Analysis of The Availability of HOTS Indicators on Physics Questions for Class X SMA Adabiah 2 Padang During the Covid 19 Pandemic

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Abstract - *In the 2013 curriculum, one of the efforts to improve the quality of human resources in Indonesia is to increase HOTS in the learning of every school student. However, with the COVID-19 pandemic at the beginning of 2019, there have been changes in all areas of life, especially education. Learning during the COVID-19 pandemic was greatly disrupted because of the limited hours of lessons, besides that there were many other obstacles such as the availability of inadequate online learning support media during the COVID-19 pandemic. In addition, the delivery of material delivered by the teacher was also not optimal due to limited circumstances with only through virtual mode. This study aims to determine the availability of HOTS indicators on physics questions at SMA Adabiah 2 Padang during the covid 19 pandemic. This research instrument is an instrument that has been validated with a valid category. The research method used is a documentation study with UTS and UAS assessment sheets for class X MIPA students. Analysis of the data used in determining the availability of HOTS indicators in this Physics problem uses the formula (∑HOTS of components that appear)/(number of HOTS of components that appear) × 100%. In this study, it was found that the percentage value of the availability of the HOTS indicator on UTS questions was lower than on UAS questions, with the percentage of UTS questions being 8% and the percentage on UAS questions being 24%. Then the percentage for problem solving indicators is 66.7%, decision-making skills indicators are 85.71%, critical thinking skills indicators are 88.89%, and creative thinking skills indicators are 51.14%. Critical thinking ability has the highest percentage value with a value of 88.89%. From the data, it can be concluded that the percentage value of HOTS availability on UTS questions is lower than the UAS percentage value. The value of critical thinking ability has the first highest percentage indicator, then decision-making ability is in the second position, problem-solving skills is in third place, and the last is the ability to think creatively.*

Keywords*: HOTS; covid 19; physics*

INTRODUCTION

Quality Human Resources (HR) is the goal of the 2013 Curriculum. With these abilities, it is expected to be able to compete in the 21st century and industrialization 4.0 in the era of globalization. Anticipating these demands, education is designed to improve high-quality performance through the learning process.

According to Law no. 20 of 2003 Education is an effort for students to build a learning environment and an active learning process so that they can develop their potential. The results of a survey conducted by PISA in 2018 itself show that the achievement of the quality of education in Indonesia has decreased compared to the survey in 2015 (Sains, 2019). The ability of Indonesian students in science has an average score that is still below the OECD (Organization for Economic Cooperation and Development) countries. So with these results, it is necessary to increase the achievement of the quality of education in Indonesia. (Kemendikbud, 2019a)

Based on the national average value, it shows that the national average score for physics does not reach a value of 50 out of the range of 100. This indicates that students' physical cognitive abilities are still low

(Kurniawan et al., 2020). According to Atasoy (Erfianti et al., 2019), studying Physics requires the ability to understand concepts and understand how to apply them in problem solving. To achieve this, it is necessary to change the concept of initial knowledge according to the actual situation. To be able to change the concept of initial knowledge into long-term knowledge, we need a method called higher order thinking skills (Supahar & Saputro, 2018).

Higher Order Thinking Ability (HOTS) is a student's skill in understanding knowledge that not only remembers but also teaches in connecting the information possessed at a higher level of thinking to be able to analyze and create an idea (Widyastuti, 2017). This identifies that high order thinking skills are expected to be able to obtain a solution to a problem (Ayumniyya & Setyarsih, 2021). Karthworl and Anderson stated that in the revised Bloom's Taxonomy there are three cognitive levels that measure HOTS, namely C4 (analytical ability), C5 (evaluating ability), and C6 (creative ability) (Liana et al., 2018). The ability to create is the ability to combine elements to form unique new structures, design methods, and generate *(multiple solutions)* (S.M. Brookhart,2010). Therefore, HOTS is an important aspect of learning and is a useful tool to help students learn, improve their performance and reduce students' weaknesses (Y.M. Heong et l., 2011).
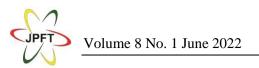
Evaluation is needed to assess the ability of HOTS. To assess, teachers need good instruments for students to test aspects of knowledge, attitudes and skills that are assessed in the revised 2013 curriculum. This study focuses on the assessment carried out by the Mid-Semester Examination (UTS) and Final Semester Examination (UAS). Meanwhile, the Ministry of Education conducts learning through the National Examination (UN) as a measure of the quality of programs or educational units. All forms of knowledge assessment carried out are related to domains based on Bloom's revised classification, which combines skills and thinking to solve problems.

