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ANALYSIS OF EXAM QUESTION ITEM TERMS OF COGNITIVE ASPECT BASED ON REVISED BLOOM'S TAXONOMY FOR PHTSICS SUBJECTS IN PUBLIC HIGH SCHOOLS

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ABSTRACT

The aim of this research is to find out the relevance of the reviewed questions from the cognitive aspects of revised bloom's taxonomy and characteristics of teacher-made questions based on the analysis of the difficulty index and discrimination index in the odd semester exam questions for physics subject of the academic year 2023/2024 at 4 Public High School in Medan. This research uses qualitative descriptive methods with data collection using documentation techniques. The analysis's results in SMAN 5 Medan indicate that the questions for the odd semester exam do not fully meet the appropriate proportion, which is 39,9% for C1 and C2, 59,9% for C3 and C4, and 0% for C5 and C6. The analysis's results in SMAN 7 Medan show that the questions for the odd semester exam also do not fully meet the appropriate proportion, which is 0% for C1 and C2, 86,67% for C3 and C4, and 13,34% for C5 and C6. The results in SMAN 8 Medan show that the exam questions do not fully meet the appropriate proportion, which is 20% for C1 and C2, 75% for C3 and C4, and 5% for C5 and C6. The results in SMAN 18 Medan indicate that the exam questions also do not fully meet the appropriate proportion, which is 46,6% for C1 and C2, 53,3% for C3 and C4, and 0% for C5 and C6. Meanwhile, the appropriate proportion of questions is 30% for C1 and C2, 40% for C3 and C4 and 30% for C5 and C6. The results of the analysis of the difficulty index in 4 public high schools in Medan are dominated by the medium category. Based on the results of the analysis of the differentung criteria of the 4 schools, it is dominated bye the bad category.

Keywords: Analysis of Questions; Cognitive Aspects; Revised Bloom's Taxonomy; Difficulty Index; Discrimination Index

INTRODUCTION

Evaluation is a part of the educational process. Evaluation is carried out as a teaching and learning process to measure the achievement of student learning outcomes. The achievement of learning outcomes is intended to assess competency performance, improve the learning process, and become a reference in preparing student learning progress reports. As Hadijah & Anggereni (2016) asserted that evaluation actions are carried out systematically and continuously to determine the quality (value and meaning) of something, based on certain considerations and criteria in decision making. Consideration or decision making in the evaluation process must be done by collecting information. Collecting this information can be done with an assessment tool, namely a test.

According to Magdalena et al (2021) tests are methods (can be used) or procedures (must be done) in the context of measurement and assessment in education. Therefore, a test can be

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interpreted as a technique used in carrying out measurement activities in which there are various questions or a series of tasks that students do or answers to measure student abilities. According to Srika & Yusrizal (2018) a good test must contain the qualities of item assessment, namely validity, reliability, level of difficulty of questions, differentiation of items, and effectiveness of checkers. If the instrument successfully measures the target variable or produces accurate measurement findings, then the test is considered to have high validity. Therefore, question items must consider their feasibility. To see the feasibility of question items functioning properly or not, it is necessary to analyze the question items.

Test quality analysis is a stage that must be taken to determine the quality of the test, both the test as a whole and the items that are part of the test. According to Elviana (2020) the main purpose of item analysis is to learn more about the characteristics of each item through item review and empirical analysis. The findings of the test result analysis can be used to measure the quality of test questions and student learning abilities. The end-of-semester exam is one of the exams made by the teacher that needs to be evaluated, because the end-of-semester exam questions are the culmination of the teacher's evaluation of students' learning abilities.

According to Meliasari et al (2022) explained that at the stage of making question items, teachers need to consider each question made, determine each question made according to the ability of students, the questions made must include the categories of remembering, understanding and thinking skills according to the content of the subject matter being tested, and the use of sentences and language in the questions must be appropriate and clear. In addition, Afryaningsih et al (2022) also stated that in the preparation of questions must pay attention to the distribution of the cognitive domain level, which includes remembering (C1), understanding (C2), applying (C3), analyzing (C4), evaluating (C5), and creating (C6). Cognitive aspects are one of the important aspects in preparing evaluation questions covering all cognitive levels, arranged from the lowest level of cognitive level to the highest cognitive level so that the evaluation questions become qualified.

