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| **ANALYSIS OF HOTS INDICATOR ON SENIOR HIGH SCHOOLS PHYSICS EXAM QUESTION IN WETS PASAMAN DISTRICT** |
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| |  |  | | --- | --- | | 1 Physics Education Student, FMIPA Universitas Negeri Padang  2Physics Department Learture’s, FMIPAUniversitas Negeri Padang  Corresponding author. Email:sonianurriza512@gmail.com,silviyuliasari@fmipa.unp.ac.id, fannyrahmatinarahim@@fmipa.unp.ac.id,ydarvina@fmipa.unp.ac.id | | | **ABSTRACT** | | | *Education is a fundamental foundation for human life. In every educational development, there is always a change in the curriculum. The 2013 curriculum requires HOTS-based learning. In the 2013 curriculum, students must practice thinking skills at the HOTS level by giving HOTS questions. Therefore, the teacher must provide students with HOTS questions. The observations show that the questions used in Senior High Schools throughout West Pasaman District are still in the low category and do not meet the excellent proportion of questions. Therefore, an indicator analysis research was carried out on Physics questions for Senior High Schools in West Pasaman District.*  *This research is descriptive research with a qualitative approach. The population of this research is about Midterm Exam and Semester Exam Senior High Schools in 2018/2019 and 2019/2020 in semesters 1 and 2 in West Pasaman District.*  *The research data was taken using an analytical instrument of question presentation and data collection techniques through documentation. Based on the research that has been done, it was found that the questions that have the highest availability of HOTS indicators for Semester Exam between 2018/2019 and 2019/2020 are in class XI and XII Semester Exam in 2018/2019 while in class X, namely in 2019/2020. As for the Midterm Exam in using the HOTS questions, the highest is Senior High School 1 Pasaman, and the lowest is Senior High School 1 Gunung Tuleh. Based on the research that has been done, it is found that these questions do not meet the availability of HOTS questions.* | | |  | | | **Keywords :***Analysis, Exam Question, HOTS* | | |  | **This is an open access article distributed under the Creative Commons 4.0 Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. ©2019 by author and Universitas Negeri Padang.** | |  | | |  | | |

# INTRODUCTION

Education is the most critical foundation for human life. Education is constantly experiencing developments in the curriculum. This is marked by the rapid advancement of technology and information. The purpose of education will be achieved if the implementation is by government regulations. One of them is to follow the provisions of student assessment that the government has set. The evaluation of students can be seen using various assessment techniques such as tests, observations, individual or group assignments, and other forms that are by the characteristics of the competence and level of development of students' learning outcomes by educators which are carried out in the form of tests, observations, assignments and or other conditions. required. To measure and determine the achievement of student competencies, improve the learning process, compile reports on the progress of daily learning outcomes, mid-semester, end of the semester, end of the year, and or grade increase [1] .

According to Permendikbud No. 23/2016, the assessment of learning outcomes by educators is carried out in the form of tests, observations, assignments and or other necessary documents. To measure and determine the achievement of student competencies, improve the learning process, compile reports on the progress of daily learning outcomes, mid-semester, end of the semester, end of the year, and or grade increase  [2].

Regarding the development of education at the international level, the 2013 Curriculum was made with improvements. Improvements were made to the content standard, namely reducing irrelevant material and deepening and deepening of relevant material for students to think critically and analytically by international standards. Assessment of learning outcomes to assist students in improving higher-order thinking skills (HOTS) because higher-order thinking can encourage students to think broadly and deeply about the subject matter [3].

According to the Revised Bloom's Taxonomy, thinking skills are divided into two levels, namely LOST (Lower Order Thinking Skill) and HOTS (Higher Order Thinking Skill). According to the Directorate of High School Development, HOTS is one approach in learning where students can think critically, logically, reflectively, metacognitively, and creatively. Higher-order thinking skills can encourage students to believe in higher order [4].

In Bloom's Taxonomy, there are three aspects in the cognitive domain, namely analyzing (C4), evaluating factors (C5), and creating elements (C6). Analytical ability is a person's ability to determine the parts of a problem and show the relationship between these parts and the material as a whole. Evaluation ability is an activity to make an assessment based on specific criteria and standards [5] . The ability to create/create is to combine elements to form a new and unique structure, design ways, and find multiple solutions [6].

