

Profile Of Teacher's Understanding Of Mathematics Symbols And Vocabulary

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Abstract

This study aims to investigate teachers' understanding of mathematical symbols and vocabulary. The subjects of this study were five junior high school teachers in Lambitu Sub-District Bima District. This research is a descriptive qualitative research that aims to explore the mastery of symbols and mathematical vocabulary in teachers. The subjects in this study were five mathematics teachers in Lambitu Sub-District Bima District. Data collection techniques in this study are observation and interviews. Overall, the five teachers studied had a good understanding of the various mathematical symbols and vocabulary they used in their lessons. However, there are still some mistakes in understanding mathematical symbols and vocabulary. Overall the mastery of symbols and mathematical vocabulary on the teacher is quite good. These errors or omissions are caused by misconceptions and inaccuracies

Keywords: Mathematics Symbols Vocabulary

Abstrak

Penelitian ini bertujuan untuk menyelidiki pemahaman guru tentang simbol matematika dan kosa kata. Subyek penelitian ini adalah lima orang guru SMP di Kecamatan Lambitu Kabupaten Bima. Penelitian ini merupakan penelitian kualitatif deskriptif yang bertujuan untuk menggali penguasaan simbol dan kosa kata matematika pada guru. Subyek dalam penelitian ini adalah lima orang guru matematika di Kecamatan Lambitu Kabupaten Bima. Teknik pengumpulan data dalam penelitian ini adalah observasi dan wawancara. Secara keseluruhan, kelima guru yang diteliti memiliki pemahaman yang baik tentang berbagai simbol matematika dan kosa kata yang mereka gunakan dalam pembelajaran. Namun, masih terdapat beberapa kesalahan dalam memahami simbol dan kosa kata matematika. Secara keseluruhan penguasaan simbol dan kosa kata matematika pada guru cukup baik. Kesalahan atau kelalaian ini disebabkan oleh kesalahpahaman dan ketidakakuratan.

Kata Kunci : Kosakata Simbol Matematika

1. INTRODUCTION

Mathematics is a branch of science that is different from the others. Mathematics has its own language (Morgan, 2014). The language of mathematics consists of natural language using technical terms and grammatical conventions typical for mathematical discourse, plus a highly specialized symbolic notation for mathematical formulas (Ilany, B.S., & Margolin, 2010). The language of mathematics is a system used by mathematicians to communicate mathematical ideas among themselves. This language contains natural language with the use of technical terms and grammatical conventions typical for mathematical discourse, coupled with a highly specialized symbolic notation for mathematical formulas (Ilany, B.S., & Margolin, 2010).

The syntax of the mathematical language includes lists of symbols, configuration rules for constructing language patterns, axioms, deductive

systems, and theorems. Mathematical terms and symbols are clearly defined. Likewise, every statement in the language of mathematics has only one meaning or is unambiguous. Each mathematical pattern has a structure that is determined by operational rules (Ilany, B.S., & Margolin, 2010).

Many advanced math sentences have complex structures that are easy to understand if one knows some basic mathematical grammar terms. Good mathematical language skills require a strong foundation of vocabulary knowledge; flexibility; fluency and ability to understand numbers, symbols and sentences (Riccomini, P. J., Smith, G. W., Hughes, E., & Fries, 2015).

Mathematics becomes difficult to understand because it contains terms and symbols that are difficult to understand. In learning mathematics, students have difficulty in translating terms in mathematics, as well as making mathematical models of the problems

given (Pramono, 2012; Cruz, J. K. B. Dela, & Lapinid, 2014; Jupri, A., & Drijvers, 2016).

Mathematics learning activities in the form of words and mathematical symbols also become difficult because of the abstraction of the object being discussed and its consequences affect the difficulty of expressing the things discussed (Mulwa, 2014). Thus the teacher first needs to have a good mastery of words and mathematical symbols. This is because teacher knowledge will have an impact on student achievement (Leong, K. E., Meng, C. C., & Rahim, 2015). Teachers who have good abilities will be able to better teach students how to use sentences in mathematics, symbols, and multi-representation (Accurso, K., Gebhard, M., & Purington, 2017).

In learning mathematics, it is important for teachers to use clear language to express the reasons behind mathematical procedures. Through mathematical vocabulary and symbols, students can explore the concepts involved and learn the meanings contained in them (Riccomini, P. J., Smith, G. W., Hughes, E., & Fries, 2015). Teaching the language of mathematics to students helps teachers identify more clearly what is the source of the difficulties and helps them understand how to make the language of mathematics more meaningful to students.