The results of observations by Munauwarah & Umam (2022) that teachers only make test questions without preparing test items in advance. This is because teachers have limited time and energy to prepare test items and coupled with activities outside of school. Meanwhile, the activity of preparing test items is very necessary to obtain information about the quality of the test questions used as an evaluation tool so that it can improve the items that are not good.

Based on the results of research conducted by Meliasari et al (2022) entitled Analysis of final semester exam questions using qualitative descriptive methods from 40 questions about C1 questions and C2 questions dominate. From the results of his research there were 12 (30%) questions C1, 15 (37.5%) questions C2, 8 (20%) questions C3, 3 (7.5%) questions C4, and 2 (5%) questions C5, while the question C6 was not found. The results of the study were uneven because the making of questions carried out by the subject teachers copied questions from the textbook.

Therefore, this research is important to do to find out the test instrument on the quality of the item test used by the subject matter teacher at school. Researchers want to know whether the questions used by teachers on school final exams already have cognitive levels based on Bloom's Taxonomy that can build students' thinking levels from the lowest level to the highest level, because good quality questions will affect student learning outcomes obtained.

METHODS

This research is item analysis of the odd semester exam in physics subject using ex post facto design. Ex post facto is a research or observations made after it occurs (Arikunto, 2010). This research intends to obtain information and data that can be used to determine the distribution of items of physics exams based on the cognitive aspects of Revised Bloom's Taxonomy. This research was conducted in 4 schools in Medan city, that are SMA Negeri 5 Medan, SMA Negeri 7 Medan, SMA Negeri 8 Medan, and SMA Negeri 18 Medan.

The research was conducted by interviewing physics teachers. Item analysis was carried out based on Bloom's Taxonomy cognitive level. Data processing techniques by analyzing the level of difficulty of the question and the discrimination index of the question. Data collection using documentation techniques. In this research, the researchers collected physics final exam questions of students of grade XI IPA and data obtained from physics teachers that approved by the school

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principal in SMA Negeri 5 Medan, SMA Negeri 7 Medan, SMA Negeri 8 Medan, and SMA Negeri 18 Medan.

RESULT & DISCUSSION

Analysis of the results of the cognitive domain of Revised Bloom's Taxonomy of the final exam of the odd semester of physics class XI IPA SMA Negeri 5 Medan, SMA Negeri 7 Medan, SMA Negeri 8 Medan, SMA Negeri 18 Medan obtained the following analysis results:

Table-1. Results of Cognitive Aspect Analysis Based on Revised Bloom's Taxonomy in Final Exam Questions

Cognitive Level	Percentage (%) Cognitive Domain of Final Exam Questions			
	SMAN 5	SMAN 7	SMAN 8	SMAN 18
C1 (Remember)	33,3%	0%	10%	20%
C2 (Understand)	6.67%	0%	10%	26,6%
C3 (Apply)	6,67%	0%	10%	43,3%
C4 (Analiyze)	53,3%	86,6%	65%	10%
C5 (Evaluate)	0%	6,67%	5%	0%
C6 (Create)	0%	6,67%	0%	0%

Based on the data presented in table-1, it can be seen that almost all questions show that the final exam questions of the odd semester of physics subjects in class XI IPA SMA Negeri 5 Medan, SMA Negeri 7 Medan, SMA Negeri 8 Medan, SMA Negeri 18 Medan use more questions that tend to C4

Quantitative Analysis of Questions Based on the Level of Problem Difficulty

Question items with difficulty index classified as difficult are questions whose index range from 0.00-0.30. If the difficulty index is classified as medium, the index ranges from 0.31-0.70. If the difficulty index is classified as easy, the index ranges from 0.71-1.00.