The population and samples in this study were taken from SMA Adabiah 2 Padang and were selected based on several criteria. First, the location of the area which is located in the middle of the city. Second, SMA Adabiah 2 Padang, whose school has trained HOTS in the learning process. Third, judging from the results of the national exam, it can be seen that the physics national exam at SMA Adabiah 2 Padang is relatively low.

The actual conditions were obtained through direct interviews and literature studies. The results of interviews with teachers indicate that teachers have improved their HOTS skills as a result of implementing the Lesson Plan (RPP). However, during the learning process, several obstacles were encountered in its application. The main obstacle recognized by the teacher is the low competence of students and learning support facilities in schools. In addition, in the learning process, the teacher does not direct students to practice questions that encourage them to think at level analysis, evaluation, and creation. The questions that are tested on students usually tend to test more about memory questions until they are applied. This makes students unfamiliar with questions that require higher-order thinking.

The results of the literature study according to (Abdul Azis, 2021) show that the HOTS LKS indicators from publishers and teachers used by schools in West Sumatra are still low, in the category of less facilitating and not facilitating. In addition, the results of the analysis conducted by (Syafrinaldi, 2020) showed that the LKS was

not yet HOTS oriented. The availability of HOTS on LKS from publishers and teachers used by schools in West Sumatra is still low in the less available category.

The ability of students during the pandemic has not been seen because there has been no assessment that leads to students. When viewed from the learning process, there is a very big difference between the learning carried out before the pandemic and during the pandemic. Based on the allocation of study time, learning hours during the pandemic at schools are reduced from regular school hours before the pandemic. When viewed from learning activities, during the pandemic it was carried out online so there was less interaction between students and teachers. In addition, in the learning process teachers are more likely to give assignments to students without explaining the learning material to students. This makes students less understand the task given by the teacher. Teachers also find it difficult to apply the right method when learning online during a pandemic. This very different learning process can prove that it is very possible for teachers to develop students' HOTS abilities. Because the learning process in the 21st century has led to higher order thinking skills. Therefore, it is necessary to conduct a study to find out how students' abilities during the pandemic are carried out through evaluation activities in schools.

Based on the above background, the researchers were motivated to analyze the questions of Physics subjects according to the HOTS indicators which contained the revised cognitive domain of Bloom's taxonomy. The formulation of the problem in this research is whether there are HOTS in the assessment of student learning outcomes of grade 10 SMA Adabiah 2 Padang during the Covid-19 pandemic?

RESEARCH METHODS

The type of research conducted is descriptive research and the approach used is the approach in the exposure of the research results. Descriptive research is the most basic form of research. It is intended to describe or describe existing phenomena, both natural phenomena and human engineering. While the qualitative approach is research that produces descriptive data in the form of written or spoken words from people and observed behavior (Arikunto,2010).

The population is a generalization of the area consisting of objects or subjects that have certain qualities and characteristics that are determined by the researcher to be studied and then conclusions are drawn. The population in this study were all physics exam questions. The sample was part of the selected population and represented the population. The sampling technique used in this study was saturated sampling and proportional stratified random sampling.

The questions analyzed are the mid-semester exams (UTS) and final semester exams (UAS) for class X and XI in 2020. Research instruments must be prepared and made based on operational definitions of variables which contain indicators of the research variables to be studied (Munandar, Utami. 2002).

The data collection technique in this study was through documentation studies and interviews. Interviews were conducted by making an interview guide sheet in advance which contained questions regarding the learning carried out by teachers in schools related to HOTS. Documentation studies are carried out by collecting documents or data needed in research problems and then examining them in depth. Documents used in this study are written documents, namely UTS and UAS Physics Class X questions.

The procedure in this study can be divided into three stages, namely the preparation stage, the implementation stage, and the completion stage. At the preparatory stage, what must be done is to prepare a research design, determine the subject and object of research or questions to be used, prepare a draft research instrument, test the validity of the instrument, analyze the results of the instrument validity test, and improve the instrument. At the implementation stage, the data collected was in accordance with the needs of the researcher. At the stage that is carried out is to process the research data, draw conclusions from the research conducted, and report the research results.

