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Development of HOTS Questions with Two-Level Multiple Choice Diagnostic Tests in Environmental Change Learning in Class X SMA/MA Students

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Abstrak

Education is an effort to develop the potential in students, the quality of education is determined by the quality of learning. The quality of learning in curriculum implementation aims to foster student character education with HOTS-based assessment (Higher Order Thinking Skill) or higher-order thinking skills that students must have in the 21st century. Students' higher-order thinking skills are analytical skills, analytical abilities can be identified by diagnostic tests. This study aims to develop HOTS items with a diagnostic test to identify students' analytical skills on environmental change learning for class X SMA/MA. The method used in this research is RnD (Research and Development) with a 4D model design including: Define, Design, Development and Disseminate. The subjects in this study were students of class XI and XII MIPA 1 and 2 SMA YSKI, Semarang for the academic year 2020/2021. Data was collected by observation, interviews and literature review. Data were taken from instruments which included: validation sheets, HOTS items with diagnostic tests to identify students' analytical skills, questionnaires for teacher and student responses. Data analysis includes content validation by experts, item validation with the help of Microsoft Excel and Rasch Model. The student's analytical ability profile on the small-scale test is 44.8% and the large-scale test is 31.09%.

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INTRODUCTION

Education is an effort to develop the potential or abilities of students actively in the learning process (Triwiyanto, 2014). The quality of education is determined by the quality of its good learning, to achieve the goals of national education. However, until now there are still problems with graduate competency standards, namely the low quality of education in curriculum implementation (Dewi et al., 2019). The implementation of the 2013 curriculum aims to foster student character education through an effective learning process and assessment based on HOTS (Higher Order Thinking Skill) or higher-order thinking skills in accordance with 21st century skills. The government continues to strive to improve the quality of education in Indonesia through the Minister of Education Regulation Number 23 2006 which emphasizes critical and creative thinking skills that must be mastered by students in the 21st century in the form of reasoning by using higher-order thinking skills (HOTS).

In face-to-face learning, it is known that students' higher-order thinking skills are still relatively low. So it is possible that during distance learning (online) students' higher-order thinking skills will decrease. Based on observations made by (Ilaah & Yonata, 2015) on 38 students to analyze learning outcomes at SMA Kemala Bhayangkari 1 Surabaya, as many as 67.89% of students failed to make the correct hypothesis, 78.95% of students answered unable. identify experimental variables, 65.79% of students failed to analyze the experimental data correctly, 86.8% of students failed to formulate the problem correctly and 67.11% were unable to draw appropriate conclusions.

Observations were also made to biology teachers at SMA YSKI Semarang regarding the form of student assessment and analytical thinking skills, it was found that students still had difficulty answering questions with problems of daily life that required analytical skills in answering, this was due to questions that students usually did. still in the form of memorizing theory and there are no questions that require in-depth student analysis, so it can be concluded that students' analytical thinking skills are still relatively low and there is a need to improve the quality of learning, especially in its implementation. 2013 curriculum, namely HOTS-based learning.

In the world of education at the high school (SMA) level, there are subjects that require thinking skills, attitudes, and science process skills, one of which is biology. Biological science is closely related to how to find and understand nature systematically, so that biology is not only the mastery of a collection of knowledge in the form of facts, concepts, principles in the form of rote theory but also a process of discovery. Biology learning aims to create scientific attitudes in students, including the ability to understand, discover and explain concepts, principles in biology and be able to apply them to solve everyday problems (daily life).

Biology learning is closely related to Higher Order Thinking Skills (HOTS). Biology subject requires students to be able to think analytically. Students who are able to analyze a scientific problem will be able to recognize existing problems which can then be investigated scientifically, recognize key words to examine information and recognize the characteristics of scientific investigations. In biology learning material about the concept of environmental change, the basic competencies that must be achieved are 3.11 Analyzing data on environmental changes, their causes and impacts on life and 4.11 Formulating ideas to solve problems of environmental change that occur in the surrounding environment, aiming to train students to be sensitive and care about the environment that happens in the real world. Based on the basic competencies to be achieved, the development of HOTS questions on environmental change material is very important so that it requires students to be able to analyze more deeply about existing changes, their causes and impacts on humans and the surrounding environment.

