

ANALYSIS OF HOTS INDICATOR ON SENIOR HIGH SCHOOLS PHYSICS EXAM IN WEST PASAMAN DISTRICT

Sonia Nur Riza¹, Yenni Darvina^{1*}, Silvi Yulia Sari¹, Fanny Rahmatina Rahim¹

¹ Department of Physics, Universitas Negeri Padang, Jl. Prof. Dr. Hamka Air Tawar Padang 25131, Indonesia

Corresponding author. Email: 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. Because, the teacher must provide students with HOTS questions. The observations showed that the questions used in Senior High Schools throughout West Pasaman District are in low category and are not in the excellent proportion of questions. Therefore, an indicator analysis research was carried out on Physics questions for SMAN in West Pasaman District. This research includes descriptive research by the qualitative approach. The population of this research are 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 with proof of questions. From the research 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. ©2021 by author and Universitas Negeri Padang.

I. 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 provisions. If the implementation is in accordance with government regulations, the educational goals will be achieved. The evaluation of students can be seen using one of the assessments tests. Its function is to be able to measure and find out the level of competence in student, tidy up the learning process, tidy up reports so that you can see the progress of daily tests, mid-semester, end of the semester, end of the year, and or grade increase[1].

According to Minister of Education and Culture No. 23/2016, evaluation is seen from student learning outcomes, namely in the form of written assignments, in the field in the form of observations and other tasks 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, improvements to the 2013 curriculum were carried out on content standards, namely the reduction of some material to irrelevant students so can help student in critical and analytical thinking. The result of this assessment in order to help students improve their HOTS thinking skills[3].

Revised Bloom's Taxonomy explains that thinking ability is divided into three levels, namely LOTS, MOTS and HOTS. According to the Directorate of High School Development, HOTS is one approach in

learning where students can think critically 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 activity to make an assessment based on specific criteria and standards[5]. The ability to create/create is to unite elements to form new and unique structures, think of ideas, and find solutions to problems[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[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. According to King, higher order thinking skills consist of critical thinking, logical thinking, reflective thinking, meta cognitive thinking, 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 SMAN in the District West Pasaman. The following are the results of the study conducted.

Table 1. The Data of National Exam on Physics Senior High School in 2018

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

(Source: Data survey in 2021)

Based on the data of national exam on physics senior high school in West Pasaman District in 2018, it can be seen that students are still low in answering HOTS question, 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.

II. METHOD

Based on the problems found, the target in this study is to determine the fulfillment of the HOTS indicator for physics question in SMAN in West Pasaman District. This type of research is descriptive research by using 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[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[13]. The population of this study are all the 2018 and 2019 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[13]. 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.

The instrument is a measure used by using a measuring device. Instruments in education such as tests, questionnaires, interview formats and so on[15]. For this research the instrument used is the HOTS instrument seen in Bloom's Taxonomy revision and 4 HOTS indicators.

For the preparation of a good instrument, several steps are carried out[16] namely:

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

3. Writing instrument items
4. Trial, which is in the form of validity test

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

$$\text{Moment Kappa (k)} = \frac{Po - Pe}{1 - Pe} \quad (1)$$

With: k = moment kappa; Po = the realized proportion; Pe = unrealized proportion

Table 2. Validity Category Based on Kappa Moment (k)

Criteria	Category
81 – 100	Very Valid
61 – 80	Valid
41 – 60	Quite Valid
21– 40	Less Valid
01 – 20	Invalid

(Source: Kappa Moment (k)[13])

The validation results obtained from two expert validators are in the correct category.

Table 3. Results of Instrument Validation

Name Validator	Skor	Category
Validator 1	74	Valid
Validator 2	66	Valid

After the instrument used was validated by validators, it was revised according to the validator's suggestions and comments. 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
2. Implementation Stage
3. Completion Stage

After completing the three stages of the procedure, 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 purpose of the research conducted. According to Sugiyono, data analysis is a way to find data obtained from the purpose of question and answer, field conditions, and evidence[17].