Table-2 Results of Analysis of the Level of Difficulty of Multiple Choice Problem Items

Cognitive Level	Percentage (%)			
	SMAN 5	SMAN 7	SMAN 8	SMAN 18
Easy (0,71-1,00)	13,33%	13,33%	5%	6,67%
Medium (0,31-0,70)	80%	60%	75%	86,67%
Difficult (0,00-0,30)	6,67%	26,67%	20%	6,67%

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Quantitative Analysis of Questions Based on Question Discrimination Index

The question discrimination of the items can be known by looking at the size of the discrimination index. To interpret the results of the calculation of discrimination index, namely: 0.00-0.20 is included in the not good category, 0.20-0.40 is included in the sufficient category, 0.40-0.70 is included in the good category, and 0.070-1.00 is included in the very good category.

Table-3 Analysis of Differentiating Power of Multiple Choice Questions Items

Cognitive Level	Percentage (%)			
	SMAN 5	SMAN 7	SMAN 8	SMAN 18
Not Good (0,00-0,20)	66,67%	60%	50%	60%
Sufficient (0,20-0,40)	13,33%	20%	45%	36,67%
Good (0,40-0,70)	20%	20%	5%	3,33%
Very Good (0,70-1,00)	0%	0%	0%	0%

Discussion

Problem Analysis Based on Bloom's Revised Taxonomy Cognitive Domain

Based on the results of research on the distribution of questions based on the cognitive aspects of Bloom's taxonomy, the final exam questions of the odd semester of physics grade XI IPA SMA Negeri 5 Medan in the 2023/2024 academic year questions categorized as C1 with a total of 5 items with a percentage of 33.3%, C2 category with a total of 1 item with a percentage of 6.6%, C3 with a total of 1 item with a percentage of 6.6% and C4 questions amounted to 8 items with a percentage of 53.3% while for C5 and C6 with a percentage of 0%. These results indicate that the odd semester exam questions in physics grade XI IPA have not met the proportion of good questions where C1 and C2 (39.9%), C3 and C4 (59.9%) and C5 and C6 (0%). According to septiana (2016) that the proportion of good questions if it fulfill the proportion of questions C1 and C2 (30%), C3 and C4 (40%), and C5 and C6 (30%).

The distribution of questions based on the cognitive asspects of Bloom's taxonomy about the odd semester final exam in physics grade XI IPA SMA Negeri 7 in the 2023/2024 academic year, questions categorized as C1, C2, and C3 with a percentage of 0%, C4 with a total of 13 items with a percentage of 86.67%, C5 with a total of 1 item with a percentage of 6.67%, and C6 1 item with a percentage of 6.67%. The results of the analysis show that the odd semester exam questions in physics grade XI IPA SMA Negeri 7 medan have not fulfilled the proportion of good questions where for questions C1 and C2 (0%). C3 and C4 (86.67%), and questions C5 and C6 (13.34%). While the proportion of questions that should be 30% for questions C1 and C2, 40% for questions C3 and C4 and 30% for questions C5 and C6 (Septiana, 2016).

The distribution of questions based on the cognitive domain of Bloom's taxonomy about the odd semester final exam in physics grade XI IPA SMA Negeri 8 in the 2023/2024 academic year, questions categorized as C1 amounted to 2 items with a percentage of 10%, C2 amounted to 2 items with a percentage of 10%, C3 amounted to 2 items with a percentage of 10%, C4 amounted to 13 items

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with a percentage of 60%, C5 amounted to 1 item with a percentage of 5%, and C6 with a percentage of 0%. The results of the analysis show that the odd semester exam questions in physics class XI IPA SMA Negeri 8 medan have not fulfilled the proportion of good questions where for questions C1 and C2 (20%). C3 and C4 (75%), and questions C5 and C6 (5%). While the proportion of questions that should be 30% for questions C1 and C2, 40% for questions C3 and C4 and 30% for questions C5 and C6 (Septiana, 2016).

