



## Analysis of USBN Items in Mathematics at MTS Madani Alauddin

Tarmizi Ramli\*, Sitti Mania, Andi Ika Prasasti Abrar, Fitriani Nur, Lisnasari Andi Mattoliang

UIN Alauddin Makasar, Indonesia

\* [tarmiziramlia96@gmail.com](mailto:tarmiziramlia96@gmail.com)

© 2021 JIPM (Jurnal Ilmiah Pendidikan Matematika)

This is an open access article under the CC-BY-SA license (<https://creativecommons.org/licenses/by-sa/4.0/>) ISSN 2337-9049 (print), ISSN 2502-4671 (online)

**Abstrak:** Tujuan dari penelitian ini adalah untuk menganalisis item matematika USBN (The National Standard School Examination) di MTs Madani Alauddin. Penelitian ini menggunakan metode evaluasi kuantitatif dengan pendekatan deskriptif. Penelitian ini dilakukan di MTs Madani Alauddin melalui lembar jawaban 113 siswa. Teknik pengumpulan data yang digunakan adalah teknik dokumentasi. Data yang diperoleh dianalisis menggunakan aplikasi Anates V4. Hasil penelitian menggunakan aplikasi versi 4.09 menunjukkan bahwa: (1) Tingkat kesulitan pertanyaan yang diperoleh, ada 16 item (45,71%), sedang dengan 19 poin (54,29%) dan tidak ada pertanyaan mudah. (2) Berdasarkan kriteria perbedaan daya yang diperoleh dengan perbandingan 12 item (34,29%), sedang 7 poin (20%), cukup bagus 6 poin (17,14%), dan sangat bagus 10 poin (28,57%). (3) Berdasarkan efektivitas penipuan diperoleh 10 item (33,33%) dalam kategori sangat baik, 9 item (30%) dalam kategori baik, 3 item (7,5%) dalam kategori buruk, 8 item (26,67%) dalam kategori buruk dan tidak ada dalam kategori sangat buruk. Berdasarkan hasil analisis, dapat disimpulkan bahwa ada 9 item (25,71%) dalam pertanyaan kualitas baik, 11 item (31,43%) dalam pertanyaan kualitas buruk, dan 15 item (42,86%) dalam kualitas buruk. Pertanyaan kualitas dapat dimasukkan ke pertanyaan bank, item yang tidak dapat direvisi, dan item yang lebih buruk tentang pertanyaan masalah baru.

**Kata kunci:** Analisis Poin Masalah, Tingkat Kesulitan, Kekuatan Membedakan, Efektivitas Tipuan, AnatesV4.

**Abstract:** The aim of this research was to analyze USBN (The National Standard School Examination) items of mathematics at MTs Madani Alauddin. This research used quantitative evaluation method with a descriptive approach. This study was conducted at MTs Madani Alauddin through 113 students' answer sheets. Data collection technique used was the documentation technique. The data obtained was analyzed used the Anates V4 application. The result of the study using the 4.09 version of the application showed that: (1) Difficulty level of the questions obtained, there were 16 items (45.71%), medium with 19 points (54.29%), and there was no easy question. (2) Based on the criteria for differences in power obtained by comparison of 12 items (34.29%), medium 7 points (20%), quite good 6 points (17.14%), and very good 10 points (28.57%). (3) Based on the deception effectiveness obtained 10 items (33.33%) in the excellent category, 9 items (30%) in the good category, 3 items (7.5%) in the poor category, 8 items (26.67%) in the bad category and none in the very bad category. Based on the results of the analysis, it could be concluded that there were 9 items (25.71%) in good quality questions, 11 items (31.43%) in poor quality questions, and 15 items (42.86%) in poor quality. Quality questions could be put into bank questions, items that could not be revised, and items that were worse about the new problem questions.

**Keywords:** Analysis of Problem Points, Difficulty Levels, Distinguishing Power, Deceptive Effectiveness, AnatesV4.

## **Introduction**

Education is a deliberate process of activity on the input of students to produce an expected outcome according to the goals set (Purwanto, 2011). As an intentional process, education must be evaluated to find out the learning outcomes of students, besides knowing the quality of the educational process in general and the quality of the teaching-learning process in particular. Educational evaluation is an activity or process of determining the value of education, so that quality or results can be known (Sudijono, 2009). So, comprehensive educational evaluation must be carried out on all components and work systems.

