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Analysis of Items for Selection of High School Biology Olympics Participants

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ABSTRACT

Based on observations at school, the teacher has not analyzed the items for the biology Olympics selection that will be tested on the participants. This study aims to determine the quality of the questions of the MAN Model Biology Olympics in Jambi City. This research is a quantitative descriptive study with the subject of class X students participating in the biology Olympics training. Data were obtained through test instruments in the form of multiple choice questions, answer sheets, and answer keys. The data analysis technique used Anates 4.0.9 program. The results showed the level of validity at the coefficient level of 5%, namely, valid questions amounted to 13 questions and 27 questions invalid. At the level of reliability obtained a value of 0.46 with a sufficient category. At the level of difficulty, there are 3 questions that are categorized as easy, 16 are categorized as medium, and 21 are categorized as difficult. Then on the discriminatory power there are 7 questions categorized as very good, 12 categorized as good, 7 categorized as bad and 14 categorized as very bad. Furthermore, in the distractor quality analysis, there are 4 questions with very good and good distractor quality, while the rest have distractor qualities in the criteria of poor, bad, and very bad. Based on the results of the item analysis recap, there is 1 question that can be used directly, 12 questions can be used but need to be improved and 27 questions cannot be used.

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INTRODUCTION

The High School Biology Olympics is one of the government programs to develop students' talents and interests in the field of biological science which is held annually. Selection is carried out at the district/city, provincial and national levels. In the selection at the district/city level, the participants of the olympics are high school/MA students who were selected from all schools in each district/city. There are a series of evaluation activities for students carried out by each school to represent each school in participating in the

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selection of biology Olympics participants at the district/city level.

Learning evaluation is a process or activity that is systematic, continuous, and comprehensive in controlling, guaranteeing, and determining the quality of learning on various learning components based on certain considerations and criteria (Arifin, 2014).

Teachers must evaluate learning outcomes and determine competency standards that must be achieved by students participating in the biology Olympics. By evaluating learning outcomes, teachers can find out whether the instruments used are too easy or difficult, or whether the instruments are in accordance with the indicators of learning or not, and whether the learning (models, approaches, strategies, and methods) used by teachers in teaching Biology Olympics is appropriate. If the instrument is too difficult, it is necessary to make improvements by analysing each item used.

Item analysis is a process of reviewing the quality of the questions in each item. Analysing each item is especially important, lest each item contains things that are not in accordance with what is the goal, when viewed from the level of difficulty, distractor patterns, discriminatory power, and others. Item analysis can be done with the help of the Anates program, which is one of the software to analyse question items (Haryanto, 2020).

Anates is an application developed by Drs. Karno, M.Pd and Yusuf Wibisono, ST who can calculate item analysis quickly, easily, and accurately. This application is capable of displaying features and calculations, including weighted data scores, reliability, discriminatory power, difficulty level, correlation between item scores and totals, and distractor quality. In addition, the Anates application has also been widely used in analysing questions, for example, the analysis of the quality of the Biology Olympics questions for SMA in West Sumatra, Riau, Jambi and Bengkulu in 2018. (Syarif & Syamsurizal, 2019). Analysis of the quality of final exam questions for even semester biology subjects of class XI IPA at SMA Negeri Selatan Region, Solok Regency, for the 2015/2016 academic year (Friatma *et al.*, 2017), and item analysis of the type of multiple choices questions (MCQ) at the end of the even semester biology class XI SMA Negeri IV Jurai for the 2017/2018 school year (Syafti *et al.*, 2019).

Based on observations at the Jambi Model MAN school, it was found that the teacher had not analysed the items that would be given to the participants in the school-level Olympic selection. Because no research or trials have been conducted on these questions, it cannot be known whether the questions are of high quality and meet the standards or not. For this reason, it is important to analyse the selection of the Olympics. By using questions that have been analysed and whose quality is known, this makes the school more mature and optimal in preparation for the selection for the Biology Olympics at the district/city level. Fitrianawati (2015) explain other benefits of item analysis, namely determining whether the function of an item is as expected, providing input to students about their abilities and as a basis for discussion in class, providing input to teachers about student difficulties, providing input on aspects of for curriculum development, revising the assessed or measured material, and improving question writing skills for teachers.