Explanation of mathematical concepts to students must be done using simple language that students understand (Lapele, 2018). This is very important to note because when teachers use inappropriate mathematical language, students will not be able to explain mathematical ideas and concepts in appropriate language (Eshun, E. S., & Amihere, 2014). Students have difficulty using mathematical terms and related concepts so that the learning carried out must be able to be explained in simple language so that students understand more easily (Mulwa, 2014).

This study aims to investigate teachers' understanding of mathematical

symbols and vocabulary. The subjects of this study were five junior high school teachers in Lambitu District, Bima Regency.

2. METHOD

This research is a descriptive qualitative research that aims to explore the mastery of symbols and mathematical vocabulary in teachers. The subjects in this study were five mathematics teachers in Lambitu, Bima District. Data collection techniques in this study are observation and interviews. Observations were made to observe the mastery of symbols and mathematical vocabulary when the teacher carried out the learning process. Interviews were conducted to obtain data on the factors that influence the mastery of symbols and mathematical vocabulary for teachers. Data analysis techniques used are data reduction, data presentation, and drawing conclusions.

3. RESULTS AND DISCUSSION

This study aims to investigate teachers' understanding of mathematical symbols and vocabulary. The subjects of this study were five junior high school teachers in Lambitu District, Bima Regency. The data were obtained through observations made when the teacher was teaching. In addition, interviews were also conducted to obtain more in-depth information about the teacher's understanding of vocabulary and mathematical symbols.

Overall, the five teachers studied understood well the various mathematical symbols and vocabulary they used in learning. However, there are still some mistakes in understanding mathematical symbols and vocabulary.

S1 Mathematics Symbols and Vocabulary Understanding

In general, S1 has a good understanding of mathematics symbols and vocabulary. It can be seen that in S1 learning activities, most of the mathematics symbols and vocabulary are used correctly. There is only one error in

understanding mathematical symbols. Look at the following picture.

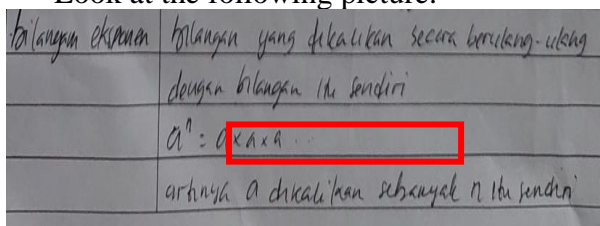


Figure 1. Misunderstanding of Mathematical Symbols by S1

It can be seen that S1 has not understood the concept of numbers with exponents well. By definition, S1 has indeed understood the concept of numbers to powers, but still has errors in writing the notation of numbers to powers. The correct writing of the concept of exponents is $a^n = a \times a \times a \times \dots \times a$ n times or it can be written $a^n = a \times a \times a \times \dots \times a$ n times. The three dot (\dots) symbol represents repetition. It can be seen that S1 has not understood the importance of the meaning of the three dot (\dots) symbol in writing the notation of exponents. S1 only writes the multiplication of the variable a three times. Even though it only means a^3 which means it only applies to $n = 3$. This is of course wrong. Writing general notation must apply to all conditions, not just one condition. The following is an excerpt from an interview with S1.

- P* : Based on what you wrote that $a^n = a \times a \times a$, do you write this every time you teach this material?
S : Yes sir, a number to the power of it means repeated multiplication.
P : Is the description really only written $a \times a \times a$ like this?
S : It depends on the number of n sir.
P : I think you can see where and how it should be written.
S : Oh yes sir, it should be up to n .

S2 Mathematics Symbols and Vocabulary Understanding

S2 has a good understanding of mathematics symbols and vocabulary. This can be seen in the learning carried out. S2 explains almost all mathematical symbols and vocabulary correctly. But there is a slight error in explaining the meaning of

using the coordinate axes. Look at the following picture.

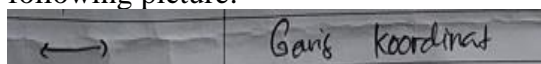


Figure 2. Misunderstanding of Mathematical Vocabulary by S2

In the figure, S2 represents the line as a coordinate line. This is wrong because the coordinates do not have lines. Coordinates are points consisting of the abscissa axis and the ordinate axis or are often symbolized by (x, y) with x being on the X -axis (abscissa) and y being on the Y -axis (ordinate). The line in the figure can be expressed as the axis of the Cartesian coordinate plane. In addition, S2 also misunderstood the symbol phi (π). The symbol π should represent the length of the circumference of a circle whose diameter is 1 unit. S2 instead states as "radius". This is a fatal error that can lead to misconceptions in students. The error is as shown in the following figure.