Education involves students, teachers, methods, goals, curriculum, media, facilities, principals, governments, communities, users of graduates, the physical environment, people, etc. Therefore educational evaluation is carried out on the components of education. Comprehensive evaluation produces complete information as a basis for improvement in education.

Law No. 20 Year 2003 in Article 57 (2nd paragraph) states that evaluations is carried out on students, institutions and formal and non-formal education programs for all levels, units and types of education (Nasional, 2003). Assessment of student learning outcomes is carried out continuously to monitor the process, progress, and improvement of results in the form of daily tests, midterm tests, end of semester tests, repetitions, school examinations and national standard of school examinations. One part of the education evaluation system is assessing learning outcomes by the education unit in the form of USBN (The National Standard School Examination) (Irena, Rika, Ginda, & Afgani, 2020). Assessment is one of the vital steps in the process of teaching and learning (Khoshaim & Rashid, 2016).

Rozien & Retnawati (2019) state that national exam is an annual event that has become an obligation for the student-level end of each level of education in Indonesia. National standard of school examination, hereinafter referred to as USBN, is an activity to measure the students' competency achievement by academic units for certain subjects by referring to graduate competency standard to gain recognition for learning achievement (Hardiyanti, 2018). The school's final exam is one of the learning assessment processes that have important roles and objectives in education (Mansyur & Muliana, 2016).

The term 'national standard' in USBN is intended: (1) USBN questions are arranged based on a nationally applicable grid. The grid is developed based on the Content Standards which are revealed to be basic competencies in accordance with the applied curriculum; (2) USBN questions have problems from the Center of 20-25 percent, except for subjects specified in the POS USBN; and (3) USBN is implemented by referring to POS USBN determined by BSNP (BSNP, 2018). USBN in this study is specifically the mathematics subject. In math subject, USBN is carried out with test technique. A test or question is a measure of the success of learning. A good test is a test that can measure learning outcomes correctly, or a good test is a quality test so that it can provide a clear description of learning outcomes.

In general, the analysis of tests are done by two ways, they are qualitative analysis and quantitative analysis. Qualitative analysis is often also referred to as logical validity which is done before the question is used. The point is to see whether or not a question is functioning. While quantitative problem analysis is often also referred to as empirical validity, which is done

to see whether a question is functioning more or less after the question has been tested on a representative sample (Enang, 2014).

This analysis emphasizes the analysis of the internal characteristics of the test through empirically obtained data. Quantitative analysis of the question means the study of questions based on empirical data from the items in question. This empirical data is obtained from the questions that have been tested. Ideally, in analyzing the items through the two methods above, qualitative and quantitative. Qualitative methods include the stages of validation and reliability test items and quantitative by looking at the distinguishing power, level of difficulty, and effectiveness of deception on multiple-choice questions.

Based on an interview conducted with one of the curriculum section teachers at MTs Madani Alauddin, the USBN questions of mathematics that have been tested to students were made by a combination of mathematics teachers (KEMENAG Kabupaten Gowa) and the questions have not been analyzed. The school principal also does not require teachers to conduct an analysis of the USBN questions. In addition, the researchers also found information about the results of USBN obtained by the students that many of which did not match the KKM, namely only 10 out of 113 students who match the KKM or only about 9% even though tutoring was held every afternoon in the school.

The National Standard School Examination (USBN) is the final exam of the national standard education unit. The quality of national examination items plays a vital role in recognizing mastery abilities and difficulties of the students (Retnawati, Kartowagiran, Arlinwibowo, & Sulistyaningsih, 2017). Therefore, USBN questions are expected to qualify as good instruments so it can provide valid and objective information. Non-qualified exam questions can provide information that is not in accordance with student performance. It can harm students and provide incorrect or misleading information for decision-makers (Kartini, 2018). So, the USBN questions should be analyzed. Item analysis is used to determine errors in compiling the test (Sudjana, 2009). Diagnostic information on what examinees have learned and what they have not learned can be given by item analysis (Boopathiraj & Chellamani, 2013).

