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The Student of Error Analysis and Remedial Program in Working on the Story of Comparative Material and Turning Value

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Abstract
Problem solving mathematics error in a matter of story on ratio material worth and turn around values still often occur, so we need a remedial program to minimize these errors. For this reason, this study aims to determine the types of errors, remedial program steps and types of errors after the remedial program. This research is a qualitative descriptive study with the data collection method uses tests, interviews, and personal documents. The study was conducted at eighth grade of SMP Pangudi Luhur 1 Yogyakarta. This study applies a layered validation strategy in the form of triangulation techniques, Focus Group Discussion (FGD) and the involvement of resource persons and experts. The results showed that the dominant error in the form of an error did not understand the command problem with a percentage of 43%, the error shown if every step taken by students was correct but the final result given was not a solution done with a percentage of 80% and a calculation error with a percentage of 20%. After the results are obtained remediation efforts are made. Based on the remediation results that have been made, there is a decrease in 2 categories of dominant student errors, namely mistakes not understanding the question command to a percentage of 31%, errors that are shown if each step taken by students is correct but the end result given is not a completion done to 60%. Thus, the remediation program makes fewer types of mistakes made by students than before remediation.

Keywords: *Error analysis, remedial program, ratio material*

Introduction

Mathematics is one of the fields of study that has an important role in education (Sholihah et al: 2015 and Rofii et al: 2018). It is in because in addition to providing supplies numeracy, mathematics also provides the ability to reason that the logical and critical (Kusumawardani, et al: 2018). In general, mathematical characteristics, namely (1) have abstract properties, in the form of facts, operations, concepts, and principles ; (2) relies on agreement, both in the form of symbols and axioms also have a deductive mindset; (3) is consistent in the system, has symbols that are empty of meaning, and pays attention to the universe of conversation (Soedjadi: 2000 and Sumardyono: 2006). This general characteristic of mathematics makes it difficult for students to understand mathematics.

The results of research conducted by Larasati, et al (2018) showed that the most common mistakes made by students in solving the story matter of comparative value and reversal value is the transformation error with a percentage of errors of 27%. The causative factor according to the research conducted by Anshori (2018) is the error in reading the question, understanding the question, transformation of the question, process skills and writing the final answer.

In general, there are some mistakes made by students in solving the story. According to White (2005: 17) and Suyitno (2015: 531) the classification of errors according to Newman in the form of reading errors, comprehension errors, translational errors, process skills errors, answer writing errors and aggression errors. Meanwhile, according to Hadar (1987) the classification of errors is in the form of

data errors, errors in interpreting the language, errors in using logic to draw conclusions, errors in using definitions / theorems, unchecked solutions and technical errors. Mistakes made by students can be minimized through the provision of remedial programs in the implementation of final stage evaluations, tests, and repetitions.

A remedial program is a form of teaching that is healing or correcting that makes it good (Ahmadi, 2013: 144). Remedial teaching is a complement to the teaching process as a whole (Mulyadi, 2010: 46). According to Jones (1984: 31-32) in the implementation of remedial programs, a teacher is expected to review the students will be given assistance, have alternative actions, and evaluation have in remedial programs. Therefore, remedial teaching has an important role in the overall teaching-learning process, specifically in achieving optimal learning outcomes.

The purpose of this study is to find out the types of errors found, the steps of remedial program that is done to overcome those errors as well as the types of errors that are found after the remedial program when students work on the topic of comparative topic value and reversal value.

Methods

This study is a qualitative descriptive study. Qualitative research is a study aimed at describing and analyzing phenomena, events, social activities, attitudes, beliefs, perceptions, thinking of individuals individually or in groups. This study uses descriptive research because the purpose of this research is to describe the types of errors qualitatively analyzed in accordance with the actual situation.i. (Sukmadinata, 2011: 60)**.**

The subject of this research is all eighth grade students of SMP Pangudi Luhur 1 Yogyakarta. All eighth grade students were selected to obtain accurate data and a more complete error classification. The data collection techniques used in this study were tests, interviews, and personal documents. Data collection through test techniques was done during the preliminary study before the research began (Lestari, 2015: 232), while interviews were conducted online at home of each research subject with zoom media and video call whatsapp in groups or individually, while personal documents that collected in this study in the form of notes of researchers during the research both at the stage of tests and interviews conducted online.

