ANALYZING STUDENTS MATHEMATICS LEARNING DIFFICULTIES IN THE MATTERIALS OF LINEAR EQUATION SYSTEM WITH TWO VARIABLES IN GRADE VIII OF SMP MUHAMMADIYAH 1 PRAMBANAN SLEMAN REGENCY IN THE ACADEMIC YEAR OF 2018/2019

Yayang Suci Mariya Dalyanti[a], Sunaryo[b]
Mathematics Education Program FKIP UAD
Jl. Ringroad Selatan, Kragilan, Tamanan. Banguntapan.Bantul, Yogyakarta
[a]yayangsuci98@gmail.com, [b]sunaryo.bener@yahoo.com

ABSTRACT

Mathematics learning difficulties are commonly faced by the students of SMP Muhammadiyah 1 Prambanan in the Materials of Linear Equation System with Two Variables. This study aims to determine the students' mathematics learning difficulties in the Materials of Linear Equation System with Two Variables (SPLDV) in SMP Muhammadiyah 1 Prambanan seen from the factual, conceptual, and procedural difficulties. The research sucject were grade VIII C students of SMP Muhammadiyah 1 Prambanan in the academic year of 2018/2019. The object of this research is the difficulties of learning mathematics in the Materials of Linear Equation System with Two Variables. The data were collected through test, interview guidelines, and image recording. The data were analyzed using *Miles and Hubberman* model steps which include (1) data reduction (2) data display (3) verification. The results showed that the students found difficulties in learning the Materials of Linear Equation System with Two Variables (SPLDV), with the average score for factual difficulties were 52%, conceptual difficulties 63%, and procedural difficulties 64%. Students experience factual difficulties due to lack of understanding of the problems so they cannot change into mathematical sentences. Whereas students who experience conceptual difficulties because they cannot use the rules equate one variable coefficient. As for procedural difficulties because students do not write the steps to work correctly, so the results are less precise.

Keywords: Analysis, Difficulties Learning, SPLDV

Introduction

Education is one way to improve the quality of Human Resources (HR) (Kamariyah, & Marlissa, 2016). Education can be pursued using three pathways. Based on the Law of the Republic of Indonesia Number 20 of 2003 Article 1 Paragraph 10 that the education pathway consists of formal, non-formal and informal education. Based on the Law of the Republic of Indonesia Number 20 of 2003 Article 1 Paragraph 11, "Formal education is a structured and tiered education pathway consisting of basic education, secondary education, and tertiary education." In formal education such as (SMP / MTs) learning is carried out mathematics.

Mathematics studied at school includes algebra, geometry, trigonometry, arithmetic, calculus, and statistics. Every individual who has attended school must experience learning mathematics (Jamaris, 2014: 178). Learning mathematics for students is the formation of a mindset in understanding an understanding and in reasoning a relationship (Suherman, Erman 2003: 57).

Learning runs smoothly if students often practice and have no difficulty. In Thorndike's theory of learning there are several types of learning laws. One of them is the law of exercise. According to Thorndike's theory (in Suherman, Erman 2003: 29) that "The law of training states that if a stimulus response relationship occurs, the consequence is that the relationship gets stronger, whereas the less the stimulus relationship is used, the weaker the relationship occurs." Thus it can be interpreted that the more often students are in practice, the more responsive in accepting a thing.

Mathematics is usually considered the most difficult subject for children and adults (Muijs, 2008: 332). Difficulty learning is something experienced by some elementary school students, even experienced by students who study at a higher education level (Jamaris, 2014: 3). Difficulty in learning mathematics

according to Amir (2015: 188), "Difficulty in learning mathematics is a barrier or learning disorder in children marked by the child's inability to express quantitative and spatial relationships."

Based on the results of observations of students of class VIII C conducted on Friday 8 March 2019, while working on math problems, students looked confused. As for students who walk around to ask friends who are considered good at mathematics. There are also students who are trying to open a book to re-read how to do the equivalent problem. When work time is over, students complain / difficulty working on given math problems.