This indicates that it is necessary to study the USBN questions to be used as a reference for making the next questions and can be considered by teachers about any material that requires more. This is in accordance with research conducted by Supandi & Farikhah (2016) which shows that the item quality of the item validity level, valid at 70% and invalid at 30%. From the reliability level of the questions with a significance level of 5%, the questions were declared reliable. Based on the level of difficulty of the questions, there are 60% in the easy category, 30% are in the medium category, and 10% are in the difficult category. The difference in power shows that 50% of the questions are categorized as good and 50% of the categories are sufficient. Based on the results of data analysis, it can be concluded that the quality of the questions has high validity and reliability, while the level of difficulty is relatively easy and the power difference is sufficient. This is also in accordance with research conducted by Putra (2018) which shows that the overall results of the Final Test Question of Odd Semester Mathematics Subject for Class VIII of SMP Negeri 28 Purworejo 201/2018 Academic Year based on the level of difficulty, different power, and effectiveness of deceivers is a matter of minimum quality good (minimum number of good quality items less than 61%).

Therefore, this study aims to determine USBN items' quality, including the level of difficulty, distinguishing power, and the effectiveness of tricky questions. It is hoped that by

knowing the quality of the USBN questions it can be used as a reference in making more quality questions.

## Method

This research was conducted at MTs Madani Alauddin. This research included evaluative research. Evaluation is the activity of collecting data or information, to be compared with certain criteria, then conclusions are taken.

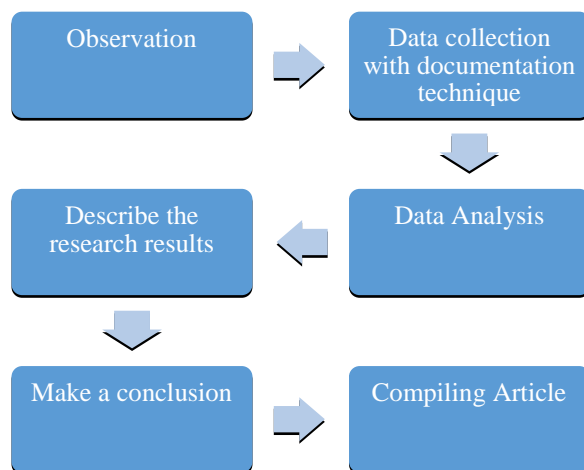


Figure 1. Research Steps

The approach used is a quantitative approach. Data collection technique in this study was the documentation technique. This method is used to obtain research data in the form of questions along with the results of USBN mathematics at MTs Madani Alauddin. Data analysis was performed on USBN items in mathematics at MTs Madani Alauddin with a quantitative data analysis technique. The researcher analyzed the data to find the level of difficulty, distinguishing power, and effectiveness of the tricky questions with the help of Anates V4.

## Findings and Discussion

### Findings

#### *Difficulty Level*

Tabel 1. Frequency Distribution and Percentage of Difficulties in Mathematical USBN questions at MTs Madani Alauddin

Number	Criteria	Questions Number	Total	Percentage
1	Easy	-	0	0%
2	Medium	1,4,5,7,8,9,10,11,12,14,19, 20,21,22,26,27,28,31,35	19	54.29%
3	Hard	2,3,6,13,15,16,17,18, 23,24,25,29,32,33,34	16	45.71%

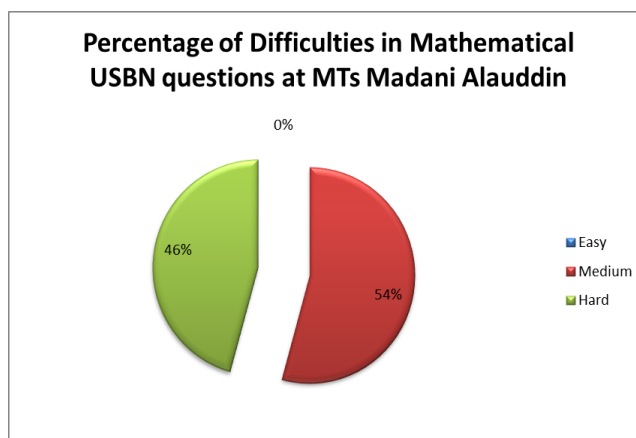


Figure 2. Percentage of Difficulties in Mathematical USBN Questions

Table 1 and figure 2 shows that there are 35 items, most of them in the medium criteria (54.29%), 16 items (45.71%) in the difficult criteria, and there is no questions (0%) in the easy criteria.

Conclusion criteria for the quality of the good items based on the level of difficulty are the questions with the difficulty level of the medium. The good items are 19 items; they are item 1, 4, 5, 7, 8, 9, 10, 11, 12, 14, 19, 20, 21, 22, 26, 27, 28, 31 and 35. These questions can be said as good questions because overall, the questions are answered correctly by 32% - 66% of students and are in the range of difficulty levels  $0.31 \leq P \leq 0.70$ , which means medium category. This is consistent with the theory that good questions are not too easy or not too difficult. Questions included in the category can be added to the question bank.