The distribution of questions based on the cognitive aspects of Bloom's taxonomy about the odd semester final exam in physics grade XI IPA SMA Negeri 18 in the 2023/2024 academic year, questions categorized as C1 with a total of 6 items with a percentage of 20%, C2 with a total of 8 items with a percentage of 26.6%, C3 with a total of 13 items with a percentage of 43.3%, C4 with a total of 3 items with a percentage of 10%, C5 and C6 there are no items so that the percentage is 0%. The results of the analysis show that the odd semester exam questions of physics subjects in grade XI IPA SMA Negeri 8 medan have not met the proportion of good questions where for questions C1 and C2 (46.6%). C3 and C4 (53.3%), and questions C5 and C6 (0%). While the proportion of questions that should be 30% for questions C1 and C2, 40% for questions C3 and C4 and 30% for questions C5 and C6 (Septiana, 2016).

Quantitative Analysis of Questions Based on Difficulty Index

To find out the level of difficulty of the items, an analysis of the level of difficulty of the items is carried out which aims to determine how difficult and easy the test will be tested for each item. Based on the results of the analysis of the test level of difficulty of the question shows that the final exam questions of the odd semester school physics class XI IPA from 4 schools have not met the proportion of good questions. According to Sudjana (2001) that the level of difficulty of the question has a good proportion of questions if it has 30% easy category, 40% medium category, and 30% for the difficult category. This is evident from the results of research in 5 (five) schools that became the research sample did not meet the proportion of good questions. The odd semester final exam questions at SMA Negeri 5 medan show that more than 15 items are at a medium level of difficulty (80%) as many as 12 items. Some of the remaining questions were in the easy category (13.37%) as many as 2 items and the difficult category (6.67%) as many as 1 item.

In the second sample at SMA Negeri 7 medan there are 15 items showing that there are 9 items in the medium category (60%), 2 items in the easy category (13.33%) and as many as 4 items in the difficult category (26.67%). The third sample at SMA Negeri 8 Medan had 20 items. A total of 15 items were categorized as medium (75%), 1 item was categorized as easy (5%) and the remaining 4 items were categorized as difficult (20%). In the fourth sample at SMA Negeri 18 Medan, there were 30 test items. Of these test items, 26 items showed a medium category (86.67%), 2 items were in the easy category (6.67%), and the remaining 2 items were in the difficult category (6.67%).

A good question according to Arikunto (2010) is a question that is not too easy or not too difficult. This is because questions that are too easy do not stimulate students to maximize their ability to solve problems, and questions that are too difficult will cause students to become discouraged and have no enthusiasm to solve problems because they are beyond their ability. Therefore, from the results of the analysis of the level of difficulty in 4 public high schools in Medan city, it has not fulfilled the proportion of good questions, namely 30% easy, 40% medium, and 30% difficult.

Quantitative Analysis of Questions Based on Discrimination Index

Based on the results of the analysis of the question differentiator test, it shows that the questions of the end of the odd semester test of physics grade XI IPA at SMA Negeri 5 medan which are included in the category of differentiating power of multiple choice questions are not good 6.67%

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(10 items), 13.37% (2 items) are included sufficient, 20% are included in the good category (3 items), and 0% for the very good category (0 items). The second sample at SMA Negeri 7 Medan included 60% (9 items) in the not good category, 20% (3 items) in the sufficient category, 20% (3 items) in the good category and 0% in the very good category. The third sample at SMA Negeri 8 medan was 50% (10 items) in the not good category, 45% (9 items) in the sufficient category, 5% (1 item) in the good category, and 0% in the very good category. In the fourth sample at SMA Negeri 18 Medan, 60% (18 items) were categorized as not good, 36.67% (11 items) were categorized as sufficient, 3.33% (1 item) were categorized as good and 0% were categorized as very good.

Based on the results of the analysis of the differentiating power of the 4 schools, it has not produced questions with good differentiating power criteria. According to Nasir (2015) that if the differentiating power is said to be good if the criteria for differentiating power 0.30-1.00 ≥ 85%. Differentiating power aims to determine the ability of the question in differentiating students who are classified as having high achievement and students who have low achievement and is used to determine students who have or have not mastered the lesson competencies (Sudjana, 2001).