The data analysis technique in this study begins by examining all available data from various sources, namely interviews, observations that have been written in field notes, personal documents, official documents, pictures, forums, and so on (Moloeng, 2009: 247). The data analysis technique in this study is a qualitative data analysis technique. Qualitative data analysis is the effort made by working with data, organizing data, sorting it into manageable units, synthesizing it, searching for and finding patterns, finding what is important and what is learned, and deciding what can be told to people lain (Moloeng, 2009: 248).

Qualitative data has a high risk of bias or subjectivity, therefore it is necessary to have a strategy to ensure that the data and analysis results written as the basis of policy making remain valid. This research implements a layered validation strategy, given the importance of research results for many stakeholders. Some of these strategies include triangulation techniques, Focus Group Discussion (FGD) and the involvement of resource persons and experts.

Result and Discussion

Result

The data obtained in this study are qualitative data in the form of groups of students' mistakes while working on the questions given. In this study, 35 students were taken to be interviewed after their test results were corrected well. Based on the results of the research that has been done, obtained

categories of student errors, namely (1) Data Errors (a) Errors of not understanding the question order and (b) Errors of replacing the specified terms or information with other inappropriate information, (c) Errors of ignoring important data provided, (2) Errors in Using Definitions or Theorems in the form of (a) Errors in using comparative values of value and reversal of values and (b) Errors in using fractional simplification properties, (c) Errors in fractional multiplication, (3) Errors of Resolution No Reviewed in the form of (a) Errors shown if each step taken by the student is correct but the end result given is not the solution of the problem worked, (4) Technical Errors in the form of (a) Calculation errors, (b) Data collection errors.

Based on the results of the remediation that has been done, a category of student errors is obtained, namely (1) Conceptual Errors in the form of (a) Formula errors in writing and (b) Errors in writing the type of questions, (2) Technical Errors in the form of (a) Calculations and (b) Mistakes of negligence, (3) Mistakes of Understanding Question Information in the form of (a) Mistakes of translating questions.

Discussion

In error type (1a) the student makes a mistake by writing down all the numbers and ignoring the numbers on the same unit. In error type (1b) students enter numbers that are not necessarily based on their own opinions. In error type (1c) students do not enter the numbers correctly because the numbers are not written directly on the question. In the type of error (2a) students do not pay attention to the solution of the question, some even still work by way of value comparison on all the questions given. In error type (2b) and (2c) students are less careful in making calculations. In error type (3a) students do not re-check their work and seem to be in a hurry to collect the results of their work. In error type (4a) students are less careful in performing calculations. In the type of error (4b) students are less careful in using the required question data.

Students still make a lot of mistakes in working with mathematical questions related to the comparison of values and reversals, therefore an analysis of the mistakes made and also a remedial process to correct errors and reduce the types of errors that exist. Remedial programs are designed based on methods according to Sugihartono, et al (2007: 179-181). Irham and Wiyani (2013: 298) say that the remedial program is adapted to the types of mistakes made by students who then do the final test after the remedial program. The purpose of this test is to know the impact of the remedial program conducted. Error analysis steps in general can be done by:

1. Perform an initial written test (pretest) in order to be able to analyze any types of student errors in working on questions related to the material provided.
2. Conducting online learning in accordance with the material planned for 5 meetings in accordance with the help of the media zoom
3. Perform remedial program after knowing who made the mistake. The questions in the remedial program can be prepared based on the indicators of achievement of learning outcomes determined by modifying the questions of the written test (pretest)
4. Perform a final written test (posttest) to find out whether students who have participated in the remedial program can overcome the mistakes made during the initial written test (posttest). The question used in the final written test (posttest) is a question that is very similar to the question of the initial written test (pretest)
5. Interviews with students who are suspected of making mistakes have the purpose to clarify the mistakes made and find out the cause. In addition, the interview also aims to provide assistance in the form of remedial teaching with individual (private) methods. Questions that can be asked in the interview include:Apakah ada kata dalam soal yang tidak anda pahami artinya?
   a) What are the things that are known and asked based on the following questions?
   b) How is your process of solving the question?
   c) Why are you confident in this answer?
   d) Are things less accurate than the settlement process you are doing?

