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The Implementation Of Feedback In Means-Ends Analysis Of Student's High-Level Mathematic Thinking Ability

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Abstract : This research goals is to apply learning by using the Means-Ends Analysis model with direct corrective feedback to hope that higher-order thinking skills and students' self-efficacy can increase. Researcher used mixed method with sequential designs. Result of this research obtained means-ends analysis with a quality direct corrective feedback on achievement of learners' higher order mathematical thinking skill. This research population was class VIII MTs Ma'arif 20 Kalidadi in the first Semesters for the 2020/2021 Academic Year. Sampling using cluster random sampling technique, which is randomly selected two classes from the population. Higher order thinking ability with high self-efficacy category shows that subject 1 has shown that answer has reached indicators of analyzing then evaluating but has not seen achievement of indicator of creativity. High-order thinking skills with moderate self-efficacy category indicate that subject 2 has shown that the answer had reached the indicators of analyzing and evaluating but has not seen achievement of indicators of creativity; Higher order thinking skills with high self-efficacy category indicate that subject 3 does not show the answer, has reached the indicators of analyzing, evaluating then creating and at evaluation stage there is no correct answer to complete answer to the end. This can also be seen in the interview stage which shows that subject 3 cannot give the right reason.
Keyword: Direct corrective feedback, Means Ends Analysis, Self-efficacy, *Higher-Order Thinking.*

INTRODUCTION

The big challenge of Indonesian society in the 21st century is globalization, where globalization can cause competition in all areas of people's lives to be greater. The basic skills of reading, writing, and absolute arithmetic are no longer enough to be able to compete in the 21st century which is full of challenges.

Human Resources (HR) in the 21st century are required to have three important abilities such as: creative thinking, critical thinking and problem solving. These three abilities are familiar as HOTS (Higher Order Thinking Skills). As revealed by Saraswati (2019) that the important thing needs to be done now is to prepare the younger generation with the ability to think critically, creatively and skillfully to make decisions in solving each problem.

HOTS can be interpreted as the ability to understand and master students over learning materials so that children can think critically (critical thinking), creative (creative thinking), as well as problem solving (problem solving), and able to make decisions. In the most difficult situations.Students who can think critically or make decisions are those who can reason, consider, analyze, and evaluate (Nuraida, 2019).

(Heong, et al, 2011) assumed that HOTS played an essential role in learning activities, as well as an educational process and affect leaning ability, effectiveness then speed of learning. In a line with those opinions, (Jumaisyaroh, et.al, 2014) added that problems-based mathematics learning could improve learners' thinking skill. Additionally, (Sulistiani, at.al, 2018) said that quality in learning mathematics have been influenced by learning thinking ability. While, learning mathematics is needed to develop thinking skills particularly HOTS. Meanwhile, (Haeruman, 2019) said ability to think high in mathematics

is one of ability in connecting, manipulating then transforming knowledge creatively and critically.

Based on results of survey that was conducted by Organization for Economic Cooperation and Development (OECD) using PISA program in 2018 education in Indonesia was ranked 72 from 78 countries that took the PISA test.This shows the importance of teachers directing their students to think at a higher level in order to be able to compete with other countries. One of the factors that cause low thinking ability is lack of training of Indonesian children in completing questions that require analysis, evaluation, and creativity. The questions that have these characteristics are HOTS questions (Kurniati et al, 2016).The survey results show that Indonesian students still have difficulties in learning mathematics. One of the important aspects in learning mathematics that is still difficult for students in our country is in higher order thinking. Problems related to higher order thinking is a problem that must get the attention of all of us.