Based on the description above, a study with the title Analyzing Students Mathematics Learning Difficulties in the Matterials of Linear Equation System with Two Variables in Grade VIII of SMP Muhammadiyah 1 Prambanan Sleman Regency in the Academic Year of 2018/2019. So the formulation of the problem are: 1) What learning difficulties do students experience in solving problems in the two-variable linear equation material in class VIII students of SMP Muhammadiyah 1 Prambanan Academic Year 2018/2019? 2) What are the causes of learning difficulties determining factual, conceptual, and procedural determination in learning mathematics subject matter of two-variable linear equations in class VIII students of SMP Muhammadiyah 1 Prambanan Academic Year 2018/2019? While the purpose of this study are: 1) Knowing the learning difficulties experienced by students in solving problems in the two-variable equations in the eighth grade students of SMP Muhammadiyah 1 Prambanan in the 2018/2019 Academic Year. 2) Knowing the causes of learning difficulties determine factual, determine conceptual, and determine procedural in learning mathematics subject matter of two variable linear equations in class VIII students of SMP Muhammadiyah 1 Prambanan Academic Year 2018/2019.

Research methods

The type of research used is qualitative research. The place and time of the study was conducted in SMP Muhammadiyah 1 Prambanan for two months starting from March 2019 to April 2019. The research subjects were 10 students of class VIII C of SMP Muhammadiyah 1 Prambanan. The object of this research is the Mathematics Learning Difficulties in the Matterials of Linear Equation System with Two Variables. Taking the subject using Purposive Sampling. Data collection techniques using written tests and unstructured interviews. Data collection instruments include test questions and interview guidelines. Data validity uses source triangulation and external editor. Data analysis techniques using the model of Miles and Hubberman. The stages in data analysis techniques consist of data reduction, data presentation and conclusions or verification. The steps taken in the study are the implementation of tests on students and then the results of student work are obtained. After that the results of the work are examined whether the truth and harm are grouped according to the difficulties experienced by students. From the grouping results obtained students to be interviewed.

Research Results and Discussion

Based on the results of research conducted from March 2019 to April 2019 using the test questions instrument, the results of the study are presented in the following table:

Table 1

Analysis of student difficulties

Number	factual difficulties				conceptual difficulties					procedural difficulties				
	F_{11}	F_{12}	F_{13}	F_{14}	K_{11}	K_{11}	F_{11}	F_{11}	F_{11}	F_{11}	F_{11}	F_{11}	F_{11}	F_{11}
Number of students who have difficulty	30	11	15	15	14	20	21	21	31	12	13	32	32	32
Presentase	52%				63%					64%				

The table above was obtained from student test results. The steps are student answers corrected in advance to know right from wrong in doing. Then from the wrong answers, grouped into 3 groups, namely factual difficulties, conceptual difficulties, and procedural difficulties. After the test is then taken 10 students to be interviewed to find out the causes. From the test results obtained that students who experienced factual difficulties by 54%, conceptual difficulties 63%, and procedural difficulties by 64%. The following graph is presented in the following test results:

Graph of Learning Difficulty Test Results for Linear Equations of Two Variables

- 52%
- 63%
- 64%
- ■ Kesulitan Faktual
- ■ Kesulitan Konseptual
- ■ Kesulitan Prosedural
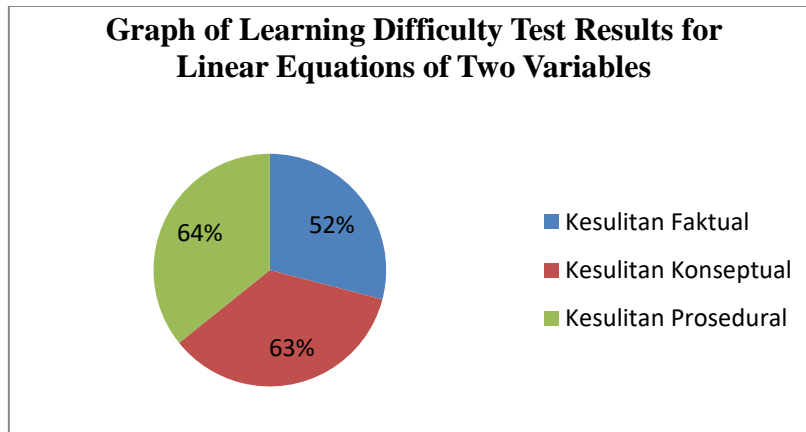
Figure 1. Graph of Learning Difficulty Test Results for Linear Equations of Two Variables

The following questions are used in research, namely:

Andi, Bardi, and Caca together buy notebooks and similar pencils. Andi buys 4 notebooks and 1 pencil for Rp 14,000.00. Bardi bought 6 notebooks and 2 pencils for Rp. 22,000.00. If Caca buys 4 notebooks and 3 pencils, how much rupiah does he have to pay?