In (Sulastri et al., 2018) it is stated that the analytical thinking ability of students in Indonesia is still relatively low. (Riwayani et al., 2019) added the fact that students' higher order thinking skills at school are still relatively low. The low ability of students' analysis of a concept in biology learning is also the cause of not achieving the KKM that has been made by the school. Students who have good analytical skills will show good learning outcomes, and vice versa students who have low analytical skills will hinder the

learning process and student learning outcomes.

Based on first observations made at SMA YSKI Semarang by analyzing UAS questions for class X even semester of the 2020/2021 academic year, it shows that of the 50 multiple choice exam questions, 50% of the questions are still at the LOTS (Low Order Thinking Skills) Level and 50% problem has been solved. HOTS (Higher Order Thinking Skills) level. In the environmental change material, there are 7 questions with LOTS level. The problem of environmental change material being tested is still in the form of memorization and classification questions so that it is not enough to improve students' higher-order thinking skills. Environmental change materials must require analytical thinking skills to diagnose, predict, assess and plan actions that cause changes that occur in the environment. This encourages researchers to develop environmental change material questions with the HOTS level to improve higher-order thinking skills.

Analytical thinking skills can be trained with analytical activities and can be measured using diagnostic tests. Diagnostic tests are tests that are used to determine student weaknesses so that the causative factors can be identified for proper treatment (Arikunto, 2012, Sudjana 2012). Diagnostic tests can be used by developing multiple choice questions or fill-in questions with the HOTS type of cognitive level.

Multiple Choice is one form of test that is often used in the world of education in schools. Multiple-choice tests are used to measure students' level of understanding of a concept, multiple-choice tests are easy to administer and assess, and the results obtained are also easy to process and analyze (Tan et al., 2008). The Two-Tier Multiple Choice (TTMC) question model is a tiered multiple-choice diagnostic test instrument that can provide an effective assessment to build students' conceptual understanding (Sesli & Kara, 2012). The Two-Tier Multiple Choice (TTMC) question model has two levels with first level students (first level) being asked to choose the correct answer and then at the second level (second level) students must know the reason for the question. answers in the first level. Answers at the second level (second-tier) are also in the form of multiple choices which have also been provided with choices.

Based on the background, observations of several studies that have been carried out and the results of the initial observations of this study to determine the level of students' analytical skills on biology material, the development of HOTS questions with two-level multiple-choice diagnostics. The test is expected to be effective in determining students' higher-order thinking skills, especially on environmental change material even though learning is carried out in the pandemic era.

RESEARCH METHOD

The type of this research is research and development (R&D). The subjects in this study were students of class XII SMA YSKI Semarang as the subject of a small-scale trial. Class XI SMA YSKI Semarang as the subject of a large-scale trial. The small-scale trial consisted of 20 students of class XII science. The large-scale trial consisted of 50 students of Class XI MIPA. Data analysis in this study was carried out using two analytical techniques, namely item analysis using Microsoft Excel formulas and analysis using the Rasch model. Classical item analysis techniques include validity test, reliability test, level of difficulty, discriminating power of questions, and reliability test of student response questionnaires. Then the construct analysis technique using the Rasch model includes item reliability testing, item suitability, Wright map analysis (person-item map), item difficulty (item measure), individual suitability level and individual ability level.

RESULTS AND DISCUSSION

Data analysis in this study was carried out using two analytical techniques, namely item analysis using Microsoft Excel formulas and analysis using the Rasch model. Classical item analysis techniques include validity test, reliability test, level of difficulty, discriminating power of questions, and reliability test of student response questionnaires. Then construct analysis technique using Rasch model includes item

reliability test, item fit, Wright map analysis (person-item map), item difficulty (item measure), individual suitability level and individual ability level.

The student's analytical ability profile in this study was calculated based on correct answers on both tiers, namely students could answer correctly both tier-1 and tier-2. If the student is only correct at one level then it will not be counted in the analytical ability profile. This calculation is because the purpose of analytical skills is for students to be able to organize, distinguish, and attribute any existing information. The questions are arranged interrelated between the tier-1 answer choices and the tier-2 answer choices. So that students must be able to connect between the answer choices chosen in tier-1 with the answer choices selected in tier-2. Thus the analytical ability is calculated based on the correct answers at both levels. The following is a profile of students' analytical abilities starting from small and large scale tests which are presented in Table 1.