Based on the description above, to find out what problems are related to higher-order thinking, observations and interviews were carried out in March 2020 at MTs Askhabul Kahfi Semarang.The results of interviews wit mathemathic teacher eighth class at the school are that students still have difficulty understanding the questions presented form of story questions, students' lack of mastery of basic mathematical concepts that are related to the material being taught. In line of this research, we knew from interview with students indicate that students tend to be less thorough in reading and understanding the questions given and students tend to be less motivated to analyze the stages of completion that need to be applied in order to obtain solutions in answering the questions given. In addition, the teacher also said that the learning model applied in learning process especially in the classroom still applied scientific problem based learning (PBL) model and there are no variations of new learning models to be applied during learning.

In addition to the formation of higher-order thinking skills, good mathematics learning must also pay attention to students' psychological problems where the development of positive psychological aspects is expected to influence the formation of students' HOTS. Psychological aspect that should be increased in the process f learning mathematics that supporting high level abilities are self-confidence self-efficacy and self-regulation. (Bandura, 2006) explains self-efficacy is concerning with individual's beliefs in their capabilities in producing attainment. He also used self-efficacy to refer about people's abilities in organizing then carrying out actions to achieve their main objectives. Then, self-confidence is an extent to which individual had confident in their assessment of their abilities and could feel sense of worthiness to succeed. Last (Mollah, 2019) explained self-regulation is the active and constructive process where learners could set their objectives for their learning to plan monitor and action, regulate then control cognition, behavior or motivation. (Ogus in Sri Hapsari, 2017).

With regard to the descriptions above, in order to maximize learners' ability in higher order thinking and to develop their self-efficacy, the teacher is responsible for choosing the right learning model and approach in learning process. The aims is to motivate and increase students' enthusiasm in learning mathematics.Seeing the difficulties experienced by students in mathematics, especially in optimizing higher order thinking skills, the researchers were challenged to find solutions to overcome these difficulties by applying the Means Ends Analysis (MEA) model with Direct Corrective Feedback.

Means Ends Analysis (MEA) is a variation of learning with problem solving (Aris, 2014). According to Huda (2013: 294) MEA is a model for analyzing problems through various ways to achieve the desired final goal. MEA is used to analyze a problem in various ways so that learning objectives can be achieved. In addition, according to Shoimin (2014: 104) Means Ends Analysis has advantages such as it can encourage learners to be more active in utilizing knowledge or skills that tend to problem solving problems and learners

with low abilities can respond problems by using their own ways. But in fact students in responding to the stimulus given by the teacher are still lacking and there is a misconception of giving problems to students in solving problems. So that the application of the MEA Model still cannot anticipate these misconceptions, therefore there is a need for feedback to minimize student misconceptions in solving problems.

Giving direct feedback makes students feel that the work they are doing is noticed and appreciated by the teacher so that students are motivated to try and explore their knowledge (Hudoyono in Anita et al, 2017). The advantage of direct corrective feedback is that it follows up on student problem solving, so that the teacher provides direct feedback to students who have completed problem solving so that the teacher does not need to discuss the results of homework in class so that learning time can be efficient (John Bitchener, Stuart Young & Denise Cameron, 2005) . It is hoped that the application of direct corrective feedback can help students understand in solving problems, and students can solve problems well. The use of MEA assisted by direct corrective feedback makes students' solutions sharper and can explore answers properly and directed according to teacher directions.

According to description above, this research goal is to apply learning using Means-Ends Analysis model with direct corrective feedback in hope that HOTS and learners' self-efficacy can increase.

METHOD

Type of this research is mixed method. It combines quantitative and qualitative research. while, researcher used sequential mixed method that applying stages of collecting quantitative and qualitative data sequentially. In this design, sequential explanatory was chosen because quantitative was carried out first and then followed by qualitative analysis.

The population of this study was class VIII MTs Ma'arif 20 kalidadi the first Semesters for the 2020/2021 Academic Year. The sample used was 31 students of class VIII MTs Ma'arif 20 Kalidadi. Sampling using cluster random sampling technique, which is randomly selected two classes from the population. This technique is used because it pays attention to characteristics, including: students receive material based on the same curriculum, students who are the object of research at the same level, and class placement is not based on ranking. Then two classes were selected to be used as research samples. The experimental class was given a lesson using Means-Ends Analysis with Direct Corrective Feedback and the control class was given a lesson using PBL (problem based learning) scientific approach that is commonly used by teachers in the school. In addition, one more class was selected as a test class. The sampling was carried out to obtain quantitative data in this study.

