

# Students' Error Analysis in Completing English Math Story Problems

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## ABSTRACT

Students will feel more difficult in dealing with story problems as they not only must determine the formula but also must be more aware in reading the questions to gain information as well as to identify what is asked in the questions. Language is a medium for communication or interaction, in other words, a language is a tool for conveying thought, idea, concept, or feeling. The English language is an international language. Most schools in Indonesia, particularly located in the urban area use English in their learning process. Many students do not master English so that they have difficulties in comprehending the lesson. This research is carried out at SMK Al Ihsan Depok with 30 students as samples. The method used in this research is a descriptive method by examining the quantitative approach to identify the total of students' errors and qualitative approach to define the position of students' errors as well as to identify the factors contributing to errors. The technique of data collection uses documentation, test, and interview. The results of the research point out that students' errors are as follows: (a) Determine problems that are acknowledged in the questions, (b) Determine problems that are asked, (c) Make Math model, (d) Select an appropriate formula that is suited to the questions, (e) Do the calculation, (f) Interpret model's answer to the former problem, (g) Make sentence meanings into Bahasa Indonesia. And contributing factors are: (a) Students are not careful in reading the question to get on its meaning, (b) Students are poor in the Math basic calculation, (c) Students feel hurried in completing the questions, (d) Students are lack of English vocabulary in the subjects of Statistics and Probability.

**Keywords:** *Error analysis, Story problems, English language*

## 1. INTRODUCTION

An object learned in Math is considered abstract, this is a reason why Math is assumed to be a difficult lesson for some students. Accordingly, the language use in Math is more dominant conveyed by number, symbol, and notation so that in the problems' completion, students must comprehend each existing symbol and notation, then determine the appropriate formula to be used.

The story problem is related to daily life activities. Here, students will feel more difficult to answer as they are asked not only to determine the formula but also to be more aware of reading the questions to get information and to define what is asked.

Language is a communication medium used to interact. In other words, language is a device for conveying thought, idea, concept, or feeling. English is an international language where most schools in Indonesia,

particularly located in urban use English in the learning process. Many students do not master English so that they face difficulties in learning.

This present research will analyze students' errors in completing English story problems in the subjects of Math, particularly in Statistics and Probability at the twelfth grade of SMK AL IHSAN Depok. To this level, the students are supposed to have a sufficient understanding of real-life Math as they will be engaged in real-life circumstances after their graduation. It means that they should have enough knowledge to analyze their real-life matters.

## 2. THEORY

### 2.1. Definition of Story Problem

Math problems that are related to real-life are commonly assigned in story problems. The stories could be from daily life problems or other problems. The short length of a story depends on the weight of the problem expressed, the heavier the weight, the longer the story, and vice versa.

The story's problems are problems stated in the form of a meaningful sentence and are easy to understand [1]. Story problems in Math are problems that are related to problems in real-life which can be solved by using Math sentences [2]. Those sentences are Math sentences which comprise of operations of numerical calculation. The story problems consist of questions that can be presented orally and in writing, a written story problem is a sentence that illustrates daily life activities [3].

The story problems are taught and taken from things that happened in students' daily life experiences. Also, the story problems should comprise of the practical application of social situations or several probable study fields [3]. On the other hand, the story problems are beneficial to implement former students' acknowledgment. The completion of story problems is an act of problem-solving. A problem-solving in completing a Math story problem is a process that consists of appropriate and logical steps to obtain the completion [4].

Following the above explanation, it can be concluded that a story problem is one of the forms of questions that are presented in the form of a story, telling problems that are related to events in daily life or others.

### 2.2. Ways to Complete Story Problems

Completing Math story problems is not only obtaining the results in the form of responses from what is asked, but much more important is that students recognizing dan comprehending the thinking process or steps to get those responses. In line with the steps in story problem completion, Polya [5] generally stressed that Math story problem completion needed to be done heuristically. In this case, heuristics means that in completing the story problems, students need to be instructed to learn steps or ways or regulations that should be assigned in identifying an answer as the finding of problem-solving in the story problems.

Due to the regulations in identifying an answer in the story problems, Haji explained that there were five steps in story problems completion based on students' skills, namely (a) a skill of reading the questions; (b) a skill of determining what are acknowledged and asked in the questions, (c) a skill of making Math model, (d) a skill of doing the calculation, and (e) a skill in determining final answer appropriately.

From those students' five skills above, there were five steps in the story problems completion as follows: (a) Read the questions carefully to determine word meaning from the keyword in the question, (b) Separate and determine what are acknowledged and asked, (c)

Determine the method that will be used to complete story problems, (d) Complete the story problems based on Math rules, so that the answer of problems will be obtained, and (e) Write down the answer correctly. Moreover, Santrock [6] stated that comprehension in the Math story problem included skill in finding important information when reading and skill in recognizing the relation between parts of texts from those sentences. This shows that comprehending the content of story problems is also comprehending what is acknowledged and asked in the questions.