Conclusion criteria of the quality of the questions that are not good based on difficulty level are the questions that their difficulty level is categorized difficult and easy. The index of difficulty or ease index represents the percentage of students who answered the item correctly (Chauhan, Chauhan, Chauhan, Vaza, & Rathod, 2015). The questions which are good enough are 16 questions (16 are categorized as difficult, and there is no easy question) they are number 2, 3, 6, 13, 15, 16, 17, 18, 23, 24, 25, 29, 32, 33 and 34. The questions can be said as not good because overall, the questions were only answered correctly by 11% - 28% students and they were in the range of difficulty level  $0.00 \leq P \leq 0.30$ , which means difficult category. The

questions categorized as not good can be added to question bank if the questions have been revised.

Based on some descriptions above, it can be concluded that the quality of USBN items in mathematics at MTs Madani Alauddin is based on the level of difficulty it includes not good questions because from 35 items there are 16 items (45, 29%) which are difficult, 19 items (54.29%) which are categorized medium and there is no easy question. This is not in accordance with the proportion of the difficulty level of the question.

### ***Distinguishing Power***

Table 2. Distribution of Frequency and Percentage of Distinguishing Power of USBN Questions in mathematics at MTs Madani Alauddin

Number	Criteria	Question Number	Total	Percentage
1	Very good	1,8,19,21,22,27,31,32,33,34	10	28.57%
2	Fairly good	2,10,11,14,20,35	6	17.14%
3	Medium	4,5,7,9,12,13,24	7	20%
4	Bad	3,6,15,16,17,18,23,25,26,28,29,30	12	34.29%

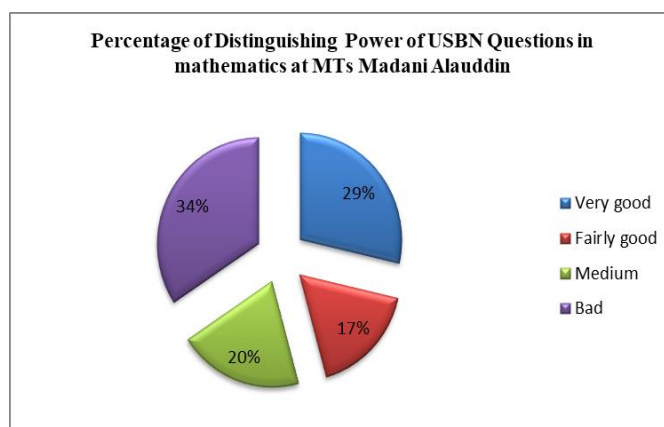


Figure 3. Percentage of Distinguishing Power of USBN Questions in Mathematics

Table 2 and figure 3 shows that the distinguishing power of USBN items in mathematics at MTs Madani Alauddin, which has 10 items (28.57%) with differentiating questions in very good category, 6 items (17.14%) in fairly good category, 7 items (20%) in the medium category and most of the items (34.29%) in the bad category.

Conclusion criteria for good quality questions based on distinguishing power are the questions with good or excellent distinguishing power. The number of good questions are 10 items, namely number 1, 8, 19, 21, 22, 27, 31, 32, 33 and 34. The questions are categorized as good because they are in the discriminant index  $D \geq 0.40$  which means that they have a good distinguishing power. These questions can distinguish students who have low ability and who have high ability. Questions included in the good category can be added into the question bank.

Conclusion criteria of a fairly good quality questions based on distinguishing power are the questions with sufficiently good or moderate distinguishing power. The number of quite good questions are 13 items (6 items are quite good categories and 7 items are moderate categories), namely numbers 2, 4, 5, 7, 9, 10, 11, 12, 13, 14, 20, 24 and 35. The questions are categorized good categories because they are in the discriminant index  $0.20 \leq D \leq 0.39$ , which means that they have a fairly good distinguishing power. Questions included in the fairly good category can be added to the question bank if the questions have been revised.

Conclusion criteria for the quality of not good (bad) questions based on distinguishing power are with a bad distinguishing power. Items there are 12 items that are not good (bad), namely numbers 3, 6, 15, 16, 17, 18, 23, 25, 26, 28, 29 and 30. The questions are categorized good because they are in the discriminant index  $D \leq 0,19$ , which means that the questions have a bad distinguishing power. These questions cannot distinguish students who have low abilities and those who have high abilities. Questions included in the bad category should be removed and replaced with new questions.