The instruments used in this study were description tests and interviews. The description test will be carried out to obtain quantitative data by giving a test after the application of the learning treatment to the experimental class. While the interviews used in this study were used to obtain qualitative data by interviewing informants who had been determined according to the category.

The research subjects to obtain qualitative data were selected from experimental class using a purposive sampling technique, namely the subject was selected with certain considerations (Sudjana, 2014). To analyze qualitatively, 1 student from a low level of self-efficacy was selected, 1 student from a moderate levels of self-efficacy. Then, 1 student from high levels of self-efficacy, so that the total interview subjects were 3 students who would observe higher-order thinking skills through the answer sheet. and conduct interviews.

RESULT AND DISCUSSION

Quality of learning in this research is to measure learning mastery test, the classical 75% completeness test, the average difference test, and the different proportion tests. Test was accomplished to see roles of direct corrective feedback in Mean-Ends Analysis in achieving learners' higher-order mathematical thinking skills. From the result of calculation of mastery learning with a quantitative approach shows t_{hitung} > t_{tabel}atau 3,369 > 2,03,it means that the average result of learners' HOTS in mathematics reached minimum completeness criteria. In the classical completeness testing also shows the results hasil $z_{hitung} = 1,14$ >it means that more than 75% of all students have exceeded KKM on the higher order mathematical thinking ability test.

As for an average difference testing, results showed that sig < 0.05 or 0.012 < 0.05, meaning that the average results of learners' HOTS by applying direct corrective feedback in Mean-Ends Analysis are better than classes using PBL learning approaches. scientific. Meanwhile, in the different test the proportion of completeness shows the results z_hitung=4.0>z_table=0.87, which means that the proportion of the learners' higher-order mathematical thinking abilities that exceeding KKM in direct corrective feedback learning in Mean-Ends Analysis is more than proportion of learners who exceeding KKM in learning. PBL scientific approach. The test shows that quantitatively the quality is very good by looking at the achievement of the KKM and the proportion that reaches the KKM is more than 75%.

The tests that have been carried out show that the application of direct corrective feedback in the Mean-Ends Analysis to achieve higher-order mathematical thinking skills is effectively applied to students. The application is produced because in solving problems students are assisted by feedback provided by the teacher, the teacher's role in implementing this MEA is as a facilitator to assist students in solving problems, because in stages the teacher also provides feedback by providing a stimulus in the answers that have been completed by the teacher. students, so that teachers do not need to correct students' problem solving. Therefore, MEA learning by providing feedback in the form of direct corrective feedback can improve students' higher thinking skills.

This is similarly shown in research that uses corrective feedback in the PBL model that the achievement of mathematical communication skills is achieved by achieving KKM and the proportion that reaches KKM is more than 75% (Fadillah, 2019). In addition, other studies had shown that hybrid learning could expand learning outcomes more than conventional learning methods (Asyrofi, 2016; Guntur, 2021).This means that hybrid learning plays a role in realizing the achievement of higher-order mathematical thinking skills. Meanwhile, other research also shows that the STAD learning models assisted by direct corrective is better than using t conventional learning. (Kusumahati, 2016). This shows that direct corrective feedback in Mean-Ends Analysis also played roles to achieve higher-order mathematical thinking skills.

According to the explanation above, it shows that direct corrective feedback in Mean-Ends Analysis is able to achieve higher-order mathematical thinking abilities. Achievement of higher-order thinking skills by looking at tests that have been carried out which shows that the results received by students are very good through this learning, meaning that learning is quantitatively quality.