After the data is collected, the data is then processed using the correct data analysis techniques. The data analysis technique used is content analysis, namely the method by making contextual inferences (conclusions) so that communication messages can be fully understood. Calculating the percentage of presentations on physics questions facilitates HOTS on each question analyzed by the formula:

$$\frac{\sum \text{Komponen HOTS yang muncul}}{\text{total} \sum \text{komponen HOTS yang muncul}} \times 100\% \qquad (1)$$

RESULTS AND DISCUSSION

The results of the HOTS availability study based on the Revised Bloom's Taxonomy were obtained by analyzing the UTS and UAS sheets for class X SMA Adabiah 2 Padang during the Covid 19 pandemic.
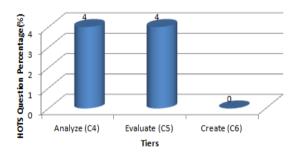
Results

The following table shows the results of the analysis of the availability of the HOTS indicator on Physics questions at Adabiah 2 Padang High School during the COVID-19 pandemic.
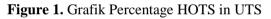
Table 1. Hots Availability in UTS Questions

No.	Tiers	Percentage
1.	Analyze (C4)	4%
2.	Evaluate (C5)	4%
3.	Create (C6)	0%
Total		8%

Based on Table 1. on the UTS sheet there are no HOTS indicators, it can be seen from the percentage gain based on HOTS levels getting a total result of 8% from various levels. The percentage table graph is as follows.

Figure 1. Grafik Percentage HOTS in UTS

Based on the analysis data on the availability of HOTS on UAS questions, it can be concluded that there are HOTS indicators on UTS questions with an analysis value for the total of all levels of 8%.

Table 2. Hots Availability in UAS Question

No.	Tier	Percentage
1.	Analyze (C4)	16%
2.	Evaluate (C5)	8%
3.	Create (C6)	0%
Total		24%

Based on Table 2. students' C4 abilities obtained the highest results with a percentage of 16%. The percentage table graph is as follows:

The HOTS indicators in UAS questions are described one by one through several indicators including problem solving skills, decision making skills, critical thinking skills, and creative thinking skills.
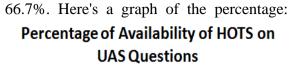
The percentage results are translated through sub-indicators.

Table 3. Problem Solving Skills Indicator

No.	Sub Indicators	Percentage
1.	Formulating the Problem	16,7%
2.	Analyzing the Problem	8,3%
3.	Formulating Hypotheses	8,3%
4.	Collecting data	16,7%
5.	Testing Hypotheses	8,3%
6.	Determining the Solution	8,3%
Total		66.7%

Based on Table 3. In the indicator of problem solving skills, the percentage obtained by the total percentage of all indicators for problem solving skills is 66.7%. Here's a graph of the percentage:
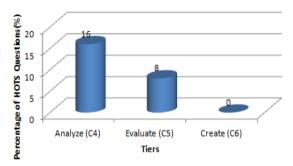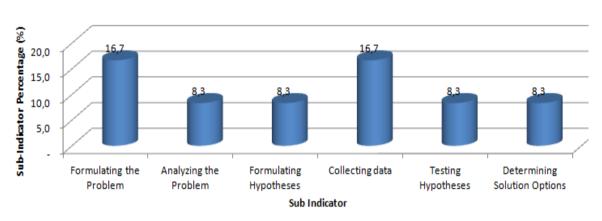

Figure 2. Grafik Perscentage HOTS in UAS

Figure 3. Graph of HOTS Availability Percentage on Troubleshooting Indicators

Table 4. Decision Making Skills Indicator

No.	Sub Indicators	Percentage
1.	Analyzing the Cause of the Problem	28,57%
2.	Identifying Problem Impact	28,57%
3.	Identifying alternative decisions	14,29%
4.	Make decision	14,29%
5.	Giving Reason	0%
6.	Predicting Impact	0%
7.	Giving an Assessment of the Decision	0%
Total		85,71%

Based on Table 4. In the decision-making skills indicator, the same percentage is obtained for the sub-indicator to analyze the causes of the problem and identify the impact of the problem with a percentage value of 28.57%. The percentage graph of decision-making skills indicators is as follows.

Figure 4. Graph of HOTS Availability Percentage on Decision-Making Skills Indicators.