Based on some of the descriptions above, it can be concluded that the quality of USBN items in mathematics at MTs Madani Alauddin based on its competency includes a fairly good question because from 35 items there are 10 items (25.57%) which are categorized as good, 13 items (37.14%) are categorized quite well and 12 items (34.29%) categorized as not good (bad).

### ***Deceptive Effectiveness***

Table 3. Distribution of Frequency and Percentage of the effectiveness of deception USBN Questions in mathematics at MTs Madani Alauddin

Number	Criteria	Questions Number	Total	Percentage
1	Very good	4,6,9,10,15,16,20,21,24,28	10	33.33%
2	Good	1,3,11,13,14,22,23,25,26	9	30%
3	Not Good	5,12,27	3	10%
4	Bad	2,7,8,17,18,19,29,30	8	26.67%
5	Very Bad	-	0	0%

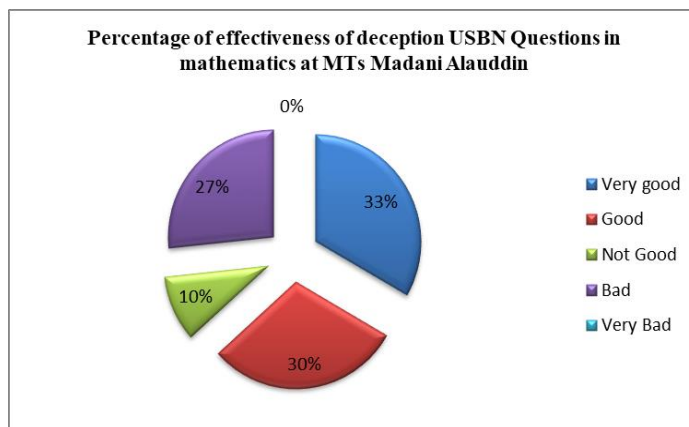


Figure 4. Percentage of Effectiveness of Deception USBN Questions in Mathematics

Table 3 and figure 4 shows that out of 30 items there are 10 items (33.33%) that have excellent deception quality and no item (0%) which has very poor-quality options even though there are 9 items (30%) having good deceptive questions, 3 items (10%) have poor quality and 8 items (26.67%) that are bad quality.

Conclusion criteria for good quality questions based on the effectiveness of deception are questions that are in the good or very good category. There are 19 items that are good items, they are 10 items are very good and 9 items are good) namely number 1, 3, 4, 6, 9, 10, 11, 13, 14, 15, 16, 20, 21, 22, 23, 24, 25, 26 and 28. The questions can be said good because all the deceivers function properly. Questions included in the good category can be added into the question bank. Distractor has been able to carry out its functions well if the distractor has been selected at least 5% of all test participants (Sudijono, 2011). Conclusion criteria for the quality of the fairly good questions based on the effectiveness of the deception are the questions that are in the poor category. The items which are fairly good are 3 items, namely numbers 5, 12, and 27. The questions can be said quite good because there are two deceptors that function. Questions included in the fairly good category can be added to the question bank if the questions have been revised.

Conclusion criteria for the quality of the questions that are not good (bad) based on the effectiveness of the deception are questions with the effectiveness of poor or very bad tricky questions. The items that are not good are 8 items, namely numbers 2, 7, 8, 17, 18, 19, 29 and 30. These questions can be said not good because all the deceivers do not function. Questions included in the bad category should be discarded and replaced with new questions.

Based on some of the descriptions above, it can be concluded that the quality of USBN items in mathematics at MTs Madani Alauddin based on the effectiveness of the tricky questions included a good question because out of the 30 items, there are 19 items (63.33%) categorized as good, 3 items (10%) categorized fairly good and 8 items (26.67%) are categorized as not good (bad).

Table 4. Distribution of Frequency and Percentage of Quality of



USBN Question in mathematics at MTs Madani Alauddin

Number	Category	Questions Number	Total	Percentage
1	Good	1, 4, 9, 10, 11, 14, 20, 21,22	9	25,71%
2	Fairly Good	5, 7, 8, 12, 13, 19, 24, 26, 27, 28, 31	11	31,43%
3	Not Good (Bad)	2, 3, 6, 15, 16, 17, 18, 23, 25, 29, 30, 32, 33, 34, 35	15	42,86%

Based on table 4 and figure 5, there are 35 items, most of them in the bad category items (42.86%), 11 items (31.42%) in the fairly good category, and 9 items (25.71%) in the good category.