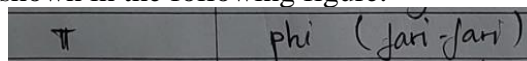


Figure 3. Misunderstanding of Mathematical Symbols by S2

- Consider the following interview excerpt.
P : In the list of symbols and terms, mother writes that pi is the radius. Are you sure it's correct?
S : Sorry sir, I wrote it wrong, pi should have a value of 3,14 and the radius of the symbol is r .
P : How do you explain to students about the value of phi so that the value is 3,14?
S : It's not that it's already been decided?

S3 Mathematics Symbol and Vocabulary Understanding

S3 has a good understanding of mathematics symbols and vocabulary. This can be seen in the learning carried out, S3 is able to explain almost all symbols and mathematical vocabulary well. But there is a little mistake in writing vocabulary. Look at the following figure.



Figure 3. Misunderstanding of Mathematical Vocabulary by S3

S3 made a mistake in writing the word "curve". This error at first glance is a small error because it is only wrong in the use of one of the letters. But if this is allowed to continue and be understood by students, it will be embedded in students' thinking. These mistakes will also happen to students. This of course has bad consequences. Thus, the slightest error needs to be considered so that it can be corrected. Students will get the concept correctly. The following is an excerpt from an interview with S3.

P :Based on the observation sheet, you wrote the terms “negative”, “minus”, and “subtraction”. In your opinion, what is the difference between these three terms?

S : Aren't these three terms the same, sir?

S4 Mathematics Symbol and Vocabulary Understanding

S4 has a good understanding of mathematics symbols and vocabulary. The S4 is a bit different from other subjects. But there are two mistakes in writing mathematical symbols. Look at the following figure.

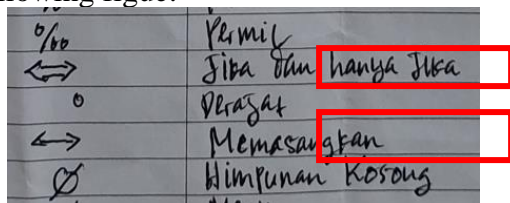


Figure 4. Misunderstanding of Mathematical Symbols by S4

In the picture, it can be seen that S4 has not understood all the mathematical symbols correctly. The first error is in the symbol " \Leftrightarrow " which should represent "equivalence". S4 represents the symbol as an "if and only if" symbol. That is wrong. The second error is in the use of the symbol " \leftrightarrow " which should represent "if and only if". S4 denotes the symbol as the symbol for "pairing". Both of these errors need to be corrected because they will lead to misunderstandings in students.

S5 Mathematics Symbol and Vocabulary Understanding

S5 has an excellent understanding of mathematical symbols and vocabulary. This can be seen in the learning activities carried out, S5 can use all mathematical symbols correctly.

The presentation of the results above shows that teachers are still often mistaken in stating mathematical problems into symbols or mathematical vocabulary. This is in line with Boulet's (2007) statement that even though the teacher states that he has mastered the concept, the teacher is still confused about explaining the mathematical concept with the appropriate mathematical language and is understood by the students. This is indicated by the presence of several errors in the vocabulary and mathematical symbols of the teachers studied

Therefore, mastery of vocabulary and mathematical symbols is very important to note because when teachers use inappropriate mathematical language, students will not be able to explain mathematical ideas and concepts in appropriate language (Eshun & Amihere, 2014). Thus the teacher first needs to have a good mastery of words and mathematical symbols. This is because teacher knowledge will have an impact on student achievement (Leong, Meng & Rahim, 2015)..

4. CONCLUSION

Overall the mastery of symbols and mathematical vocabulary on the teacher is quite good. There are only a few mistakes or mistakes that teachers sometimes make in the use of symbols and mathematical vocabulary. These errors or omissions are caused by misconceptions and inaccuracies.

5. RECOMMENDATION

Future researchers are expected to be able to further explore the mastery of mathematical symbols and vocabulary based on the study of documents made by the teacher. These documents include the Learning Implementation Plan, modules

and test questions given by the teacher to students.

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