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

$$\frac{\sum \text{HOTS indicator that appears}}{\sum \text{HOTS indikator}} \times 100\% \quad (2)$$

- 3) Determining HOTS availability criteria in physics problems as shown on Table 4

Tabel 4. HOTS Indicator Availability Category

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.

III. 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. The analysis was carried out to select presence of HOTS indicators on Midterm Exam and Semester Exam questions. After analyzing the availability of HOTS questions on physics class X, XI and XII. 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 are described as follows:

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

The comparative analysis of the HOTS components can be seen in Figure 1.

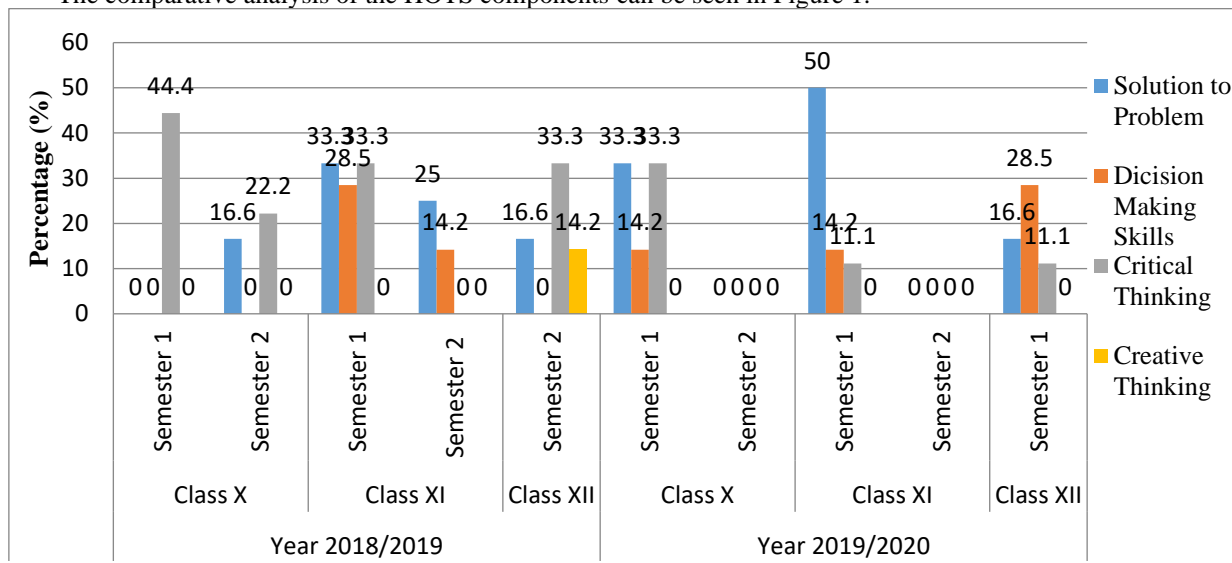


Fig. 1. Percentage Comparison of the Availability of HOTS Indicators on Physics Semester Exam Questions at Senior High Schools West Pasaman District 2018/2019 and 2019/2020

Based on Figure 1, the results of the analysis were obtained for the UAS questions. From these HOTS component (Solution to Problem/Problem Solving, Decision Making Skills, Critical Thinking, Creative Thinking), it is clear which components are often used and which are rarely used, So that 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, the see that the average for on HOTS component 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.

2. *Comparison of the Availability of HOTS Components on physics Midterm Exam questions at SMAN 1 Pasaman*

The comparative analysis of the HOTS component can be seen in Figure 2.