From the results of interviews that have been carried out at Senior High Schools throughout the West Pasaman District, it has not been appropriately implemented in the learning process that should be required in the 2013 curriculum. Many students are still not used to working on HOTS questions because the questions given by the teacher do not meet the cognitive aspects by the demands of the curriculum on the proportion of the difficulty of the questions. According to Arikunto, the calculation of the difficulty level of a question is a measurement of how significant the degree of difficulty of a question is. If a question has a balanced level of difficulty, then the question can be said to be good [7].

Questions can be used as learning evaluations in the form of test and non-test instruments. Usually, the evaluation technique used is in the form of test questions [8]. Questions are used to foster student understanding during the teaching and learning process at school. That way, it can create a high-level account of students with HOTS questions [9]. HOTS questions are arranged based on the C4, C5 and C6 domain levels formulated in the question indicators. High-order thinking skills have problem-solving abilities, creative thinking skills, critical thinking, reasoning skills, and decision-making abilities. According to King, high order thinking skills include critical, logical, reflective, metacognitive, and creative thinking [10]. With the hope that the evaluation of learning is by the demands of the curriculum in the proportion of questions in the soon.

Observations that have been made obtained the results of a survey in 3 Senior High Schools in the District of West Pasaman. The following are the results of the study conducted.

**Table 1. Based on the data of UN Physics Senior High School in West Pasaman Distict in 2018 are as follows:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| QuestionsLevel | Number of Questions | Percentage  Question | Percentage | | |
| SMAN A | SMAN B | SMAN C |
| HOTS | 6 soal | 15 % | 34 % | 40 % | 35 % |
| MOST | 27 soal | 67,5 % | 43 % | 46 % | 39 % |
| LOST | 7 soal | 17,5 % | 44 % | 49 % | 42 % |

(Survei: 2021)

However, the questions used in evaluating learning are not yet known whether or not they contain indicators for HOTS questions from other tests. In the background, it can be seen that the implementation of the use of HOTS-based questions has not been carried out properly with the conditions that occur in the field. In this way, how is the HOTS indicator available in Physics classes X, XI and XII semesters 1 and 2 at Senior High Schools throughout West Pasaman District.

# METHOD

Based on the background stated, the purpose of this study is to determine the availability of HOTS indicators on physics questions at Senior High Schools in West Pasaman District. This type of research is descriptive research with a qualitative approach. Descriptive research aims to describe a phenomenon or event to explain or describe things as they are [11]. Descriptive research is a fundamental research object. Used to define or describe existing phenomena, both natural and engineered [12]. The research method used is descriptive correlational research because this research aims to describe a phenomenon, events, symptoms, and events that occur factually, systematically. As well as accurate. According to Sugiyono, the population is an area of ​​generalization of objects or subjects with specific qualities and characteristics that researchers use to understand then conclude [13]. The people of this study are all the 2018 and 2019 Senior High School PHYSICS Midterm Exam and Semester Exam Questions used by 13 Senior High Schools in West Pasaman District. The sample, according to Notoatmojo, is partly taken from the entire object under study and is considered to represent the whole population [14]. The sampling technique used in this study is proportional stratified random sampling, which is a technique for taking sample members if the population members are not homogeneous and proportionally stratified [15]. The reason for taking this technique is because the population in this study is Senior High Schools West Pasaman District.For all schools to be represented, this sample is handled with the same portion. In this technique, the sample selection is determined based on the grouping of school literature by looking at the 2018 National Examination average score of Senior High School West Pasaman District in Physics subjects in 2018, namely by randomly selecting schools from each category of high, medium and low.Regarding the sampling technique, Arikunto (2005: 120) suggests that if the subject is less than 100, it is better to take all, so the research is a population study. Furthermore, if the issue is significant, it can be taken between 10%-15% or 20%-25% or more. This sample size is grouped into three groups, namely high, medium and low.

The instrument is a measure used by using a measuring device. Where an agent is a tool used to approach the target in research, research instrumentation means the equipment used in the study—instruments in education such as tests, questionnaires, interview formats and so on [16].The instrument used in this research is the HOTS instrument in terms of the Revised Bloom's Taxonomy and 4 HOTS indicators.