Changing the content of story problems into Math sentences is carried out after students comprehend the content of story problems by determining what is acknowledged and asked in the questions. This step is a basic step for students to make a process in planning the story problems completion through Math sentences. According to Jonassen [4], the definition of a Math sentence is equal to the definition of making a Math model. He proposed that in the Math story problems, students were not only required to have high comprehension to do the content of the story problem, but they were also expected to be able to make an appropriate Math model.

Moreover, it is also explained that making a model from the story problem is a difficult activity for students. This is due to the problem that has a different model. Modeling a story problem into Math sentences is a plan from a story problem. The object learned in Math is a kind of abstract thing that makes Math is assumed as a difficult subject for some students. Accordingly, the use of language in Math lesson is more dominantly formed in number, symbol, and notation so that in the problem completion, students must comprehend each existing symbol and notation to determine the appropriate formula that will be used.

## 3. METHOD

This research was carried out at Vocational High School (SMK) AL IHSAN, Jalan Bungsan No. 51 Rt.005/03 Desa Bedahan Kecamatan Sawangan Depok Jawa Barat Telp. (0251) 8601230 which was led by Ibu Lilih Maliyah, M.Pd. The research process administered from September 2018 to December 2018.

The research conducted a mixed-method of descriptive analysis by examining the quantitative and qualitative approaches. Sugiyono [7] stated that the descriptive analysis method is a statistical analysis that is used to analyze data by describing collated data in particular without general conclusion or generalization.

The quantitative approach was carried out to determine a research subject by calculating the total of errors made by students in completing English Math story problems viewed from their types of errors. Meanwhile, the qualitative approach was employed to determine the position and the types of students' errors by analyzing the test's answer, as well as to identify factors that contributed to errors by interview. Therefore, the data would be released in the form of a description of students' error analysis in completing English Math story problems.

The technique of data collection in this research was as below:

1. Documentation method to identify students who become as population and a sample.
2. Test method to define the students' errors in completing English Math story problems.
3. Interview method to identify factors contributing to students' errors in completing English Math story problems.

This research instrument was English Math story problems in the essay form consisting of 4 questions that must be working on in 45 minutes. Before the instrument was used for the research, it had been firstly tested in the trial class where validity and reliability tests were held. It was meant to gain a set of questions that had good quality.

The followings were the results of the validity test and reliability test of the instrument trial data.

**Table 1.** Reliability Statistics

| Cronbach's Alpha | N of Items |
|------------------|------------|
| .606             | 5          |

**Table 2.** Item-Total Statistics

|                    | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
|--------------------|----------------------------|--------------------------------|----------------------------------|----------------------------------|
| Test Item Number 1 | 17.00                      | 4.108                          | .495                             | .476                             |
| Test Item Number 2 | 16.92                      | 4.291                          | .569                             | .454                             |
| Test Item Number 3 | 17.08                      | 4.129                          | .479                             | .485                             |
| Test Item Number 4 | 17.05                      | 4.538                          | .364                             | .550                             |
| Test Item Number 5 | 17.11                      | 5.718                          | .003                             | .729                             |

In line with the above calculation by using SPSS 16.0, it obtained the results that those instruments were reliable since *Cronbach's Alpha* = 0,606 > 0,6 and the test items number 1 until number 4 were said to be valid as *corrected item-total correlation* values > 0,3 whereas the test item number 5 was not valid because < 0,3.

The technique of qualitative data analysis was conducted by reviewing students' test results, defining the position of errors that were made, identifying factors that contributed to errors, and finding a solution for errors that were not to be made repeatedly.

## 4. RESULTS AND DISCUSSION

### 4.1. Results

Researchers checked the students' answers based on their errors which were validated by the answer key made formerly. The answer key was made in line with the steps

of story problem completion which had been explained in the former lesson as it eased for the data to be analyzed.

In accordance with students' answers on the main topics of Statistics and Probability, there were several student's errors identified. The answers from seven (7) students who made errors in completing English Math story problems were assigned to be analyzed. Those students were selected by the consideration that the errors they made represented general errors from other students. Those students were as follows:

1. Student 1 (Number of Attendance List 3)
2. Student 2 (Number of Attendance List 7)
3. Student 3 (Number of Attendance List 13)
4. Student 4 (Number of Attendance List 16)
5. Student 5 (Number of Attendance List 27)
6. Student 6 (Number of Attendance List 29)
7. Student 7 (Number of Attendance List 30)

### 4.2. Discussion

Headings, with valid data of the types of students' errors and the factors contributing to errors, then data triangulation was employed. The triangulation was conducted to coordinate the data of observation, the error analysis of students' answers in completing the test, and the interview responses. The followings were validation results from 7 students.

**Table 3.** Students' Errors

| No | Students' Errors  | Student |   |   |   |   |   |   |
|----|---|---------|---|---|---|---|---|---|
|    |   | 1       | 2 | 3 | 4 | 5 | 6 | 7 |
| 1  | Determine problems that are acknowledged in the questions     | -       | √ | - | √ | - | - | - |
| 2  | Determine problems that are asked                             | -       | - | - | - | - | - | √ |
| 3  | Make Math model   | √       | √ | √ | √ | - | - | - |
| 4  | Select an appropriate formula that is suited to the questions | √       | - | - | √ | - | - | √ |
| 5  | Do the calculation  | -       | √ | √ | - | - | √ | - |
| 6  | Interpret model' answer to the former problem                 | √       | - | √ | √ | √ | - | √ |
| 7  | Make sentence meanings into Bahasa Indonesia                  | √       | - | - | √ | - | - | √ |

Here are the explanations of the errors made by the research subject.