Table 1. Profile of the Analysis Ability of YSKI Semarang High School Students

No	Analysis Ability Indicator	Uji	
		Small-Scale	Large-Scale
1	<i>Differentiating</i>	17,8%,	10,25%,
2	<i>Organizing</i>	16,3%,	13,78%,
3	<i>Attributing</i>	10,7%.	7,5%.
total		44,8%	31,09%

Based on Table 1. above, the student's analytical ability profile can be explained in detail in the following discussion.

Profile of Student Analysis Ability in Small-Scale Trial

A small-scale trial of the HOTS question development instrument with a two-level multiple-choice diagnostic test for environmental change for SMA/MA class X students was conducted on 20 students of class XII MIPA SMA YSKI, Semarang. The analytical ability profile is divided into 3 types of abilities, namely (1) Differentiating Ability, (2) Organizing Ability, (3) Attributing Ability.. The results of the calculation of the student's analytical ability profile on environmental change material on a small-scale test are: (1) Differentiating Ability of 17.8%, (2) Organizing Ability of 16.3%, and (3) Attributing Ability of 10.7%. With the overall analytical ability of students of 44.8% included in the medium category. The following is a discussion of the student's analytical ability profile for each indicator.

Analysis Ability Profile of Differentiating

The questions included in differentiation analysis ability section are questions number 9, 11, 13, 14, 16, 19, 20, 21, 24, 25, 26 and 28 with a total of 12 questions. In the differentiation analysis ability profile, 17.8% results are obtained which are included in the low category based on adaptation by Sukardjo (2010: 96).

Of the 12 questions, the question with the highest level of differentiating ability is question number 19 with 16 students answering correctly and 4 students answering incorrectly. While the questions with the lowest level of differentiation are questions number 9 and 20 with the number of students who answered correctly 6 students and 14 students incorrectly. Problems 9, 19 and 20 are questions based on KD 3.11. Analyze data on environmental changes, their causes and impacts on the environment.

Question number 19 is a question with Academic Achievement Indicators, namely students are able to record environmental changes and analyze factors and causes of environmental changes, in differentiation analysis skills students are required to be able to provide effective considerations and solutions to the problems presented. Problem number 19 presents facts and data on problems that occur in big cities in Indonesia, namely flooding due to high rainfall, the cause of flooding is due to human factors

such as logging, land conversion and forest fires. In tier-1 students are asked to analyze and correlate the factors causing flooding due to high rainfall with human activities that have damaged nature, while in tier-2 students are asked to provide effective solutions to flood problems. There were 16 students who were able to answer correctly at both levels, meaning that overall students were able to properly analyze the problems presented and provide effective solutions. There is 1 student who is only able to answer correctly on tier-1 because students are only able to understand the problem but are wrong in providing effective solutions.

Question number 9 is a question with Academic Achievement Indicators, namely students are able to analyze the types of pollutants and their impact on the environment, on the ability to analyze differences, students are required to be able to identify the causes of problems from the information presented. Problem number 9 presents an overview of air pollution by factory smoke, in tier-1 students are asked to analyze what types of pollutants are contained in factory smoke and in tier-2 students are asked to identify the impact of pollutants when reacting with the air and the surrounding environment. Only 6 students who can answer correctly at both levels and 14 students who answer incorrectly mean that students have not been able to analyze the questions properly. There are 4 students who are only able to determine the type of pollutant in tier-1 but incorrectly identify the causes caused in the environment. There are 10 students who cannot answer correctly both level-1 and level-2 which means that students do not understand well the concept of types of pollutants in environmental change material.

Question number 20 is a question with Academic Achievement Indicators, namely students are able to record environmental changes and analyze factors and causes of environmental changes with differentiation analysis skills, students are required to be able to determine pieces of relevant information to solve complex scenarios. Question number 20 presents data from the National Disaster Management Agency (BNBP), where the city of Semarang is predicted to sink in 50 years due to land subsidence that reaches 10-12 cm every year. In tier-1 students are asked to analyze the causes of the problems presented, namely the causes of land subsidence that occurred in the city of Semarang, then in tier-2 students are asked to determine the flow of the problem scenarios that occur and solve the main problems. There are only 6 students who are able to answer correctly at both levels, meaning that overall students have not been able to properly analyze the questions presented. There were 7 students who only answered correctly on tier-1, meaning that students were only able to determine the cause of the problem but could not solve the problem scenario, there were also 7 students who could not answer the two tiers because students were unable to analyze the problem in the questions presented.