For the preparation of a good instrument, several steps are carried out [17] namely:

1. Planning, at this stage, the formulation of objectives, determining variables and variable categories.

At this stage, a literature review is carried out regarding what variables need to be included in the instrument, which will later be by the category with the device made.

1. Writing the instrument grid

At this stage, compile the instrument is to be carried out by designing the grid on the device first. The lattice is made in the form of a table where the instrument lattice table will be made, then make the instrument according to the previously prepared lattice.

1. Writing instrument items

At this stage, an instrument is made that refers to the grid that has been designed previously.

1. Trial, which is in the form of validity test

The test is carried out to test whether the research instrument can or cannot be used in considering its feasibility.

The overall validity results used the Kappa Cohen formula. At the end of the assessment, the moment kappa (k) value is obtained. The kappa moment decision categories obtained are in table 2.

*Moment Kappa* (k) =  (1)

With :

k = moment kappa (product validity)

Po = the realized proportion (the number of values given by the validator divided by the maximum number)

Pe =unrealized proportion (maximum number minus the total value given by validator divided by maximum number)

Table 2. Decision Category Based on Kappa Moment (k) [18]

|  |  |
| --- | --- |
| Criteria | Category |
| 0,81 – 1,00 | Very valid |
| 0,61 – 0,80 | Valid |
| 0,41 – 0,60 | Medium |
| 0,21 – 0,40 | Less valid |
| 0,01 – 0,20 | Invalid |

The validation results obtained from three expert validators are in the correct category. These results can be seen in table 3.

Table 3. Results of Instrument Validation by the Three Validators

|  |  |  |  |
| --- | --- | --- | --- |
| No | Name Validator | Skor | Category |
| 1 | Ahli 1 | 85 | Very valid |
| 2 | Ahli 2 | 74 | Valid |
| 3 | Ahli 3 | 66 | Valid |

After the instrument used was validated by the three validators, it was revised according to the validator's suggestions and comments. The next step is to enter the data collection stage. Where data collection techniques are ways to get data and information on research. The data collection technique is through interview studies and documentation of information such as questions. The survey of this documentation was carried out by collecting the data needed for further research problems in the analysis. The data obtained are physics questions for classes X, XI and XII at UTS and UAS in 2018/2019 and 2019/2020 at Senior High Schools throughout West Pasaman District.

The procedure carried out in this study is divided into three stages, namely the preparation stage, the implementation stage, the analysis stage and the reporting stage.

1. Preparation phase

At the preparation stage, namely:

1. We are conducting observations to obtain information on Physics values ​​in West Pasaman District.
2. Determine the subject and object of research used.
3. Prepare research instruments.
4. Implementation Stage

At this stage, data were collected using an instrument that had been previously validated according to the revision. The analysis was carried out regarding the availability of HOTS questions in each question.

1. Completion Stage

The completion stage is carried out after analyzing the Midterm Exam and Semester Exam questions. At this stage, what must be done is to process data from research results by processing according to the steps for data analysis. Then interpret the research data. Finally, conclude the effects of research that has been done.

After completing the three stages of the procedure in this study, the next step was to process the data. Data processing in a study is a significant activity because, from these activities, the data obtained will be tested and assessed. The results of this data processing technique will significantly affect the results of the research conducted. Data analysis in a study is a fundamental technique because, from this technique, the data obtained will be tested and assessed so that the data analysis technique will significantly affect the results of the research conducted. According to Sugiyono, data analysis is the process of systematically searching for data obtained from interviews, field notes, and documentation by organizing data into categories, describing them into units, synthesizing, compiling into patterns, choosing what is essential and what is not. Will be studied and make conclusions so that they are easily understood by themselves and others [19].

The data processing techniques used in this research are

1) Summing from the appearance of hots indicator instrument items in each problem analyzed

2) Calculate the percentage of availability of the HOTS indicator on the question

3)Determining hots availability criteria in physics problems can be seen in table 4

Tabel 4. **. Hots Indicator Availability Criteria On Physics Problems**[18]

|  |  |
| --- | --- |
| Criteria presentase | Category |
| 81%-100% | Highly available |
| 61%-80% | Available |
| 41%-60% | Simply available |
| 21%-40% | Less available |
| 0-%20% | Not available |

[ 4.Conclude from the data that has been obtained..