#### *4.2.1. Determine problems that are acknowledged in the questions*

The error included the students did not write information that had been obtained from the questions. They went directly to the completion step so that they faced difficulty in working on the questions. They had to read them repeatedly to complete. Some of them wrote down the information, but they failed to make meanings into Math symbols. Therefore, in the completion step, they would input the data into its formula in the wrong order. There were 29% of students who made this kind of error.

#### *4.2.2. Determine problems that are asked*

The error defined the students were wrong in noting information that was obtained of what had been asked as they completed the test in a hurry. There were only 14% of students who made this kind of error.

#### *4.2.3. Make Math model*

The error covered the students could not symbolize information that they read into the Math model. That was because they did not comprehend the information and they were lack practicing the exercises. The students who made this kind of error were released at 57%.

#### *4.2.4. Select an appropriate formula that is suited to the questions*

The error comprised the students were wrong in determining what was acknowledged from the questions, were wrong in determining what they were asked, and were wrong in making its Math model. Hence, they would be also wrong in selecting the formula. There were 43% of students who made this kind of error.

#### *4.2.5. Do the calculation*

The error contained the students were not allowed to use a calculator so that some of them were wrong to do the calculation since they had less understanding about Math basic operation. The students who did this kind of error were about 43%.

#### *4.2.6. Interpret model's answer to the former problem*

The error had occurred when the students had already satisfied with the results from the calculation using the formula. They forgot to interpret the answer of the model to the former problem. Several students were in a rush and the time allotment given was assumed to be not maximal. The students who made this kind of error were around 71%.

#### *4.2.7. Make sentence meanings into Bahasa Indonesia*

The error happened when the students were lack understanding of the questions written in English. They felt down at the beginning in seeing the questions and they did not master the English vocabulary of the subjects of Statistics and Probability. The errors identified were 57%.

Based on the validation of the 7 students above, factors that contributed to students' error were the students did not comprehend information existing in the questions, the students were weak in the basic math operation, and the students completed the questions in a rushed time. Rahmat Basuki [8] said that students' errors in completing the problems were the error of concept, the error of operation, and the error of carelessness. The error of the concept was the dominant error. The systematic and consistent errors were happened because of students' low comprehension of the subject learned. Meanwhile, the incidental errors were errors which were not caused by the low comprehension of the subject learned but were caused by other factors, such as carelessness in reading to comprehend the questions well, in calculating, or in working on the questions hurriedly as they thought that the time was limited.

According to Sutisna [8], factors that contributed to students' errors were considered as Math interference which was classified into four parts of skills. Those four skills were (a) Linguistics skill (in accordance to Math terminologies' comprehension and skill to change the written text into Math symbol), (b) Perceptual skill (a skill to recognize, to comprehend symbol and to order a group of numbers), (c) Math skill (addition, subtraction, multiplication, and division), and (d) Attentional skill (copying numbers by recognizing and comprehending operational symbol appropriately).

This research results showed that students' errors in completing English Math story problems remarked some issues, namely: (a) Determine problems that are acknowledged in the questions, (b) Determine problems that are asked, (c) Develop Math model, (d) Select an appropriate formula that is suited to the questions, (e) Do the calculation, (f) Interpret model's answer to the former problem, and (g) Interpret sentence meanings into Bahasa Indonesia. The research result was in line with the proposition of Fitria [9] who concluded that the types of students' errors mostly appeared in the form of errors in determining what were acknowledged and asked in the questions, in making model, in completing model that was suited to what was acknowledged in the questions, and in answering final questions that were suited to what was asked in the questions.

Accordingly, a research result from Hastuti [10] affirmed that the types of students' errors in completing the main topic of heat were (a) the error of concept, (b) the error of words usage, (c) the error of strategy, (d) the error of systematics, (e) the error of calculation, and (f) the questions which were not responded by students.

The technique of qualitative data analysis was conducted by reviewing students' test result, defining the position of errors that were made, identifying factors that contributed to errors and finding a solution for errors were not to be made repeatedly.

## 5. CONCLUSION

In line with the theoretical review and supported by the data analysis as well as the research questions formulated formerly, it can be concluded in two main issues. The first one stated that the students' errors in completing the English Math story problems, particularly in the subjects of Statistics and Probability covered on determining problems that are acknowledged in the questions; determine problems that are asked; develop a Math model; select an appropriate formula that is suited to the questions; do the calculation; interpret the model's answer to the former problem; and define sentence meanings into Bahasa Indonesia.

The second issue covered the factors that contributed to students' errors in completing English Math story problems, particularly in the subject of Statistics and Probability. The factors comprised the students were not careful in reading the question to get on its meaning; the students were weak in the Math basic calculation (addition, subtraction, multiplication, and division); the students were in a hurry in completing the questions; and the students were lack of English vocabulary in the subjects of Statistics and Probability.

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