6. 6. Analyze the data in qualitative research is done during the data collection takes place and after the completion of data collection in a certain period. Miles and Huberman (1984) in Sugiyono (2013: 246) state that the activity in qualitative data is done interactively and takes place continuously until completely until the data is saturated. Activities in this data analysis include:
   a) Data Reduction
      Reducing data means summarizing, choosing the basics, focusing on the important things, looking for themes and patterns, and getting rid of unnecessary things. The reduced data will give a clearer picture and make it easier for researchers to collect further data and find it when needed.
   b) Data Display
      Presenting data in qualitative research can be done in the form of short descriptions, charts, relationships between categories, flowcharts and the like. Miles and Huberman (1984) in Sugiyono (2013: 249) state that the most commonly used to present data in qualitative research is narrative text. Presentation of data from the results of the initial written test and the final written test is presented in the form of tables and the results of student work are presented in the form of drawings to show that students made mistakes. Presentation of interview data is presented in descriptive form.
   c) Conclusion Drawing / Verification
      The data that has been reduced and presented will be well analyzed and observed as material in drawing conclusions. One of the results of the conclusion is the decrease in the types of mistakes made by students and the increase in the number of students who can meet the indicators that have been determined. Based on the results of the interview can also be drawn the conclusion that students have been able to meet the specified indicators.

After that, a remediation program was done in that class and a few more types of errors were obtained than before remediation was done. In the error type (1a) students make mistakes by comparing units of km / hour with units of hours, comparing units of liters with units of rupiah, comparing units of days with workers. In the type of error (1b) students make a mistake by solving a value comparison question that is done by solving a value comparison comparison question. In error type (2a) students make mistakes in simplifying the numbers in the calculation. In error type (2b) students make mistakes in writing the calculation results. In the type of error (3a) students make a mistake by not understanding the meaning of the word "again" in a question that means adding numbers and not understanding the meaning of the word "sick worker" which means reducing numbers.

Conclussion and suggestion

Based on the analysis of the types of mistakes made by students of SMP Pangudi Luhur 1 Yogyakarta in the academic year 2019/2020 in working on questions on the topic of value comparison and value-added comparison, found 4 dominant errors namely errors in the form of errors do not understand the question order with percentage 43 %, and the error of replacing the condition or information specified with other information that does not correspond to the 26% percentage, the error indicated if each step taken by the student is correct but the end result given is not a work done with a percentage of 80% and a calculation error with a percentage of 20 %. After obtaining the results of an explanation for the errors in the results of his work, then efforts to repair or remediation are made. The questions in the remedial program are prepared based on the indicators of achievement of learning outcomes determined by modifying the written questions of the initial test. Based on the results of the remediation that has been done, there is a decrease in 2 categories of dominant student errors, namely errors not understanding the question order to a percentage of 31%, errors shown if each step taken by students is correct but the end result given is not a solution worked to 60% only , Thus, the remediation program makes the type of mistakes that students make less than before remediation.

Refference

Adinawan, et al. (2007). *Mathematics SMP and MTs Series Deepening Materials Completed Facing National Exams*. Jakarta: Erlangga.

Ahmadi, et al. (2013). *Learning Psychology*. Jakarta: PT. Rineka Cipta.

Dwirahayu, G., et al. (2016). *Developing Math Learning by Using Game Methods for Grade 1 MI Students.* Delta-Pi: Journal of Mathematics and Mathematics Education, 5 (2), 117-138.

Entang, M. (1984). *Diagnosis of Learning Disabilities and Remedial Teaching*. Jakarta: Ministry of Education and Culture

Hadar, et al. (1987). *An Empirial Classification Model for Error in High School Mathematics*. Journal for Research in Mathematics Education

Haniin, K., et al. (2017). *Influence of TPS Learning with Conceptual Scaffolding on the Ability to Solve Problems of Physical Synthesis Reviewed From the Early Knowledge of Students.* Journal of Science Learning, 1 (2), 6-14.