Analysis Ability Profile of Organizing

The questions included in the organizational analysis skills section are questions number 3, 4, 5, 6, 7, 8, 10, 15, 17, and 18 with a total of 10 questions. In the Organizational Analysis Ability Profile, the result is 16.3% which is included in the low category based on the adaptation of Sukarjo (2010: 96).

Of the 10 questions, the question with the highest organizational analysis ability is question number 18 with 13 students answering correctly, while the question with the lowest level of organization is question number 8 with 3 students answering correctly. Questions number 8 and 18 are questions based on KD 3.11. Analyze data on environmental changes, their causes and impacts on the environment.

Question number 18 is a question with Academic Achievement Indicators, namely students are able to record environmental changes and analyze factors and causes of environmental changes, with organizational analysis skills, namely students are able to analyze the information presented and recognize patterns or relationships. Problem number 18 presents graphic data on greenhouse gas emissions that increase every year, at tier-1 students are asked to analyze the causes of the problem and the consequences if greenhouse gas emissions continue to increase, at tier-2 students are asked to determine the pattern of the relationship between cause and effect. problems posed to the environment. There are 13 students who are able to answer correctly at both levels, meaning that students are able to analyze the problem well and determine the appropriate relationship pattern, there are 2 students who can only answer correctly at level 1 and 2 students who answer correctly. on tier-2 means there are 2 students each. able to identify the cause of

the problem but unable to determine the pattern of the relationship and vice versa.

Question number 8 is a question with Academic Achievement Indicators, namely students are able to analyze the types of pollutants and their impact on the environment, with organizational analysis skills, namely students are able to study and analyze appropriate/relevant information. Problem number 8 presents a table regarding the sources of soil pollutants, namely domestic, industrial and agricultural waste and the forms produced by the three wastes. In tier-1 students are asked to determine the correct pairing between the source of soil pollutants and the form produced correctly, in tier-2 students explain the types of pollutants in soil pollution and their effects on the environment. There were only 3 students who were able to correctly answer the two questions, meaning that the overall student organizational analysis ability on this question was relatively low. There is 1 student who correctly pairs the pollutant source with its shape on tier-1 but cannot analyze the type of soil pollutant pollutant and the problems caused in tier-2, there are 5 students who can only analyze the problem caused but incorrectly determine the source pair with the shape. soil pollution properly. This shows that there are still many students who do not understand the concept of the types of pollutants in environmental change material well.

Analysis Ability Profile of Attributing

Questions that are included in the domain of attributing analysis ability are questions number 1, 2, 12, 22, 23, 27, 29, and 30 with a total of 8 questions. In the attributing analysis ability profile obtained 10.7% which is included in the low category based on the adaptation of Sukardjo (2010: 96).

Of the 8 questions, the question with the highest attributing analysis ability is question number 23 with 12 students answering correctly, while the question with the lowest level of attributing ability is question number 2 with 3 students answering correctly. Question number 2 is a question based on KD 3.11. Analyze data on environmental changes, their causes and impacts on the environment. Question number 23 is a question made based on KD 4.11 Formulating ideas to overcome environmental changes that occur in the surrounding environment.

Question number 23 is a question with Academic Achievement Indicators where students analyze the impact of environmental change and its prevention efforts, with attribution analysis skills, namely students are able to relate the impact of environmental change to its causes. Problem number 23 presents facts about the power of global warming due to the greenhouse effect, in tier-1 students are required to be able to offer solutions to the problems given, then in tier-2 students relate the problems that occur, the causes and solutions offered to overcome these problems. that. Students who can answer correctly at both levels are 12 students, meaning that students are able to analyze the causes and problems that arise and offer effective solutions. There are 2 students who are only able to offer solutions at tier-1 but are wrong in linking the problems, causes and solutions offered well, meaning that the two students do not understand the relationship between problems, causes and solutions or try to answer with opportunities correctly.

Question number 2 is a question with Academic Achievement Indicators, namely students can explain and analyze the concept of environmental change with attribution skills, namely students are able to classify relationships from the information provided. Problem number 2 discusses the basic concepts of environmental balance, namely carrying capacity and resilience. A balanced environment will have a balanced carrying capacity and resilience with environmental changes that occur. At tier-1 students are asked to analyze the pattern of the relationship between carrying capacity and environmental resilience, at tier-2 students are asked to analyze the consequences that occur if support and resilience are not balanced. Question number 2 is a basic question regarding the concept of environmental balance but there are only 3 students who answered correctly at both levels, namely 1 student who was only correct at level-1 and 3 students who were only correct at level-2. This shows that students are not familiar with the terms carrying capacity and environmental resilience well. The ability to analyze student attributes on this question is relatively low.