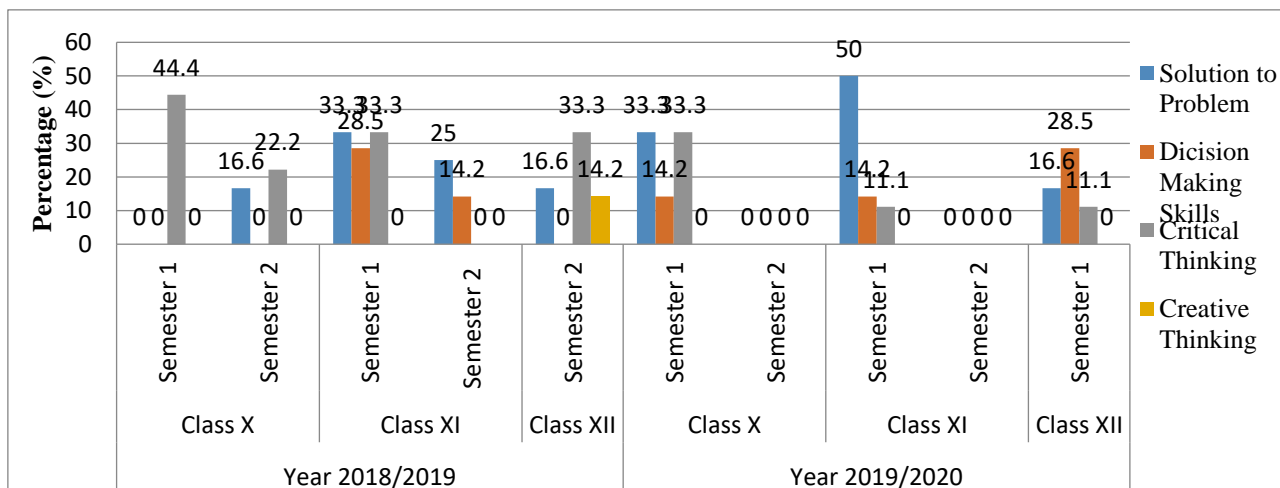


Fig. 2. Percentage Comparison of the Availability of HOTS Indicators on Physics Midterm Exam Questions at Senior High Schools 1 Pasaman 2018/2019 and 2019/2020

Based on Figure 2, the results of the analysis were obtained for the Midterm Exam questions. It was found for the Midterm Exam question that the highest percentage of HOTS component, with the result is 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.

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

The comparative analysis of the availability of the HOTS component can be seen in Figure 3.

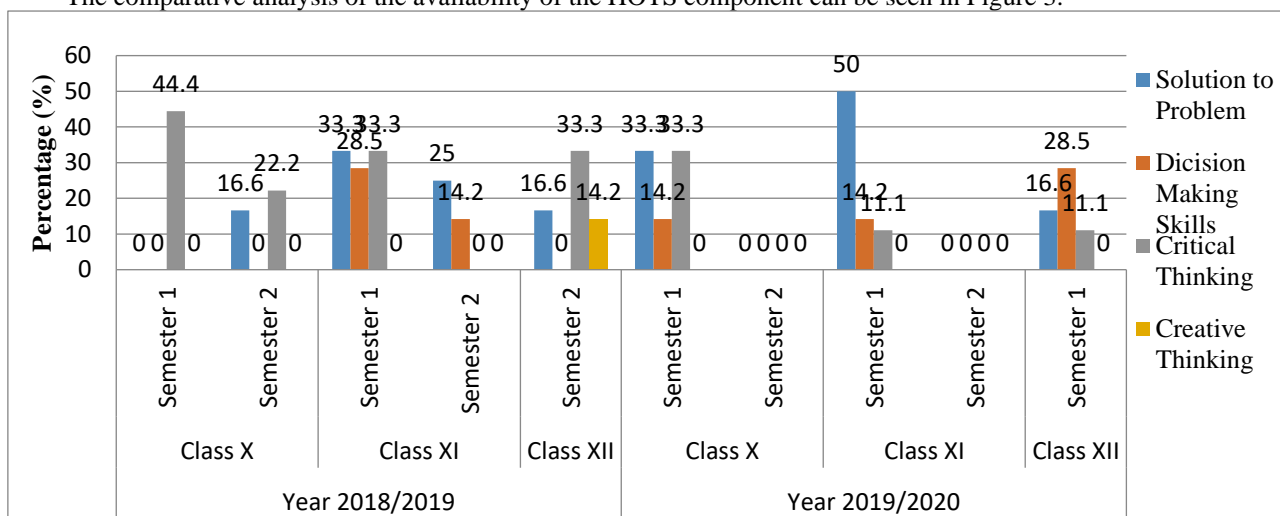


Fig. 3. Percentage Comparison of the Availability of HOTS Indicators on Physics Midterm Exam Questions at Senior High Schools 1 Gunung Tuleh 2018/2019 and 2019/2020

Based on Figure 3, it was found that for the Midterm Exam that 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.