The following excerpts from the results of tests and interviews conducted with students based on difficulties experienced include:

1. Factual Difficulties

Based on the test results factual difficulties are lower than the conceptual and procedural difficulties. Factual difficulties experienced by students include not making examples, not changing the questions that are known and asked into the form of mathematical sentences. The following are the results of the 8320 student test and interview:

Diketahui
Andi membeli 4 buku tulis dan 1 Pensil seharga Rp 14.000,00
Bardi membeli 6 buku tulis dan 2 Pensil seharga Rp 22.000,00
4x + 1y
6x + 2y

Figure 2 Student Answers 8320

Figure 3 Excerpts of Interviews with Students 8320

From the answers above, students do not write examples based on the questions given. But students immediately write down questions as they are. Actually students know that how to do it must be assumed first. Students say forget to write it down. Students forget in writing examples because the material taught has long been taught so they become forgotten. But even without writing it down students can change the questions into mathematical sentence form. Human memory is not perfect. As said by Winataputra (2007: 2.15) that forget is a common event that occurs in human life. Students who are learning new things then forget is an extinction process based on classical conditioning theory parameters. A forgotten event occurs when there is no stimulus that conditions the correct response so students cannot elicit a response. Based on the results of the subject interview, some subjects said that the subject forgot in solving the given problem. Most said they forgot because the material had already passed and they forgot. But there are also subjects who say forget to write it down not because the material and how to do it have passed, but because they forget to write it down even if the students know.

Figure 4 Student Answers 8326

Figure 5 Excerpts of Interviews with Students 8326

The answer above, students do not convert questions into mathematical sentences. By not turning into equation 1, it means that students have difficulty in changing questions into mathematical sentences. Based on interviews the students said they did not convert the questions into mathematical sentences (equation 1) because they were written directly at completion. Even though writing an example can make it easier for students to do it and as a first step in solving problems.

Figure 6 Student Answers 8303

Figure 7 Excerpts of Interviews with Students 8303

Based on the answers from the three students, students did not change the questions into mathematical sentences. Even though in order to solve SPLDV questions, the questions must be converted into mathematical sentences to make it easier to solve the problems. Students do not change what is asked to be a mathematical sentence can be because students can't. Based on the results of interviews with students, students who could not change it because they were confused so students wrote what was asked in accordance with the questions. In other words students can't understand the problem and how to change the problem into a mathematical sentence still confused and having difficulty.

2. Conceptual Difficulties

Conceptual difficulty test results are moderate difficulties compared to factual and procedural difficulties. Conceptual difficulties experienced by students include not doing multiplication in accordance with the method of elimination and not substituting the x and y values that have been obtained. The following are the results of student tests and interviews:

Figure 8 Student Answers 8306

Figure 9 Excerpts of Interviews with Students 8306

Based on students' answers, students count using the elimination method. However, in conducting multiplication operations the subject is not quite right in writing the results. It can be seen that students write it 4x + 1y = 14,000. Then each is multiplied by 6. The right result is 24x + 6y = 84000. But students write it 24x + 6y = 88. The results of calculations done by students are not right. Then for other calculations the location of the error is also the same. Based on interview excerpts, students said that students rushed in working on it.

Figure 10 Student Answers 8316

Figure 11 Excerpts of Interviews with Students 8316

From the quoted answers and interviews, students can already calculate using the elimination method. However, students do not work through to completion because based on the answers above students only calculate the value of y alone. Even though students also have to calculate the value of x. Based on interview excerpts, students said that students were confused to continue working on it. Though students also say that students do it while looking at a notebook.

Figure 12 Student Answers 8302

Figure 13 Excerpts of Interviews with Students 8302

The results of student answers, students do not substitute the values of x and y because students have not finished working. New students are looking for just one grade (eg x) so students cannot proceed to the next step. Based on a student interview quote, the student subject does not substitute the value obtained because the student has not finished working on it. When students are asked whether they can work or not, students answer lazily to complete.

3. Procedural Difficulties

Based on the test results procedural difficulties are a higher difficulty than factual and conceptual difficulties. Procedural difficulties experienced by students include directly writing the final answer, not counting what is asked and not writing a conclusion. The following are the results of student tests and interviews:

Figure 14 Student Answers 8325

Figure 15 Excerpts of Interviews with Students 8325

The picture above shows that students do not write procedures for doing. Where students directly write the final results. From students' answers, after knowing the price of each book and pencil, students can calculate what is asked where students write 4 books + 3 pencils = 12,000 + 6000 = 18000. It can be seen that actually students can count, it's just possible to be lazy to write it. Based on the results of the interview, the subjects said they were lazy to count, so they just wrote down the final results.