Table 5. Critical Thinking Skills Indicator

No.	Sub Indicators	Pesencentage
1.	Analysis	44,44%
2.	Evaluation	22,22%
3.	Interference	11,11%
4.	Eksplanation	11,11%
5.	Self-Regulation	0%
Total		88,89%

Based on table 5. On the indicator of critical thinking skills, the percentage value of the sub-indicator analysis is 44,44%. The evaluation sub-indicator is 22.22% and interference and explanation get the same percentage value of 11.11%. Here's a graph of the percentage:
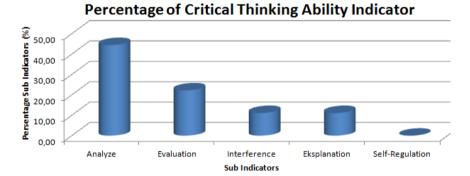

Figure 5. Graph of HOTS Availability Percentage on Critical Thinking Skills Indicator

Table 6. Creative Thinking Skills Indicator

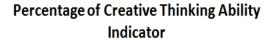| No.	Sub Indicator	Percentage
1.	Fluency	14,29%
2.	Flexibility	14,29%
3.	Elaboration	28,57%
4.	Originality	0%
Total		51,14%

Based on Table 6. The highest percentage value is obtained by the sub-indicator of recency (Elaboration) with a percentage of 28.57%. The percentage graph is as shown at Figure 6.
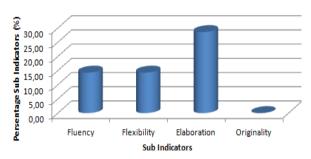
Discussion

From the table that has been obtained in the results section, we can see that the percentage of HOTS availability in physics questions for UTS is lower than UAS. Thus we can conclude that the availability of HOTS is not evenly distributed. This of course is not in accordance with the demands of the 2013 curriculum.

The presentation of exam questions during a pandemic can also be seen from the HOTS indicator. According to Desy Eka and Alimufi (Wahyuni dan Arief, 2015), HOTS contains 4 indicators, namely problem solving, decision-making skills, critical thinking skills and creative thinking skills in the analyzed test question scripts. From the analysis results, the average overall HOTS skills can be seen on the graphic image.

Percentage of Creative Thinking Ability Indicator

Figure 6. Graph of HOTS Availability Percentage on Creative Thinking Ability Indicators

In Figure 5 in table 5 it is known that the HOTS skill that has the highest skill is critical thinking skill. Students must be able to think critically which according to (Munandar, 2017) that critical thinking is the ability to think clearly, rationally, and logically in analyzing information, solving problems, and making decisions in life or daily activities. People with critical minds also have good abilities in making judgments and evaluating certain facts, phenomena, data, or objects. The ability to find many possible answers to a problem. If students can think critically then students will be able to answer HOTS-based questions. In the pre-pandemic exam questions the percentage of critical thinking skills was 21% in the less facilitating category and during the pandemic it was 9.9% in the non-facilitating category. For the lowest skill, namely decision-making skills. From the graph above, it can be concluded that the test questions before the pandemic had a higher percentage of each HOT S skill than the exam questions during the pandemic.

Based on the difference in the availability of HOTS before and during the pandemic caused by several factors. Based on the results of observations in the field, it was found that the difference was influenced by the number of learning hours during the pandemic which was carried out in schools which were fewer than the period before the pandemic. In addition, the material given to students is only limited to student understanding, not given thoroughly and in detail. Learning activities during the pandemic are carried out online and offline. Online activities are carried out with various activities. One of them is the teacher only gives assignments to students without explaining the material given to students. Teachers in schools also rarely use meeting applications in the learning process so that the interaction between teachers and students is reduced.
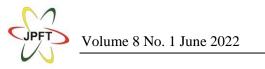
Learning during the pandemic must be carried out based on the Decree of the Minister of Education and Culture of the Republic of Indonesia number 719/P/2020 concerning guidelines for implementing the curriculum in educational units under special conditions. This Permendikbud shows how learning materials are simplified. The goal is that learning can be carried out more optimally. However, based on the analysis of the questions tested during the pandemic, schools in Solok Regency still have not used the curriculum under special conditions. This situation causes the material is not delivered optimally with limited time in the learning process.

CONCLUSION

The availability of HOTS on physics questions at SMA Adabiah 2 Padang during the pandemic has not been fully fulfilled. In the UTS assessment sheet, the percentage value of availability is lower than the UAS assessment sheet.

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