Based on the description of the background of the problem, a study was carried out with the aim of determining the quality of MAN Model Biology Olympics questions in Jambi City.

METHOD

Type of Research

This research is quantitative descriptive. The subjects in this study were 23 students of

class X MAN Model Jambi City who took part in the Biology Olympics training selection.

Data collection technique

The data collection technique used is through test instruments in the form of multiple choice questions, answer sheets, and answer keys.

Data analysis technique

The data analysis technique used in this study used the program Anates version 4.0.9 to determine the validity, reliability, level of difficulty, discriminatory power, distractor quality, and recap of item analysis. Item validity is the accuracy of measuring a question to determine the contribution of a question item on the total score. A measuring instrument can be deemed valid if it measures what it is intended to measure exactly (Arifin, 2012). Described by Sani (2016) Valid assessment means that the assessment is carried out in accordance with what should be assessed. In addition to the validity of the questions, a question must also have a measure that states the level of consistency of a test (Reliability). Reliability is a measure that states the level of consistency of a question, which relates to if the test is carried out repeatedly it can give the same results. The criteria for interpreting the reliability of the questions are presented in Table 1 (Putri & Ofianto, 2019).

Table 1. Question Reliability Criteria

Reliability Value (r)	Interpretation
0.800 - 1.000	Very High
0.600 - 0.799	High
0.400 - 0.599	Adequate
0.200 - 0.399	Low
0.000 - 0.199	Very Low

One of the requirements of a good test instrument is to have a level of difficulty that is not too difficult and not too easy. The level of difficulty is a measurement of how difficult a question is. The criteria for interpreting the level of difficulty of the questions are presented in Table 2 (Arifin, 2012).

Table 2. Criteria for Item Difficulty Level

Difficulty Level (%)	Interpretation
0 - 27	Hard
28 -72	Medium
73 - 100	Easy

In addition to the level of difficulty, one must also pay attention to the discriminatory power of an item. Discriminatory power is the measurement of a question in discriminatory the ability of students between students who have high abilities and those with low abilities. To interpret the discriminatory power coefficient, the criteria in Table 3 can be used (Elviana, 2020):

Table 3. Criteria for Discriminatory Power of Items

Discriminatory Power Level (%)	Interpretation
Negative – 9	Very Bad (must be discarded)
10 – 19	Bad (advisable to discard it)
20 – 29	Fairly Good (Enough)
30 – 49	Good
50 and over	Very good

In multiple choice questions, there are several alternative answers (options) known as distractors. A good question distractor is a distractor that is chosen evenly by students. On the contrary, if it is chosen unevenly, it is considered less good. The distractor quality based on the distractor index is presented in Table 4 (Arifin, 2014).

Table 4. Distractor Index Criteria

Distractor Index (%)	Interpretation
76 – 125	Very good
51 – 75 atau 126 – 150	Good
26 – 50 atau 151 – 175	Poor
0 – 25 atau 176 – 200	Bad
Lebih dari 200	Very Bad

RESULTS AND DISCUSSION

Validity

The results of the analysis of the validity of the items in the selection of the MAN Model Biology Olympics participants of the Jambi City using the Anates computer program version 4.0.9 can be seen in Supplementary files 1. Based on the results of the analysis of the validity of the items in Supplementary files 1, there are 13 valid questions. 8 questions have the highest validity, while 5 questions have moderate validity. This is indicated by a positive correlation value and t count is greater than the t-table with a significance level of 5% = 0.304. There are 27 items that are not valid, including numbers 11, 36, and 39 whose analysis cannot be calculated because the correlation value is 0.000 so that it displays the word NAN, then numbers 5, 9, 10, 14, 24 and 31 which display negative correlation values , while the remaining questions are those that have a correlation value of less than 0.304. This is indicated by a negative correlation value and t-count which is less than the t-table. Asrul et al. (2014) added that To accept whether the test item sought is valid or invalid, the correlation value is compared with the critical value contained in the statistical table. If there is a positive and significant correlation between the item score and the total score, it means that the item is considered valid.

Reliability

Based on the results of the reliability analysis, the test questions using the Anates software 4.0.9 resulted in a test item reliability value of 0.46. This value, if interpreted with reliability criteria, is included in the sufficient criteria. In this case, the test instrument used needs to be improved to produce high reliability. Ratnawulan & Rusdiana (2014) explained that one of the test requirements as an evaluation instrument is high reliability. Tests with a high level of reliability will produce fixed and stable results.

