016 academic year with an average grade of 56.79, 2016/2017 with an average of 56.76, and 2017/2018 with an average of 53.67 (Kementerian Pendidikan dan Kebudayaan, 2018).

The decline in the results of the national science exam is one indicator of the weak level of thinking skills of students. That is because the national exam questions have more characteristics than HOTS questions which require students to think better in their completion. The ability to think logically and rationally is still quite low. Similarly, when compared with other countries. This was discussed from the PISA and TIMSS reports which showed Indonesian participants were only able to reach second place six questions on competed questions (Soetomo, 2017). HOTS students can also be shown and trained by getting used to focus and concentration, such as understanding material, listening to presentations, conducting experiments, memorizing verses of the Qur'an (Pamungkas Stiyamulyani & Sri Jumini, 2018). These results should be the first step in improving starting from the learning planning, learning process, to assessment. Some teachers think that teaching and developing high-level thinking skills is suitable for students with high academic achievement (Zohar & Schwartz, 2005, 2012).

In addition, the low level of thinking skills of junior high school students in general in Indonesia can be seen from the evaluation carried out by PISA on reading, mathematics, and science achievements. In 2015, Indonesia was ranked 62 out of 70 countries that took the test. PISA questions can be categorized as high-level thinking.

The involvement of teachers to design learning processes that are focused on students and not only provide concepts, but by connecting students' initial knowledge with new knowledge gained by students will be one of the keys to students in possessing high-level thinking skills (Hastutu, 2020; Yusuf, 2018). However, the preparation of an evaluation that refers to HOTS becomes more necessary to be developed for the evaluation of students in the mastery of higher-order thinking skills. Because by doing a good evaluation system is expected to be a benchmark to find out students' abilities and the actual quality of education.

The National Examination conducted by the government is the government's effort to find out the development of the educational development system in Indonesia, especially the learning system of students, both primary and secondary level (Wijaya *et al.*, 2020). In the HOTS assessment the percentage of learning assessments on cognitive or knowledge aspects should be distributed by distribution C1 = 5%, C2 = 10%, C3 = 45%, C4 = 25%, C5 = 10%, C6 = 5% (Helmawati, 2019). The level of difficulty in the aspects of analyzing,

evaluating, and creating must have to increase (Agustihana & Suparno, 2019).

For schools, the national exam organized by the government is a benchmark for the school to find out the quality of graduates. So that various efforts are made by schools to be able to give the best on the results of the national exam. A common thing to do is to hold out tryouts both districts and schools. This try out aims to train students in understanding national exam questions, so students will get used to solving problems in the form of questions.

Try out that is held refers to the national exam grid for each subject, especially in physics science. In the 2019/2020 school year at the Muhammadiyah 1 Wonosobo junior high school, a try out at the district level national exam for class IX students had been done once before the Corona pandemic spread. With the try out ever held, at least students are able to know the ability to master the material that was taught.

METHOD

The kind of this research is descriptive research using documentation. Documentation technique is a way to collect data by recording data of a document such as books, texts, and existing essays (Wijaya *et al.*, 2020). Descriptive research is used because in this study will describe the results of the analysis of HOTS type questions and the level of high-level thinking skills (HOTS) students. The analysis used in this study is to examine by reading questions, reviewing questions, and recording questions with the aim of calculating the percentage of questions that are of type HOTS on the national exam try out questions at Muhammadiyah 1 Wonosobo junior high school. In addition, by analyzing the absorption of HOTS students in problem solving. The try out questions on the physics science national exam were analyzed based on the characteristics of HOTS. LOTS (Low Order Thinking Skill) type questions are also a part of this research, namely as a comparison with HOTS type questions. LOTS includes cognitive aspects of remembering, understanding, applying (Mahbubillah *et al.*, 2020).

This research was conducted at the Muhammadiyah 1 Wonosobo junior high school 2019/2020 academic year in May - June 2020. The subject of this study was the Muhammadiyah 1 Wonosobo junior high school with a population of all Muhammadiyah 1 Wonosobo junior high school students and the sample was IX grade students who totaling 126 students. National exam questions in

this case are try out questions that can be an instrument to measure students' HOTS if they have a percentage of HOTS type questions in the range of 7.5% - 15% (Iffa, 2016). As for the criteria for the absorption of students in completing the national junior high school physics science exam questions that include HOTS can be seen in table 1 below.

Table 1. Student Absorption Category

Absorbance Interval (%)	Student Absorption Category
$85\% \leq x \leq 100\%$	very good
$70\% \leq x < 85\%$	Well
$50\% \leq x < 70\%$	pretty good
$0\% \leq x < 50\%$	not good

RESULTS AND DISCUSSION

Analysis of the Try Out Question for the national exam Type HOTS

Analysis was carried out on the national exam try out questions which consisted of 40 multiple choice questions. The questions are composed of 17 physical science material questions, 4 chemical science material questions, and 19 biological science material questions. In this study, the analysis was only done on the matter of natural science physics which is based on the details of Anderson's taxonomy which is an improvement from Bloom's taxonomy. The results obtained can be seen in the following table 2 and in figure 1.