# RESULTS AND DISCUSSION

Based on the research, it has been carried out by analyzing the Midterm Exam and Semester Exam questions for class X, XI and XII semesters 1 and 2 in 2018/2019 and 2019/2020 throughout West Pasaman Regency, namely Senior High School 1 Pasaman, Senior High School 1 Gunung Tuleh, Senior High School 1 Sungai Aur, Senior High School 1 Lembah Melintang, Senior High School 1 Koto Balingka, Senior High School 1 Sungai Beremas. The analysis was carried out to determine the availability of HOTS indicators on the Midterm Exam and Semester Exam questions. After analyzing the availability of HOTS questions on physics class X, XI and XII questions. The percentage results were obtained in 6 schools. Each school produced various presentations ranging from categories according to the proportion of queries and not by the proportions of good questions. The discussion of the analysis of the HOTS component analysis in each of the analyzed questions is described as follows:

1. Comparison of the Availability of HOTS Components on the 2018/2019 and 2019/2020 Physics Semester Exam Questions at Senior High Schools in West Pasaman District.

The comparative analysis of the HOTS components on physics Semester Exam questions at Senior High Schools throughout West Pasaman District for classes X, XI and XII in 2018/2019 and 2019/2020 can be seen in Figure 1.

Figure 1. Percentage Comparison of the Availability of HOTS Indicators on Physics Semester Exam Questions at Senior High Schools West Pasaman District 2018/2019 and 2019/2020

The results of the analysis were obtained for the UAS questions. The highest percentage of HOTS availability was in the problem-solving component, with a rate of 50% in the category of moderately available. At the same time, the lowest part is creative thinking with a presentation of 0% with the variety, not public. In the Semester Exam question, it can be seen that the average for the highest HOTS component is in class XI semester 1, with a presentation of 23.8% in the less available category and the lowest presentation of 9.7% in the unavailable category.

1. Comparison of the Availability of HOTS Components on physics Midterm Exam questions at Senior High Schools 1 Pasaman

The results of the analysis of the availability of the HOTS component on the physics Midterm Exam questions at Senior High School 1 Pasaman classes X, XI and XII in 2018/2019 and 2019/2020 can be seen in Figure 2.

Figure 2.Percentage Comparison of the Availability of HOTS Indicators on Physics MidExam Questions at Senior High Schools 1 Pasaman 2018/2019 and 2019/2020

Based on Figure 2, it was found for the Midterm Exam question that the highest percentage of HOTS component availability was the critical thinking component with a presentation of 44.4% with a reasonably available category and the lowest HOTS component availability presentation was the creative thinking component with a 0% presentation in the unavailable class. But the part that often arises is between problem-solving and critical thinking. And what does not appear is creative thinking.

1. Comparison of the Availability of HOTS components on physics Midterm Exam questions at Senior High School 1 Gunung Tuleh

Analysis of the availability of the HOTS component on the physics Midterm Exam questions at Senior High School 1 Gunung Tuleh class X, XI and XII in 2018/2019 and 2019/2020 can be seen in Figure 3.

Figure 3.Percentage Comparison of the Availability of HOTS Indicators on Physics MidExam Questions at Senior High Schools 1 Gunung Tuleh 2018/2019 and 2019/2020

Based on Figure 3, it was found that for the Midterm Exam question, the percentage of the availability of the HOTS component, the component that often appears, is between problem-solving and critical thinking. And what does not occur is creative thinking. However, the highest component is the essential thinking component, with a presentation of 44.4% with an excellent available category. The lowest HOTS component availability presentation is the creative thinking component, with a 0% presentation in the unavailable class.

1. Comparison of the Availability of HOTS Components on physics Midterm Exam questions at Senior High School 1 Sungai Aur

The results of the analysis of the availability of HOTS components on physics Midterm Exam questions at Senior High School 1 Sungai Aur class X, XI and XII in 2018/2019 and 2019/2020 can be seen in Figure 4.

Figure 4.Percentage Comparison of the Availability of HOTS Indicators on Physics MidExam Questions at Senior High Schools 1 Sungai Aur 2018/2019 and 2019/2020

Based on Figure 4, it is found for the Midterm Exam question that the highest percentage of HOTS component availability is the problem-solving component with a presentation of 33.3% in the less available category and the lowest HOTS component availability presentation is the creative thinking component with a 0% presentation in the unavailable class. But the part that often arises is between problem-solving and what does not appear is creative thinking.