CONCLUSION

Based on the results and discussion of the analysis of the final exam questions of the odd semester of Physics class XI IPA in public high schools in Medan city in the 2023/2024 school year, it can be concluded that:

1. The distribution of questions based on the cognitive domain of Revised Bloom's Taxonomy on the Odd Semester Final Exam questions of Physics grade XI IPA in SMA Negeri 5 Medan, SMA Negeri 7 Medan, SMA Negeri 8 Medan, and SMA Negeri 18 Medan has not been in accordance with the proper proportion.
2. The questions of the Odd Semester Final Examination in Physics grade XI IPA in SMA Negeri 5 Medan, SMA Negeri 7 Medan, SMA Negeri 8 Medan, and SMA Negeri 18 Medan are dominated by the medium category.
3. The questions of the Odd Semester Final Examination in Physics grade XI IPA in SMA Negeri 5 Medan, SMA Negeri 7 Medan, SMA Negeri 8 Medan, and SMA Negeri 18 Medan have discrimination index are dominated by the bad category.

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BIBLIOGRAPHY

Afryaningsih, Y., Harjanto, A., & Fatmawati, R. A. (2022). Kedalaman Butir Soal Pilihan Ganda Penilaian Akhir Semester Ganjil Kelas V SD. *Edu Cendikia: Jurnal Ilmiah Kependidikan*, *2*(02), 403–409. https://doi.org/10.47709/educendikia.v2i02.1694

Arikunto, S. (2010). *Prosedur Penelitian Suatu Pendekatan Praktik*. Jakarta: PT RINEKA CIPTA.

Elviana. (2020). Analisis Butir Soal Evaluasi Pembelajaran Pendidikan Agama Islam Menggunakan Program Anates. *Jurnal MUDARRISUNA*, *10*(2), 58–74.

Hadijah, H., & Anggereni, S. (2016). Pengembangan Instrumen Tes Hasil Belajar Kognitif Mata Pelajaran Fisika Pada Pokok Bahasan Momentum Dan Impuls Sma Kelas Xi. *Jurnal Pendidikan Fisika*, *4*(1), 30–34.

Magdalena, I., Syariah, E. N., Mahromiyati, M., & Nurkamilah, S. (2021). PADA MATA PELAJARAN SBdP SISWA KELAS II SDN DURI KOSAMBI 06 PAGI. *Jurnal Pendidikan Dan Ilmu Sosial*, *3*, 276–287. http://jurnal.fkip.unila.ac.id/index.php/JPPPI/article/view/22206

Meliasari, S., Astuti, S. W., Putri, T. Y., & Walid, A. (2022). ANALISIS SOAL UJIAN AKHIR SEMESTER (UAS) MATAPELAJARAN BIOLOGI di SEKOLAH MENENGAH ATAS (SMA) NEGERI 6 SELUMA TAHUN AJARAN 2018/2019. *EDUPROXIMA : Jurnal Ilmiah Pendidikan IPA*, *4*(1), 37–43. https://doi.org/10.29100/eduproxima.v4i1.2764

Munauwarah, R., & Umam, K. (2022). Analisis Butir Soal Ujian Semester Genap Mata Pelajaran Matematika pada Kelas X SMA di Kota Banda Aceh Tahun Ajaran 2020 / 2021. *Jurnal Ilmiah Mahasiswa Pendidikan Matematika*, *7*(2), 278–284.

Nasir, M., (2015), Analisis Empirik Program Analisis Butir Soal Dalam Rangka Menghasilkan Soal Yang Baik Dan Bermutu Sebagai Alat Evaluasi Pembelajaran Fisika, Prosiding Semirata 2015 bidang MIPA BKS-PTN Barat, 336-347

Septiana, N. (2016). Analisis Butir Soal Ulangan Akhir Semester (UAS) Biologi Tahun Pelajaran 2015/2016 Kelas X dan XI pada MAN sampit. EduSanis: Jurnal Pendidikan Sains dan Matematika, 4(2), 115-121.

Srika Ningsih Pasi; Yusrizal. (2018). Analisis Butir Soal Ujian Bahasa Indonesia Buatan Guru MTSN di Kabupaten Aceh Besar. *Master Bahasa*, *6*(2), 195–202. https://jurnal.unsyiah.ac.id/mb/article/view/11666

Sudjana, N. (2001). *Penilaian Hasil Proses Belajar Mengajar*. Bandung: PT Remaja Rosdakarya.