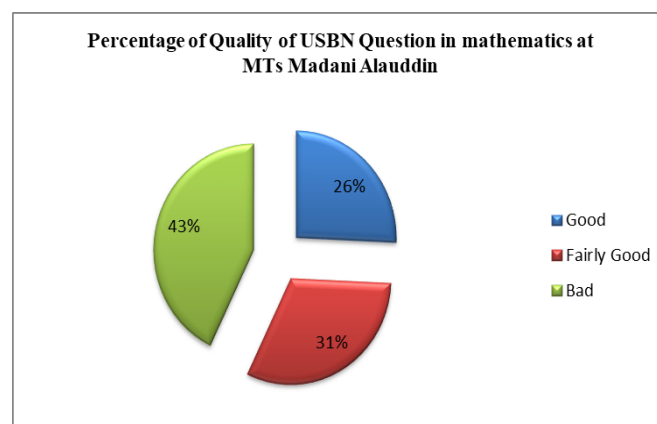


Figure 5. Percentage of Quality of USBN Questions in Mathematics

Based on table 4 and figure 5, there are 35 items, most of them in the bad category items (42.86%), 11 items (31.42%) in the fairly good category, and 9 items (25.71%) in the good category.

## Discussion

Based on the analysis of USBN items in mathematics at MTs Madani Alauddin using the AnatesV4 application which includes the difficulty level of the questions, distinguishing power, and deception effectiveness, the conclusion of the quality question is divided into 3 as follows:

### ***Good Quality of USBN Questions in Math at MTs Madani Alauddin***

Gowa Regency there are 9 questions which have good, they are number 1, 4, 9, 10, 11, 14, 20, 21 and 22. As a sample, the researchers took the example number 1 below:

The result of  $(-17 \times (-20)) - (90 : 15)$  is....

- A. 346                      C. -334  
B. 334                      D. -346

These questions have 0.6637 and a distinguishing power of 0.5806. Where 0.6637 are included in the category of medium questions that are at  $0.31 \leq P \leq 0.70$  and 0.5806 are included in the category of very good distinguishing power at  $D \geq 40$ . Based on the theory that good quality questions are the questions that are not too easy or not too difficult. That means these questions have a good level of difficulty. The questions also have a trick that works well. Based on the description above, it can be concluded that the number 1 question has a good quality because it has fulfilled three criteria, namely the level of medium difficulty, excellent distinguishing power and deception that functions well. So that question number 1 can be stored in the question bank.

Widoyoko & Kustilah (2017) said that the analysis results using the IteMan program show that the UAS questions that using KTSP is quite good because 28 items (70.0%) belong to the medium category, so the items the questions can be used for the future. Questions that are categorized as very easy and very difficult include items that are not good so that if they are used again they must be revised.

According to Yonelia, Haryati, & Azmi (2015), the quality of the items based on the level of difficulty can be affected by errors in the questions, such as errors on the direction, errors in answer options, errors on answer keys, illustrations or readings that are difficult to understand, or maybe also material that has not been taught. The following up that is done in the improvement of the item should be adjusted to the factors causing the items' poor quality, for example, in the improvement of the items in a qualitative manner and the improvement of the percentage of questions at each cognitive domain level.

### ***The Quality is Fairly Good***

USBN questions in math at MTs Madani Alauddin which has a fairly good quality since there are 11 questions namely questions number 5, 7, 8, 12, 13, 19, 24, 26, 27, 28 and 31 As a sample, the researcher took the example number 8 below:

The result of factoring  $x^2 - 5x - 14$  is....

- A.  $(x - 5)(x - 7)$                       C.  $(x - 7)(x + 2)$   
B.  $(x - 5)(x - 2)$                       D.  $(x + 7)(x - 2)$

This problem has a difficulty level which is 0.3628 and a distinguishing power is 0.6774. Where 0.3628 is included in the category of medium question difficulty which is at  $0.31 \leq P \leq 0.70$  and 0.6774 is included in the category of very good distinguishing power which is at  $D \geq 40$ . Based on the theory that good quality questions are those which are not too easy or not too difficult. That means, this question has a good level of difficulty. However, the question number 8 has two deceivers that don't work. Based on the description above, it can be concluded that the question number 8 is of good quality because it meets two criteria, namely the level of

medium difficulty, the distinguishing power is very good. So the question number 8 cannot be stored in the question bank. The question must be revised until it meets the criteria of the good questions.