Difficulty Level

The results of the analysis of the level of difficulty of the items selected for the MAN Model Biology Olympics Jambi City using the Anates computer program version 4.0.9 can be seen in Supplementary files 2. Based on the results of the analysis of the level of difficulty of the items, there are questions with low, medium, and high and very high difficulty levels. Three questions have a low level of difficulty, 16 questions have a moderate level of difficulty, and 21 questions have a high level of difficulty, while 9 questions are categorized as very difficult.

As an illustration of real learning achievement, teachers must pay attention to the level of difficulty of the questions tested on students. Problems with very easy and very difficult categories must be replaced and repaired. The questions used should not be too difficult nor too easy. According to Arikunto (2005), A good question is a question that is neither too difficult nor too easy. Very easy questions cannot stimulate students to increase their efforts to solve problems on items, while very difficult questions will make students reluctant to try to solve problems.

Discriminatory Power

The results of the analysis of the level of discriminatory power of the selection items for the MAN Model Biology Olympics Jambi City using the Anates computer program version 4.0.9 can be seen in the Supplementary files 3. The discriminatory power, to be able to distinguish smart students from those who are less intelligent. The discriminatory power of the questions obtained from the test results on 40 items is as follows: 7 items are classified as very good, 12 items are classified as good, 7 items are classified as bad, and 14 items are classified as very bad. Questions with very low to very low discriminatory power should be replaced and repaired. According to Arifin (2014), The higher the discriminating power coefficient of an item, the more the item is able to distinguish between students who are able to master and those who are less able to master competence.

Distractor quality

The results of the quality analysis of distractors on the items in the selection of Biology Olympics participants at MAN Jambi City Model using the Anates computer

program version 4.0.9 can be seen in Supplementary files 4. Based on the results of the analysis, there are 4 questions whose distractor quality is very good or good, namely number 6 , 11, 15, and 34. This question can be used because the distractors are chosen evenly by the students. Question number 6 has the percentage of distractors a, c, d, and e of 109%, 145%, 73% and 73% respectively. Choice a is classified as very good, while c, d, and e are classified as good, so that the questions can be used. Meanwhile, questions that have distracting qualities that are poor, bad, and very bad must be improved. Arifin (2014) added that The quality of the distractor is considered good if the number of students who choose the distractor is equivalent or close to the ideal number.

Item Analysis Recap

The item analysis recap is an overall analysis of the items regarding their feasibility. There are several criteria for recap of item analysis as follows: questions should be used if they are valid, have good discriminatory power, and moderate difficulty. Questions should not be used if they are invalid, have poor discriminatory power and the level of difficulty is too high or too low. Meanwhile, the question must be corrected if it is classified as valid, but one of the distinguishing features or the level of difficulty is poor, so it needs to be improved so that it can be used. The results of the recap of item analysis can be seen in Supplementary files 5. Based on the results of the recap of item analysis in Supplementary File 5, overall, the questions that can be used are 1 question that can be used immediately, 12 questions can be used but need to be improved because they have a level of difficulty, discriminatory power or distracting quality, while the remaining 27 questions cannot be used.

According to Alpusari (2014), Items that are classified as usable can be directly used and entered into the question bank provided by the teacher, and the questions can be used again in future tests. Items that fall into the category of being used but needing to be corrected must be researched and their grammar corrected, including if there are sentences that are unclear or difficult for students to understand. Meanwhile, items that cannot be used will not be used in the next test.

CONCLUSION

Based on the results of the analysis of the selection items for the MAN Model Biology Olympics Jambi using Anates 4.0.9 software, the quality of the questions for the MAN Model Biology Olympics in Jambi City is not good enough. This is indicated by the results of the analysis recap of 40 questions, where 1 question can be used immediately, 12 questions can be used but need to be improved because they have a level of difficulty, discriminatory power or poor distracting quality, while the remaining 27 questions are classified as questions that cannot be used. Based on the results of the study, it is necessary to conduct training on how to make good and correct questions to teachers at the MAN Model School in Jambi City. In addition, it is important to conduct further research on the Analysis of Biology Olympiad Selection Questions in Various SMA/MA Schools in Jambi Province to see the quality of the questions as a whole.

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