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

The comparative analysis of the HOTS components can be seen in Figure 4.

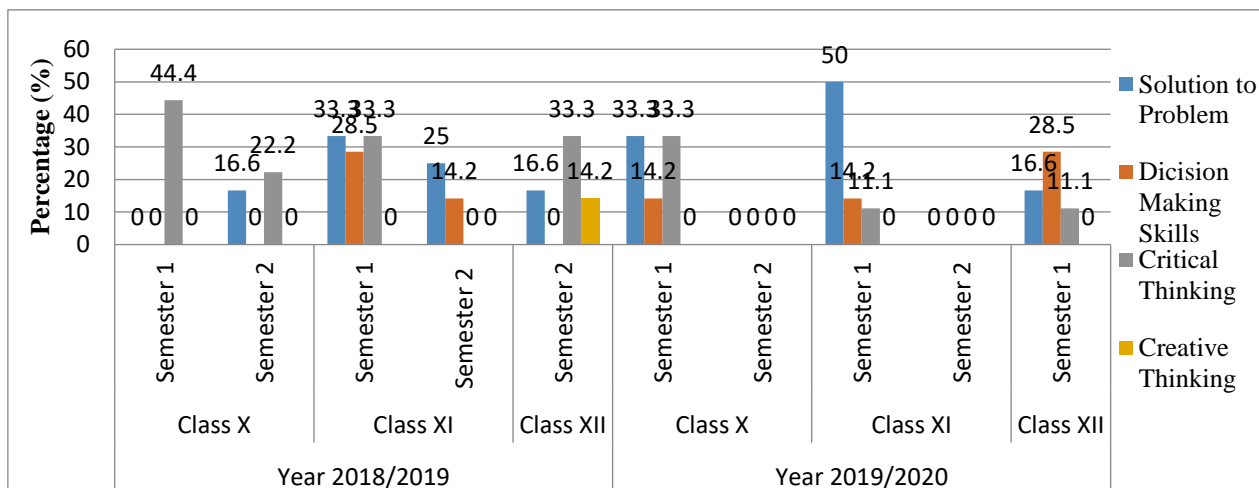


Fig. 4. Percentage Comparison of the Availability of HOTS Indicators on Physics Midterm Exam Questions at Senior High Schools 1 Sungai Aur 2018/2019 and 2019/2020

Based on Figure 4, it was 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.

5. *Comparison of the Availability of HOTS components on physics Midterm Exam questions at SMAN 1 Lembah Melintang*

The comparative analysis of the availability of the HOTS component can be seen in Figure 5.