Widoyoko & Kustilah (2017) said that the results of the analysis using the Iteman program show that the UAS questions that using KTSP 60.0% items can be used again for the next exam again because it includes good and very good questions. While the remaining 40% needs to be revised if it will be used again.

According to Wati, Suandi, & Wendra (2015), factors that cause the questions do not have a different power quality can be divided into 2, namely the quality of the questions made by the teacher and the ability of students to answer questions. Then 34.29% of the questions about USBN math at MTs Madani Alauddin which is poorly categorized can be improved by considering both of these factors.

### **Quality is Not Good (Bad)**

USBN questions in mathematics at MTs Madani Alauddin have 15 questions categorized as not good quality: questions number 2, 3, 6, 15, 16, 17, 18, 23, 25, 29, 30, 32, 33, 34 and 35. As a sample, the researcher took the sample number 18 below:

An object shaped a hemisphere has 18 cm diameter. The volume of the object is

...

- |                 |                 |
|-----------------|-----------------|
| A. $162 \pi$ cm | C. $486 \pi$ cm |
| B. $324 \pi$ cm | D. $972 \pi$ cm |

The difficulty level of this question is 0.22 and its distinguishing power is 0.19. Where 0.22 is included in the difficult question category, which is at  $0.00 \leq P \leq 0.30$  and 0.19 is included in the category of bad distinguishing power at  $0.19 \geq D$ . Based on the theory that good quality questions are not too easy or not too difficult. That means the question includes a problem that is not good. This question number 18 also has two deceivers that don't work. Based on the description above, it can be concluded that the question is poor quality because it does not meet the criteria of the good questions. So it must be revised until it meets the criteria of the good questions or be replaced with a new question.

Widoyoko & Kustilah (2017) said that the results of the analysis using the Iteman program show that the UAS questions that use KTSP, most of the items (75.0%) have very good deception so that they can be used again in the future. The remaining 25% is a bad item so it needs to be corrected if it will be used again.

Kartianom & Mardapi (2017) said the research results show that based on the implementation of the classical test theory, there are 16 items in 'difficult' category, 24 in 'intermediate' category, and no items in 'easy' category. Furthermore, upon the implementation of the item response theory, 28 items are in 'good' category and 12 items are in 'poor' category.

### **Conclusion**

Based on the results of the analysis and discussion, the conclusions obtained after conducting this research are: 1) difficulty level of USBN questions on math at MTs Madani

Alauddin is included as a problem that is not good because there are 16 items (45.29%) out of 35 items are categorized difficult, 19 items (54, 29%) are categorized medium and there is no easy category. This is not in accordance with the proportion of the difficulty level of the question, 2) differences in USBN questions in math at MTs Madani Alauddin is fairly good question because there are 10 items (25.57%) out of 35 items which are categorized as good, 13 items (37, 14%) are categorized fairly good and 12 items (34.29) are categorized as not good (bad), 3) effectiveness of tricky questions of USBN in math at MTs Madani Alauddin is a good question because there are 19 items (63.33%) are categorized as good, 3 items (10%) are categorized as fairly good and 8 items (26.67%) are categorized as not good (bad).

## **References**

- Boopathiraj, C., and K. Chellamani. 2013. "Analysis of Test Items on Difficulty Level and Discrimination Index in the Test for Research in Education." *International Journal of Social Science & Interdisciplinary Research* 2(2):189-93.
- BSNP. 2018. *Tanya Jawab Pelaksanaan Ujian Sekolah Berstandar Nasional (USBN) Tahun Pelajaran 2017/2018*. Jakarta: BSNP.
- Chauhan, Pradip, Girish Rameshbhai Chauhan, Bhoomika Rameshbhai Chauhan, Jayesh Vrajlal Vaza, and Suresh Punjabhai Rathod. 2015. "Relationship Between Difficulty Index and Distracter Effectiveness in Single Best-Answer Stem Type Multiple Choice Questions." *International Journal of Anatomy and Research* 3(4):1607-10.
- Enang, H. 2014. "Analisis Kualitas Soal Matematika Seleksi Penerimaan Peserta Didik Baru Di SMPN 32 Makassar Tahun Pelajaran 2013/2014." *Universitas Negeri Makassar*.
- Hardiyanti, N. 2018. "Pendeteksian Keberfungsian Butir Diferensial Soal USBN Kimia SMA Negeri Di Kabupaten Bone Dengan Metode Khi Kuadrat Lord." *Universitas Negeri Makassar*.
- Irena, P. L., M. M. S. Rika, M. A. S. Ginda, and Jarnawi Afgani. 2020. "Problem Analysis of Mathematics National-Based School Examination First Middle School 2018 / 2019." *THEOREMS (The Original Research of Mathematics)* 4(2):195-205.
- Kartianom, and Djemari Mardapi. 2017. "The Utilization of Junior High School Mathematics National Examination Data: A Conceptual Error Diagnosis." *Research and Evaluation in Education* 3(2):163-73.
- Kartini. 2018. "Analisis Kualitas Soal Ujian Sekolah Berstandar Nasional Mata Pelajaran Matematika Di SMK Negeri Kabupaten Bantaeng Berdasarkan Teori Respon Butir." *Universitas Negeri Makassar*.
- Khoshaim, Heba Bakr, and Saima Rashid. 2016. "Assessment of the Assessment Tool: Analysis of Items in a NonMCQ Mathematics Exam." *International Journal of Instruction* 9(1).