After the quantitative test is completed and the learning results show that it can improve higher-order thinking skills, but this is not enough because in fact there are results of students' higher-order mathematical thinking skills are still low. The application of MEA by giving direct corrective feedback also causes some problem solving that has not been maximized so that each category will be described from the results of students' higher-order mathematical thinking abilities.
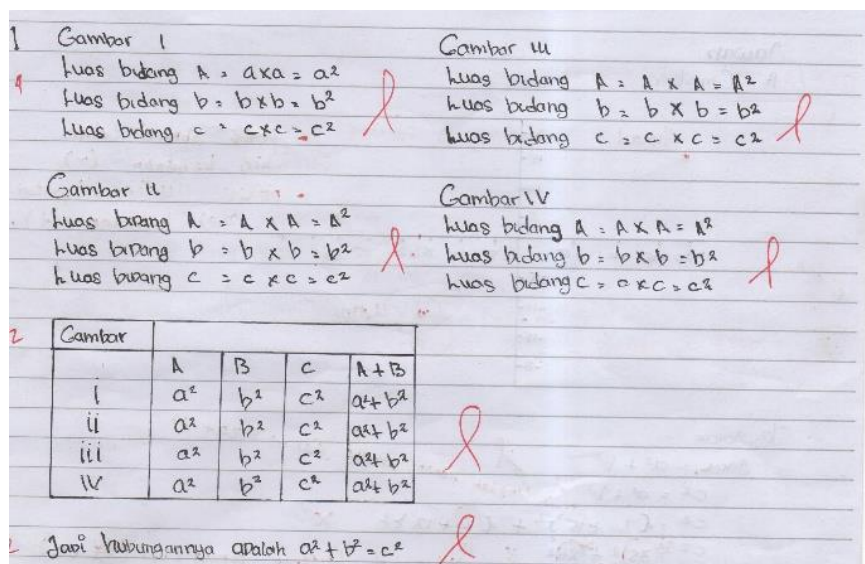
Figure 1. Students' Answers in High Category

The description analysis of learners' HOTS in the high self-efficacy category, by looking at subject 1, there are differences in answering questions. The explanation is as follows:

Subject 1 pointed out that in working on the problem on the analyzing indicator (C4), it was able to organize the Pythagorean theorem from information through observation and solve it properly and correctly. In addition, the evaluating indicator (C5) shows that students have given answers that are quite correct but are not given reasons or examples in solving the problem, this can be seen in interviews conducted by these students. While on the creative indicator (C6) this student completed questions number 3 and 4 correctly, but in solving these questions they were not able to design solutions by combining several information contained in the questions.

From those descriptions, it shows that higher order thinking skills with high self-efficacy category indicate that subject 1 had shown that answer can reach indicators of analyzing then evaluating but has not seen achievement of the indicator of creation. This is because they are still glued to the answers that have been given by the teacher.
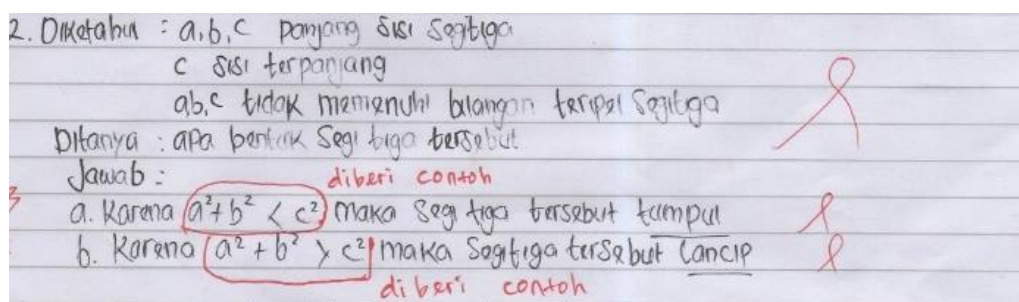

Figure 1. Students' Answers in the Medium Category

Based on result of description analysis of learners' HOTS in the moderate self-efficacy category, by looking at subject 2, there are differences in answering questions. The explanation is as follows.