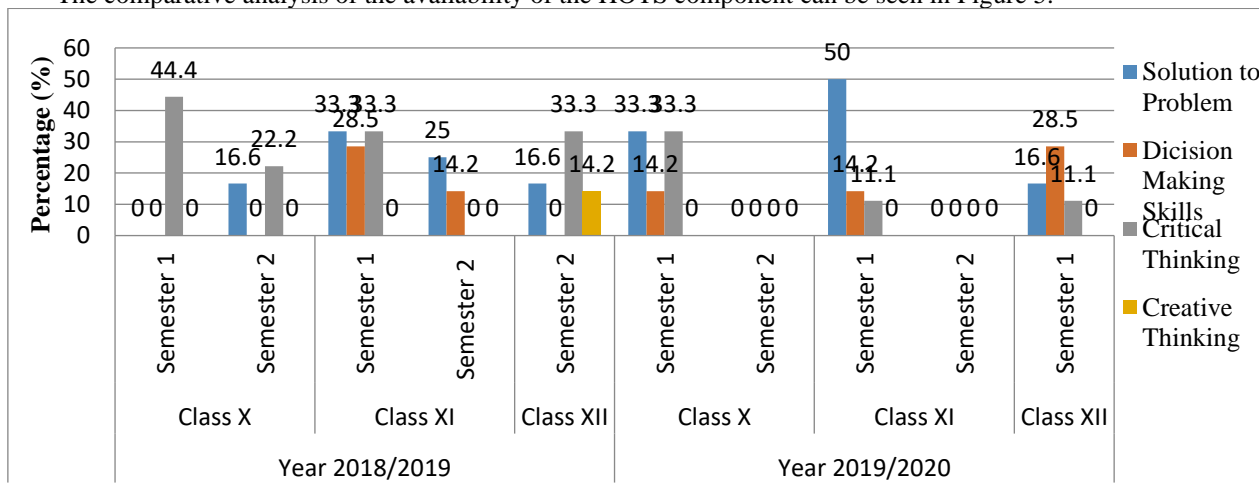


Fig. 5. Percentage Comparison of the Availability of HOTS Indicators on Physics Midterm Exam Questions at Senior High Schools 1 Lembah Melintang 2018/2019 and 2019/2020

Based on figure 5, it was found for the Midterm Exam question that 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.

6. *Comparison of the Availability of HOTS components on physics Midterm Exam questions at SMAN 1 Ranah Batahan*

The comparative analysis of the the HOTS components can be seen in Figure 6.

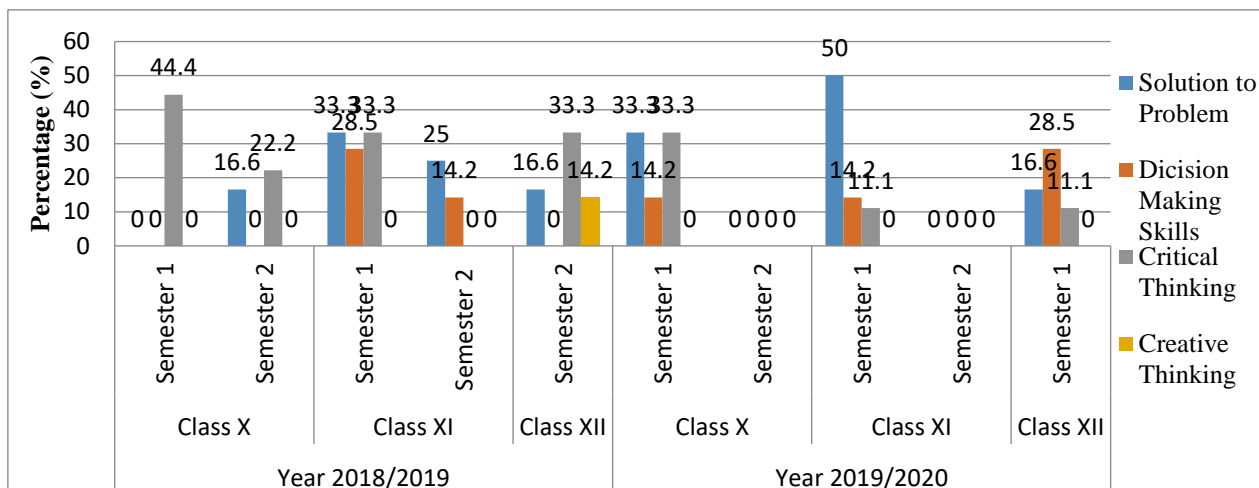


Fig. 6. Percentage Comparison of the Availability of HOTS Indicators on Physics Midterm Exam Questions at Senior High Schools 1 Ranah Batahan 2018/2019 and 2019/2020

Based on Figure 6, it was found for the Midterm Exam question that 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.

7. *Comparison of the Availability of HOTS Components on physics Midterm Exam questions at SMAN 1 Sungai Beremas.*

The comparative analysis of the availability of the HOTS component can be seen in Figure 7.