Wisdom, R. (2017). *Application of Advance Organizer Model to Improve Student Comprehension Ability*. SAP Journal, 1 (3), 271-280.

Irham, et al. (2014). *Educational Theory Psychology and Laboratory Testing Analysis in the Learning Process*. Yogyakarta: Ar-Ruzz Media.

Joyce, B., dkk. (2000). *Models of Teaching (sicth Edition).* Texas: A Person Education Company.

Jumiati, Y., dkk. (2020). Analisis Kesalahan Siswa dalam Menyelesaikan Soal Cerita Persamaan dan Pertidaksamaan Linear Satu Variabel. *Jurnal Pembelajaran Matematika Inovatif,* 3(1), 11-18.

Kusumawardani, dkk. (2018). Pentingnya Penalaran Matematika dalam Meningkatkan Kemampuan Literasi Matematika. *Prosiding Seminar Nasional Matematika (PRISMA I),* 588-595.

Larasati, Y., dkk. (2018). Pemberian Scaffolding Untuk Menyelesaikan Soal Cerita Materi Perbandingan Senilai dan Berbalik Nilai. *Math Didactic: Jurnal Pendidikan Matematika,* 4(1), 47-56.

Lestari, dkk. (2015). *Penelitian Pendidikan Matematika*. Karawang: PT. Refika Adimata.

Maswar. (2019). Strategi Pembelajaran Matematika Menyenangkan Siswa (MMS) Berbasis Metode Permainan Mathemagic, Teka-teki dan Cerita Mateamtis. *Alifmatika: Jurnal Pendidikan dan Pembelajaran Matematika,* 2(1), 28-43.

Miles, M.B., & Huberman A.M. (2014). *Analisis Data Kualitatif: Buku Sumber Tentang Metode-Metode Baru*. Jakarta: Universitas Indonesia Press.

Moloeng, L. J. (2009). *Metodologi Penelitian Kualitatif*. Bandung: Remaja Rosda Karya.

Mulyadi. (2010). *Diagnosis Kesulitan Belajar dan Bimbingan Terhadap Kesulitan Belajar Khusus*. Yogyakarta: Nuha Litera

Nasution, S. (2011). *Berbagai Pendekatan dalam Proses Belajar dan Mengajar*. Jakarta: Bumi Aksara.

Rofii, A., dkk. (2018). Characteristics of Students' Metacognition Process at Informal Deducation Thinking Level in Geometry Problems. *International Journal of Emerging Education, 2(1), 89-104.*

Soedjadi, R. (2000). *Kiat Pendidikan Matematika di Indonesia: Konstatasi Keadaan Masa Kini Menuju Harapan Masa Depan.* Jakarta: Direktorat Jenderal Pendidikan Tinggi, Departmen Pendidikan Nasional.

Sholihah, D.A., dkk. (2015). Keefektifan Experiential Learning Pembelajaran Matematika MTs Materi Bangun Ruang Sisi Datar. *Jurnal Riset Pendidikan Matematika,* 2(2), 178-185.

Sugiyono. (2015). *Metode Penelitian Kombinasi (Mix Methods).* Bandung: Alfabeta

Sukmadinata, N. S. (2011). *Metode Penelitian Pendidikan.* Bandung: Remaja Rosdakarya

Sumardyono. (2006). *Karakteristik Matematika dan Implikasinya terhadap Pembelajaran Matematika.* Makalah

Susanto, dkk. (2007). *Buku Matematika untuk SMP dan MTs kelas VII*. Jakarta: Grasindo

Suyitno, dkk. (2015). *Learning Therapy for Students in Mathematics Communication Correctly Based-On Application of Newman Procedure (A Case of Indonesian Students).* International

Journal of Education Research Vol. 3 No.1 Mathematics Education Study Program of Semarang State University (529-538). http://www.ijern.com/journal/2015/January-2015/44.pdf

White, A. L., (2005). *Active Mathematics in Classrooms: Finding Out Why Children Make Mistakes-And Then Doing Something to Help Them*. Square One, Volume 15, Number 4. Sydney: University of Western Sydney. https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.472.9065&rep=rep1&type=pdf