1. Comparison of the Availability of HOTS components on physics Midterm Exam questions at Senior High School 1 Lembah Melintang

The results of the analysis of the availability of the HOTS component on the physics Midterm Exam questions at Senior High School 1 Lembah Melintang class X, XI and XII in 2018/2019 and 2019/2020 can be seen in Figure 5.

Figure 5.Percentage Comparison of the Availability of HOTS Indicators on Physics MidExam Questions at Senior High Schools 1 Lembah Melintang 2018/2019 and 2019/2020

Based on figure 5, from the picture above for the Midterm Exam question, the highest percentage of HOTS component availability is the problem-solving component with a presentation of 25% in the unavailable category, and the lowest HOTS component availability presentation is the creative thinking component with a 0% presentation in the untouchable class. But the part that often arises is between problem-solving and critical thinking. And what does not appear is creative thinking.

1. Comparison of the Availability of HOTS components on physics Midterm Exam questions at Senior High School 1 Ranah Batahan

The results of the analysis of the availability of the HOTS components of Senior High School 1 Gunung Tuleh class X, XI and XII in 2018/2019 and 2019/2020 can be seen in Figure 6.

Figure 6.Percentage Comparison of the Availability of HOTS Indicators on Physics MidExam Questions at Senior High Schools 1 Ranah Batahan 2018/2019 and 2019/2020

Based on Figure 6, it was found that for the Midterm Exam question, the percentage of the availability of the HOTS component, the component that often appears, is between problem-solving and critical thinking. And what does not occur is creative thinking. But the highest in the problem-solving part with a presentation of 33.3% with a less available category, and the lowest HOTS component availability presentation is a creative thinking component with a 0% presentation in the unavailable class.

1. Comparison of the Availability of HOTS Components on physics Midterm Exam questions at Senior High School 1 Sungai Beremas.

The results of the analysis of the availability of the HOTS component on the physics Midterm Exam questions at Senior High School 1 Sungai Beremas class X, XI and XII in 2018/2019 and 2019/2020 can be seen in Figure 7.

Figure 7.Percentage Comparison of the Availability of HOTS Indicators on Physics MidExam Questions at Senior High Schools 1 Sungai Beremas 2018/2019 and 2019/2020

Based on Figure 7, the presentation results for the Midterm Exam question the availability of HOTS components, the components that often appear are between problem-solving and critical thinking. And what does not occur is creative thinking. But the highest in the problem-solving part with a presentation of 33.3% in the unavailable category, and the lowest HOTS component availability presentation is the creative thinking component with a 0% presentation in the untouchable class.

**CONCLUSION**

Analysis of HOTS indicators on physics questions for Senior High School class X, XI and XII semesters 1 and 2 in 2018/2019 and 2019/2020 from Midterm Exam and Semester Exam. Where the questions analyzed are questions used by six schools in the West Pasaman district. The sample documents were obtained from the Midterm Exam and Semester Exam questions where the teacher himself made the Midterm Exam questions, and (Schools Principal Working Meeting) MKKS made the Semester Exam questions in West Pasaman District. The study aims to determine the availability of HOTS on questions. According to Desy Eka and Alimufi (2015), HOTS contains 4 HOTS indicators: problem-solving, decision making, critical thinking, and creative thinking. After analyzing the question presented on the availability of HOTS components from 6 Senior High School in West Pasaman District, it was found that the element that is often used is problem-solving and which is rarely used is critical thinking and decision-making skills. The one that is never used is creative thinking. So the results of the study of the availability of HOTS questions by six schools, not all questions contain the HOTS component well, because many schools do not meet the criteria for HOTS questions, the questions in West Pasaman district are not proportional in making HOTS questions.

For a comparison of the analysis of the HOTS indicator on physics questions, it can be seen that in class X in 2019/2020, it was higher than in 2018/2019, while in class XI and XII, the HOTS questions were the highest in 2018/2019, this is due to the lack of availability of HOTS in physics Semester Exam in West Pasaman Regency in each question. As for the HOTS questions at Midterm Exam in West Pasaman District, 3 Senior High Schools with the highest HOTS in 2018/2019, hands with the same HOTS questions 1 Senior High School and 2 Senior High Schools with the highest HOTS in 2019/2020. So the availability of HOTS questions every year has not been made well.

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