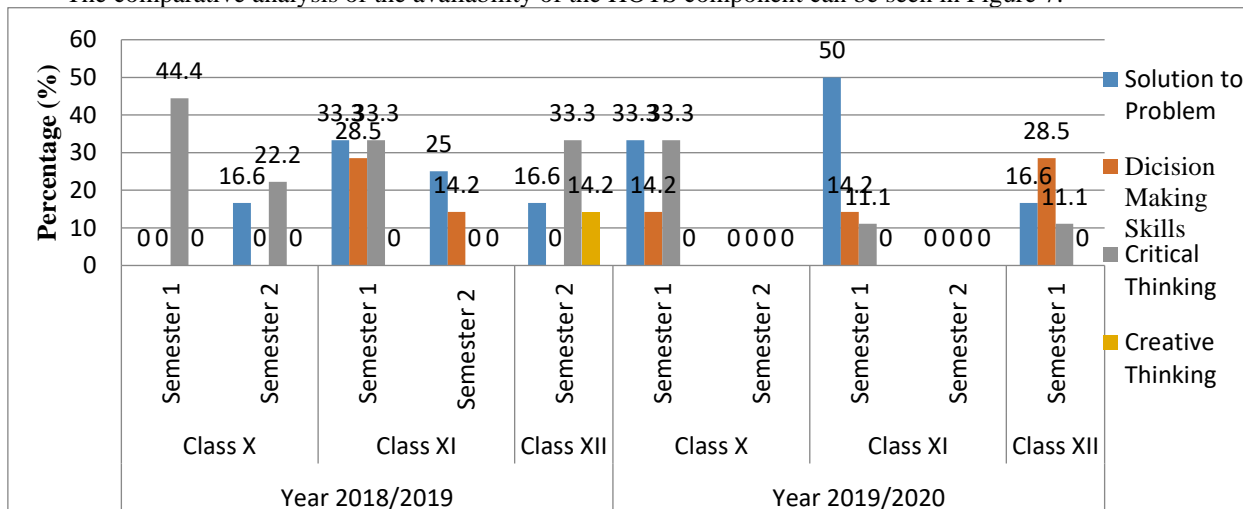


Fig. 7. Percentage Comparison of the Availability of HOTS Indicators on Physics Midterm Exam Questions at Senior High Schools 1 Sungai Beremas 2018/2019 and 2019/2020

Based on Figure 7, it was found for the Midterm Exam question that 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.

From the results of the analysis seen as a whole, the analysis of the HOTS indicator on physics questions related to the availability of the HOTS component aims to determine the availability of the HOTS component indicator. According to (Desy Eka & Alimufi, 2015), the HOTS indicator contains 4 HOTS indicators: Problem-solving, decision-making skills, Critical thinking, Creative thinking in physics questions used by 6 SMAN in West Pasaman District. This is proven through interviews where teachers have implemented the 2013 curriculum, but teachers have not implemented HOTS-based questions. Because from the analysis

results, it is known that the use of the HOTS component is very lacking, where the component that is often used is problem-solving, and the one that is never used is critical thinking.

IV. CONCLUSION

Based on the research results on the analysis of the HOTS indicators on physics questions in SMAN class X, XI, and XII in 2018/2019 and 2019/2020, it can be concluded that every UAS and UTS questions are included in the less available category. This is evidenced in the HOTS questions. At most, only five questions were found. With the availability of the HOTS component on the UTS and UAS Physics questions in the West Pasaman District, they are in the category of moderately available, less available, and unavailable. Only the UAS exams for class XI semester 1 2018/2019 are in the less general category, and UAS class X semesters 1 and 2, class XI semester two, and class XII semester 1 is in the unavailable category and for UTS from the six SMANs in the unavailable category. And the component that is often used is problem-solving and what is never used is creative thinking. It can be seen that the average cognitive level used is only up to C3.

The comparison of the analysis of the HOTS indicators on physics questions is seen in class X in 2019/2020, which is higher than in 2018/2019, while in class XI and XII, the indicators for HOTS questions are higher in 2018/2019 than in 2019/2020, this is because of lack of availability of HOTS on physics UAS in West Pasaman District in every question. As for the HOTS question indicators at the UTS in West Pasaman District, 3 SMANs with the highest HOTS in 2018/2019, while 1 SMAN and 2 SMANs with the highest HOTS in 2019/2020. So the availability of HOTS questions has not been made well 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.

ACKNOWLEDGMENT

Thanks for the guidance, direction and motivation to complete this journal. Thank you to the examiners who have provided criticism, suggestions, and encouragement to achieve this journal. Thanks to friends and parties who have helped and were involved in completing the writing of the journal to completion.