Profile of Student Analysis Ability in Large-Scale Trial

A large-scale trial of the HOTS question development instrument with a two-level multiple-choice diagnostic test of environmental change for class X SMA/MA students was conducted on 52 students in class XI SMA YSKI Semarang. The analytical ability profile is divided into 3 types of abilities, namely (1) Differentiating Ability, (2) Organizing Ability, (3) Attributing Ability. The results of the analysis of the student's analytical ability profile on the environmental change material on a large-scale test are: (1) Differentiating Ability of 10.25% (2) Organizing Ability of 13.78%, and (3) Attributing Ability of 7.05%. with the overall analytical ability of students of 31.09% included in the low category. The following is a discussion of the student's analytical ability profile for each indicator.

Analysis Ability Profile of Differentiating

The questions included in the realm of differentiating analysis ability are questions number 9, 11, 13, 14, 16, 19, 20, 21, 24, 25, 26 and 28 with a total of 12 questions. In the differentiation analysis ability profile, the results obtained are 10.25% which is included in the low category based on adaptation by Sukarjo (2010: 96).

Of the 12 questions, the question with the highest level of differentiation ability is question number 21 with 19 students answering correctly. While the question with the lowest level of differentiation is in question number 9 with the number of students who answered correctly, namely 8 students. Question number 9 is a question made based on KD 3.11 Analyzing data on environmental changes, their causes and impacts on the environment and question number 21 is a question made based on KD 4.11 Formulating ideas for solving problems of environmental change that occur in the surrounding environment.

Question number 21 is a question with Academic Achievement Indicators, namely students can analyze the impact of environmental changes and their prevention efforts with differentiating analysis skills, namely students are required to be able to provide effective considerations and solutions to existing problems. In question number 21 presented data from the Ministry of Environment and Forestry (KLHK) regarding the amount of plastic waste in Indonesia that disrupts the water ecosystem, tier-1 students are asked to provide effective solutions to the problem of water pollution with plastic waste, while in tier-2 students provide a more specific explanation of the given solution. Students who answered according to the answer keywords tier-1 and tier-2 totaled 19 students. While students who only gave answers without detailed explanations were 17 students and 16 students who answered incorrectly. If the comparison between students who are correct at both levels and students who are correct at one level, then students who correctly answer the keywords at the second level dominate the students' answers, so it can be concluded that students' analytical skills are quite good. tall.

Question number 9 is a question with Academic Achievement Indicators, namely students are able to analyze the types of pollutants and their impact on the environment with differentiation analysis skills, namely students are able to identify the causes of problems from the information obtained. Problem number 9 presents an overview of air pollution by factory smoke, in tier-1 students are asked to analyze what types of pollutants are contained in factory smoke and in tier-2 students are asked to identify these types of pollutants if they react with the air and the surrounding environment. problems that arise. Only 9 students who can answer correctly at both levels and 43 students who answer incorrectly means that students have not been able to analyze the questions properly. There are 10 students who are only able to determine the type of pollutant on tier-1 but incorrectly identify the cause that will be caused in the environment and there are 8 students who are correct in identifying the cause of the problem on tier-2 but incorrectly determine the type of pollutant on tier-1. There were 25 students who could not answer correctly either level-1 or level-2. Students who are wrong in answering both levels dominate students' answers, meaning that students do not understand well the concept of the types of pollutants in environmental change material.

Analysis Ability Profile of Organizing

The questions that fall into the realm of organizing analysis skills are questions number 3, 4, 5, 6, 7,

8, 10, 15, 17, and 18 with a total of 10 questions. In the Organizing analysis ability profile, the result is 13.78% which is included in the medium category based on the adaptation of Sukardjo (2010: 96).

Of the 10 questions, the question with the highest organizing analysis ability is question number 6 with 28 students answering correctly, while the question with the lowest level of organizing is question number 15 with 7 students answering correctly. Questions number 7 and 15 are questions based on KD 3.11. Analyze data on environmental changes, their causes and impacts on the environment.