- Mansyur, and Muliana. 2016. "Detecting Differential Item Functioning and Differential Test Functioning on Math School Final-Exam." *International Journal on Advanced Science, Engineering and Information Technology* 6(4):437-40.
- Nasional, Departemen Pendidikan. 2003. Undang-Undang Nomor 20 Tahun 2003 Tentang Sistem Pendidikan Nasional. Jakarta: Depdiknas, 33.
- Purwanto. 2011. *Evaluasi Hasil Belajar*. Yogyakarta: Pustaka Pelajar.
- Putra, Dimas Irfan Puspito. 2018. "Analisis Butir Soal UAS Gasal Matematika Kelas VIII SMP Negeri 28 Purworejo TP 2017/2018." Pp. 458-61 in *Prosiding Seminar Nasional Matematika dan Pendidikan Matematika, "Integrasi Budaya, Psikologi, dan Teknologi dalam Membangun Pendidikan Karakter melalui Matematika dan Pembelajarannya."*
- Retnawati, Heri, Badrun Kartowagiran, Janu Arlinwibowo, and Eny Sulistyaningsih. 2017. "Why Are the Mathematics National Examination Items Difficult and What Is Teachers' Strategy to Overcome It?" *International Journal of Instruction* 10(3):257-76.
- Rozien, M. I., and H. Retnawati. 2019. "Analysis of Junior High School National Examination Year 2014 to 2017 on Facilitating Students' High Order Thinking Skill." *Journal of Physics: Conference Series* 1320(1).
- Sudijono, A. 2009. *Pengantar Evaluasi Pendidikan*. Jakarta: Rajawali Pers.
- Sudijono, A. 2011. *Pengantar Evaluasi Pendidikan*. Jakarta: RajaGrafindo Persada.
- Sudjana, Nana. 2012. *Penilaian Hasil Proses Belajar Mengajar*. XVII. Bandung: PT Remaja Rosdakarya.
- Supandi, and Lailatul Farikhah. 2016. "Analisis Butir Soal Matematika Pada Instrumen Uji Coba Materi Segitiga." *JIP Mat (Jurnal Ilmiah Pendidikan Matematika)* 1(1):71-78.
- Wati, N. R., I. Suandi, and I. Wendra. 2015. "Kualitas Butir Soal Ulangan Akhir Semester Ganjil Bahasa Indonesia Kelas XI SMA Negeri 2 Singaraja Tahun Pelajaran 2015/2016 Dari Segi Taraf Kesukaran, Daya Pembeda, Dan Fungsi Pengecoh." *Jurnal Pendidikan Bahasa Dan Sastra Indonesia Undiksha* 3(1).
- Widoyoko, S., and S. Kustilah. 2017. "Analisis Kualitas Butir Soal Ujian Akhir Semester Genap Mata Pelajaran Ekonomi Kelas XI SMA Kabupaten Purworejo Tahun Ajaran 2016/2017." *Jurnal Pendidikan Surya Edukasi (JPSE)* 3(2):67-82.
- Yonelia, V., S. Haryati, and J. Azmi. 2015. "Analisis Butir Soal Ujian Semester Genap Mata Pelajaran Kimia Kelas X IPA SMA PGRI Pekanbaru Tahun Ajaran 2013/2014." *Jurnal Pendidikan Surya Edukasi (JPSE)* 2(1):1-15.