REFERENCES

- [1] Salamah, Umi. "Penjaminan mutu penilaian pendidikan." *EVALUASI: Jurnal Manajemen Pendidikan Islam* 2.1 (2018): 274-293
- [2] J. Pendidikan *et al.*, "Pengembangan Instrumen Penilaian Sikap Berbasis Kurikulum 2013 Pada Pembelajaran Kimia Sma," *J. Pendidik. Sains Indones. (Indonesian J. Sci. Educ.*, vol. 5, no. 1, pp. 44–51, 2017.
- [3] I. W. Widana, "Modul penyusunan soal HOTS," 2017.
- [4] U. Hanifah, "Improving Students' Professionalism in Arranging and Developing RPP through Curriculum Development and Learning Planning Courses," *J. Al Bayan J. Jur. Pendidik. Bhs. Arab*, vol. 11, no. 1, pp. 1–24, 2019, doi: 10.24042/albayan.v11i1.3539.
- [5] L. O. Wilson, "Anderson and Krathwohl Bloom's Taxonomy Revised Understandifile:///C:/Users/Situmorang/Desktop/Calon/Sepsis/BAB 1/Kerangka Pemikiran/BLOOM LENGKAP.pdfng the New Version of Bloom's Taxonomy," *Second Princ.*, pp. 1–8, 2016, [Online]. Available: https://quincycollege.edu/content/uploads/Anderson-and-Krathwohl_Revised-Blooms-Taxonomy.pdf%0Ahttps://thesecondprinciple.com/teaching-essentials/beyond-bloom-cognitive-taxonomy-revised/%0Ahttp://thesecondprinciple.com/teaching-essentials/beyond-bloom-cog.
- [6] C. E. Baten, *Your Classroom*, vol. 88, no. 18. 1918.
- [7] S. Arikunto, *Dasar-Dasar Evaluasi Pendidikan*, Jakarta: Bumi Aksara, 2006.
- [8] B. A. B. Ii and A. P. Evaluasi, "Wayan Nurkancana Dan Sunartana, Evaluasi Pendidikan (Surabaya, Usaha Offset Printing, 1982), 1. 8," pp. 8–30.
- [9] S. Fadhilah, S. Y. Sari, Y. Darvina, W. S. Dewi, S. Pengajar, and J. Fisika, "ORDER THINKING SKILLS (HOTS) Pendidikan Fisika , FMIPA Universitas Negeri Padang," vol. 13, no. 2, pp. 329–336, 2020.
- [10] S. W. Widyaningsih and K. Unyu, "Problem Solving Based HOTS to Improve Learning Achievement Through Students' Character Building Orientation," *Cakrawala Pendidik.*, vol. 32, no. 1, pp. 161–170, 2013.
- [11] M. Ningtyas, "Bab III - Metode Penelitian Metode Penelitian," *Metod. Penelit.*, pp. 32–41, 20014.

- [12] S. I. Astuti, S. P. Arso, and P. A. Wigati, “*濟無*No Title No Title No Title,” *Anal. Standar Pelayanan Minimal Pada Instal. Rawat Jalan di RSUD Kota Semarang*, vol. 3, pp. 103–111, 2015.
- [13] D. Mulyana, “Metode Penelitian Metode Penelitian,” *Metod. Penelit. Kualitatif*, p. 43, 2014.
- [14] م. ا. ز. رازی, “No Title1384,” *الحاوی جلد بیستم*.
- [15] P. Ipa and S. Di, “No 主観的健康感を中心とした在宅高齢者における健康関連指標に関する共分散構造分析Title,” 2017.
- [16] Arikunto, “Arikunto, Suharsimi. 2006. Prosedur Penelitian Suatu Pendekatan Praktik (edisi revisi VI). Jakarta: Rineka Cipta 67,” *Prosedur Penelit. Pendekatan*, pp. 67–87, 2013, [Online]. Available: https://scholar.google.co.id/scholar?cluster=8328591545338061807&hl=id&as_sdt=0,5.
- [17] Sugiyono, *Metode Penelitian Kuantitatif Kualitatif dan R & D*. Bandung: Alfabeta, 2009.