Question number 6 is a question with Academic Achievement Indicators, namely students can characterize the factors causing environmental change with Organizing Analysis Ability Indicators, namely students are able to study and analyze appropriate/relevant information. In question number 6, information is given about the factors that cause damage to the environmental balance that causes the breaking of the food chain in an ecosystem. Tier-1 students are asked to determine what factors cause the destruction of the natural balance and at Tier-2 students are asked to analyze the relationship between components in the environment in forming a balanced environment. Students who can answer correctly at both levels are 28 students, which means that overall students understand and are able to properly analyze the problems presented and determine the pattern of relationships between existing components properly. Although there are still 12 students who are only correct at level-1 and 4 students who are only correct at level-2. Students who answered correctly on both levels dominated the student's answers so that students can be said to have high organizing analysis skills on this question.

Question number 15 is a question with Academic Achievement Indicators, namely students can analyze the impact of environmental changes on life with Organizing Analysis Ability Indicators, namely students are able to analyze incoming information and recognize patterns or relationships. Question 15 is given information about the impact of environmental change on global health, tier-1 students are asked to determine the causes of environmental warming and in tier-2 students analyze the factors causing global warming and the pattern of their relationship with the environment. environment such as water, air, and sunlight. Only 7 students answered correctly at both levels, 18 students only answered correctly at level-1, 5 students only answered correctly at level-2, and 20 students incorrectly answered both levels. Judging from the results obtained, only 7 out of 52 students were able to analyze the questions well, 18 students were only able to determine the cause of the problem but could not analyze the pattern of its relationship with the surrounding environment, 5 were only correct in determining the relationship pattern even though they did not understand the cause of the problem and 20 students no. can analyze the problem well. Overall, students' analytical skills on this matter are relatively low.

Analysis Ability Profile of Attributing

Questions that are included in the domain of attributing analysis ability are questions number 1, 2, 12, 22, 23, 27, 29, and 30 with a total of 8 questions. In the attributing analysis ability profile, the result is 7.05% which is included in the low category based on the adaptation of Sukarjo (2010: 96).

Of the 8 questions, the question with the highest attributing analysis ability is question number 1 with 26 students answering correctly, while the question with the lowest attributing level is question number 27 with 3 students answering correctly. Question number 1 is a question based on KD 3.11. Analyze data on environmental changes, their causes and impacts on the environment. Question number 27 is a question made based on KD 4.11 Formulating ideas to overcome environmental changes that occur in the surrounding environment.

In question number 1, the Academic Achievement Indicator is that students can explain and analyze the concept of environmental change with Analysis Ability Indicators, namely students are able to classify relationships from the information provided. Question number 1 is about the basic concept of environmental change where environmental change is caused by two main factors, namely human factors and natural factors, the question presents a table regarding the causal factors with examples of problems that occur in the environment. Tier-1 students are asked to determine the right pair between the causal factors and the problems that occur, in tier-2 students are asked to explain the causes and impacts of the two main

factors, namely nature and humans, correctly. Students who can answer correctly on both tiers are 26 students, which dominate students' answers, which means that students' analytical skills on this question are high, students are able to determine the causal factors with the problem and explain the impact correctly.

In question number 27 with Academic Achievement Indicators is students can offer solutions in overcoming environmental changes with Attributing Analysis Ability Indicators, namely students are able to correlate impacts, solutions and prevention methods from the information presented. Number 27 presents the problem of water pollution caused by crude oil spills by tankers at sea. At tier-1 students are asked to analyze the problem and offer solutions to the problems above, tier-2 students explain in more detail about the solutions offered and the impact it will have. Only 3 students answered correctly at both levels, 15 students were only able to offer a solution without explaining in more detail the resulting impact and 34 students gave incorrect answers. This shows that students have not been able to solve the problems presented, the dominance of students' answers who answer wrongly by offering ineffective solutions shows the fact that students have not mastered the sub-section of the material facing environmental changes. It can be concluded that students have low attributing analysis skills on this question.

CONCLUSION

The instrument of two-level multiple-choice on environmental change has indicators of analytical ability, namely differentiating, organizing and attributing (knowing intent). Instruments of essay questions and their analysis aim to direct students to formulate problem-solving ideas in environmental change. The overall analytical ability of students who have been analyzed is 31.09% including in the low category. The percentages obtained per indicator are: 10.25% on the distinguishing indicator, 13.78% on the organizing indicator and 7.05% on the linking indicator..

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