Figure 16 Student Answers 8306

Figure 17 Excerpts of Interviews with Students 8306

Based on the results of student answers, students do not reduce the equation to eliminate one of the variables correctly. From the answer of subject 8302, the equation does not write the operation sign but students can operate. But students have calculated all the values of the variables that should be sought and the end result is correct even though the procedure is not quite right. In addition, students also do not continue the next step which is to calculate the value being asked. Based on interview excerpts, why do students not calculate what is asked in the problem that they are not careful in working on the problem Students say that students think they only work until they find the value of the variable.

Figure 18 Student Answers 8326

Figure 19 Excerpts of Interviews with Students 8326

Based on the results of students' answers, students do not write conclusions. Students already know the value of each variable obtained. But students don't count what is asked in the problem. So students cannot write conclusions. Based on the results of interviews with students, students do not write conclusions because they are lazy to continue solving problems. In addition, students said they were not accustomed to writing conclusions when solving problems that resulted when students were given questions about SPLDV, students also did not write conclusions.

The description of the results of the study above found three types of difficulties, namely factual, conceptual, and procedural difficulties. In factual difficulties students do not write examples because they have changed the material that causes students to forget. As said by Winataputra (2007: 2.15) that forget is a common event that occurs in human life. King, L. A. (2014: 434-435) says that human memory is imperfect. In addition, King, L. A. (2014: 447) also said that the Theory of disturbance states that we forget not because memory is lost from storage, but because other information is hindering when we want to remember.

In other factual difficulties students do not convert problems into mathematical sentences because students write directly on the completion. While on conceptual difficulties, students make mistakes in the elimination method. This is because students are in a hurry when working on the questions. As for students who do not substitute questions that are asked because they do not pay attention to the order of the questions. While in the difficulty of the procedure, students immediately write the final results without writing the steps to work on. This is because students are lazy to write the calculation method. As for students who did not write the final conclusion of the answer due to confusion so lazy to continue working on.

Conclusion

The results of the research and discussion as described in chapter IV, the conclusion is obtained (1) the difficulties made by students on the problem of two-variable linear equation systems obtained 52% conceptual difficulties, 63% conceptual difficulties students, 64% procedural difficulties students. Class VIII C students in SMP Muhammadiyah 1 Prambanan have the greatest difficulty in procedural difficulties. It can be said that students are lacking in exercises so that student learning outcomes are less than optimal. (2) The factors that cause learning difficulties in the two-variable linear equation system system are (a) students are lazy to learn to work on problems (b) students are difficult to practice or repeat the material that has been taught.

References

Amir, Z., & Risnawati. (2015). *Psikologi Pembelajaran Matematika.* Yogyakarta: Aswaja Pressindo.

Arafan, Arga. (2018). "Analisis Kesulitan Menyelesaikan Soal Cerita Sistem Persamaan Linear Dua Variabel Siswa Kelas X SMK Harapan Kartasura". *Skripsi S1.* Jurusan Pend. Matematika, FKIP, UMS.

Jamaris, M. (2014). *Kesulitan Belajar: Perspektif, Asesmen, dan Penanggulangannya Bagi Anak Usia Dini dan Usia Sekolah.* Bogor: Ghalia Indonesia.

Kamariyah, & Marlissa, I. (2016). "Analisis Kesalahan Menyelesaikan Soal Relasi dan Fungsi Pada Siswa Kelas VIII SMP Negeri Buti Merauke." *Magistra, 3*, 30-42.

King, L. A. (2014). *Psikologi Umum: Sebuah Pandangan Apresiatif.* Jakarta: Salemba Humanika.

Muijs, D. (2008). *Effective Teaching Teori dan Aplikasi.* Yogyakarta: Pustaka Pelajar.

Suherman, E. (2003). *Strategi Pembelajaran Matematika Kontemporer.* Bandung: Jica.

Sugiyono. (2017). *Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, dan R & D.* Bandung: Alfabeta.

Winataputra, U. S. (2008). *Teori Belajar dan Pembelajaran* Jakarta: Universitas Terbuka.