Subject 2 shows that in working on the problem on the analyzing indicator (C4), that is being able to organize the Pythagorean theorem from information through observation and solve problem number 1 but there is no writing down the relationship between the images. In addition, the evaluating indicator (C5) shows that students are able to give the correct answer by confirming the question to the end but no reasons or examples are given in

solving the problem. While on the indicator of creation (C6) this student cannot formulate a different answer.

Based on the description above, it shows that high-level thinking skills with the moderate self-efficacy category indicate that subject 2 has shown that the answer can reach indicators of analyzing then evaluating but has not seen achievement of the indicators of creativity.
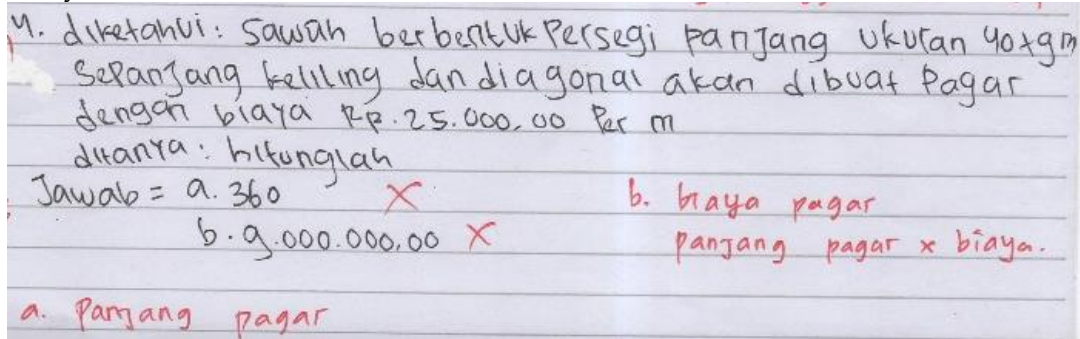

Figure 1. Low Category Student Answers

Based on results of description analysis of learners' HOTS in a low self-efficacy category by looking at subject 3, they have descriptions of HOTS indicators. Explanation is as follows.

Subject 2 shows that in working on the problem on the analyzing indicator (C4), that is being able to organize the Pythagorean theorem from information through observation and solve problem number 1 but there is no writing down the relationship between the images. In addition, the evaluating indicator (C5) shows that students are able to give the correct answer by confirming the question to the end but no reasons or examples are given in solving the problem. While on the indicator of creation (C6) this student cannot formulate a different answer.

Based on the description above, it shows that higher-order thinking skills with high self-efficacy category indicate that subject 3 does not show an answer, it has reached the indicators of analyzing, evaluating then creating at evaluation stage there is no correct answer to complete answer to the end. This can also be seen in the interview stage which shows that subject 3 cannot give the right reason.

CONCLUSION

Based on the results of the application of learning using Direct Corrective Feedback in Mean-Ends Analysis, it shows that students can think high-level mathematical students as evidenced by students achieving mastery learning; The students' high-order mathematical thinking ability reaches 75% classical completeness; The average result of the students' higher order thinking ability in mathematics using Direct Corrective Feedback in Mean-Ends Analysis was higher than in the class using PBL learning with a scientific approach; The proportion of students' higher-order mathematical thinking skills that exceed the KKM in Direct Corrective Feedback learning in Mean-Ends Analysis is more than the proportion of students who exceed the KKM in PBL learning with a scientific approach.

Meanwhile, in the application of learning, it shows that there are still students who are still unable to solve problems well by showing that in creating creative solutions they are still lacking in students who are classified as low. The application of this learning shows that there are still misconceptions in solving problems on the indicators of creating plans in solving problems so that researchers suggest to be able to develop more intensive feedback

on students, so that in practice they will create creative solutions and can develop higher-order thinking skills even better. especially in improving the indicators of creating.

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