Table 2 Percentage of HOTS Type Questions in Try Out of the Physics Science national exam

Cognitive aspects	Question number	Percentage (%)
Remembering (C1)	3, 16, 17,	17.6
Understanding (C2)	2, 5,	11.8
Applying (C3)	1, 4, 7, 10, 11, 12, 13, 14	47.1
Analyzing (C4)	6, 8, 9, 15	23.5
Evaluating (C5)	-	0
Creating (C6)	-	0

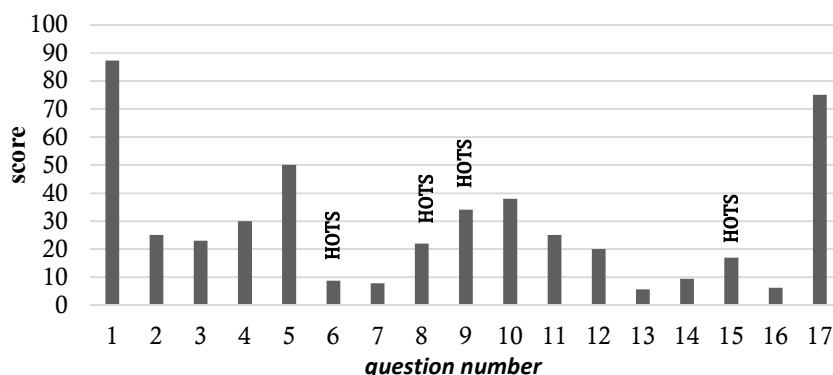


Figure 1 Student's Absorption

Table 2 shows that the try out questions on the physics science national exam have a fairly even distribution of questions, it's just that it has not yet reached the greatest cognitive aspect of HOTS which is assessing and creating. HOTS type questions only reach the ability to analyze which consists of 4 questions with a percentage of 23.5%. The problem is not maximal if it is used to measure students' HOTS. That is because there is still an ability that has not been raised to evaluate students' HOTS. The four questions that have the HOTS type consist of work material for question number 6, simple airplane for question number 8, Hydrostatic for question number 9, and Electricity for question number 15.

Questions on the cognitive aspects of C1, C2, C3 are problems that have a level of resolution with one time thinking which means enough to use memory and the ability to apply in everyday life or in this case the problem. This problem is included in the LOTS type question. Although including the LOTS question, aspects C1, C2, C3 are important abilities for students. With good mastery of aspects C1, C2, C3 it will make it easier for students to master aspects of HOTS questions. Because it is impossible for students to be able to solve HOTS type problems without passing LOTS type questions. The most important thing is the students must know about LOTS type and HOTS type and they have to master all of types.

Problem number 6 is in the form of a story about a wheelbarrow driven by a predetermined scale. The change that occurs is the mass magnitude, the change asks students to calculate the acceleration if the forces used are the same. In its completion, students need the ability to understand in advance to be able to understand the purpose of the problem. Next students must be able to relate the material to the events in the problem so that the ability to apply can also be mastered. And the last one to be able to solve these problems requires analytical skills based on a predetermined scale.

These analytical skills will bring students deeper thinking processes. Thinking deeper means that students are able to process coherently in finding solutions either by counting or by description.

Questions number 8, 9, and 15 are questions that are classified as HOTS as well as questions number 6. In the three questions the form is different from questions number 6, the form of the question asks students to differentiate first by using student knowledge and then sorting correctly. This ability has certainly passed the C1-C3 aspect, so students only need to solve with the C4 aspect of analysis.

HOTS type questions in physics science subjects can be raised on all available material. The use of appropriate verb indicators will facilitate the preparation of HOTS type questions in physics science subjects. However, please note that good HOTS type questions do not mean that all questions presented to HOTS type students. It must also have an appropriate percentage as stated in the research method above.

Analysis of Student Absorption in HOTS Types Question

Students absorption is obtained from the overall calculation based on the correctness of the students' answers to each question. This absorption is an indicator of students' understanding of physics science material, especially on HOTS type problems. The average absorptive capacity of students who are able to answer HOTS categorized questions is 28.5%. The low absorptive capacity of these students is due to the lack of instilling high-level thinking skills of students and the lack of appropriateness of the distribution of HOTS type questions on tryout questions.

Cultivation of high-level thinking skills can be by making patterns Thinking of students with ability support to analyze, create and analyze all aspects and problems (McNamara *et al.*, 2020). Can be done also with combining critical thinking and thinking creative. Ability Just think at a high level The memory aspect or memorization only, has not

yet been received on aspects of analysis, synthesis, and evaluation. Depending on when the teaching and learning process the teacher must involve students, this is done so that students able to think critically and think creatively. Thus students have Higher-order thinking skills if students can conduct analysis, synthesis, and evaluation of a critical question in responding to an event (Ikhsan *et al.*, 2019). Habit of high-level thinking will hone the ability to think of high-level students.

CONCLUSION

Based on the results of research that has been done, it was found that from 17 physics science questions in the try out questions of the national exams used in Muhammadiyah 1 Wonosobo junior high school only had a percentage of 23.5% and students' absorption ability on HOTS questions was still very low with a percentage of 28.5%. These results become the basis later in the preparation of the try out questions further so that the question drafting team pays more attention to the distribution of HOTS questions. As a physics science teacher involved in the learning process that refers to HOTS students will also help students to have high-level thinking skills well, so that the absorption of materials, especially HOTS will be better.

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