

## Profile of The Ability of Elementary School Teachers in Compiling Mathematical Word Problems and Solving The Problems With A Problem Posing Approach on Fractional Materials and Whole Numbers

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Article Info	Abstract
<p><b>Article History</b></p> <p>Received: May 04, 2021</p> <p>Accepted: August 09, 2021</p> <hr/> <p><b>Keywords :</b> Problem posing Approach, Completion and Preparation of Story Problems, Teacher Ability</p> <p><b>DOI:</b> 10.5281/zenodo.5172551</p>	<p><i>This study aims to determine the ability level of elementary school teachers in making and solving math word problems using the problem posing on fractions and count numbers at SD Alkhairaat Pusat Palu. This research was conducted at SD AlkhairaatPusatPalu in the odd semester of 2018/2019 using a qualitative descriptive research method, the subjects in this study were all high-class teachers. Descriptive analysis was conducted to obtain an overview of the teacher's ability in making and solving math word problems using problem posing on fractions and whole numbers in elementary school. The research data was obtained through the results of the preparation and completion of the Mathematical Word Problems by the teacher and the giving of interviews conducted by researchers to the subjects. The results of this study are: 1) The teacher's ability is still low in solving the problems by guiding students making questions that are used to explore the information needed to answer the problems given; 2) all subjects can arrange questions from a specified statement but only limited to 1 and 2 questions that should be infinitely many questions that can be made from one statement; and 3) all subjects been able to make a word problem involving 2 basic counting operations and 3 basic counting operations on count numbers but are still less in making a word problem by involving 4 operations on fraction and whole numbers.</i></p>

### Introduction

Learning cannot be separated from the teaching and learning process. Learning means an effort to understand and gain knowledge. While teaching is an attempt to convey and understand knowledge. So that it takes a good learning management by a teacher to be able to increase understanding of the lesson. Innovation in the management of learning by teachers can be seen from various aspects, for example in terms of preparing learning plans, implementing learning, and assessing learning achievement. Innovative learning has an impact on student motivation. Innovative learning will make students feel interested to follow it. It is this motivation that drives students to carry out learning activities..

Mathematics is one of the lessons that is still considered difficult by students. Students get concepts that are raw materials that must be processed with the cognitive abilities of students. Therefore, the correct learning of mathematics by a teacher is very necessary in instilling mathematical concepts in schools, especially elementary schools. So the teacher must have professional competence so that mathematics learning can achieve the expected goals.

The achievement of the objectives of mathematics learning can be seen from the achievements of students in achieving each indicator in the subject matter. One effort to improve students' mathematics learning achievement is to improve students' ability to solve math math word problems. Story is one form of questions that presents problems related to everyday life in the form of stories (Hartini, 2008). Therefore by understanding how to solve math word problems, students are expected to then be able to also solve various problems of daily life in a mathematical way

To solve math math word problems, a series of steps are needed. Solving a mathematical story problem is not just getting results in the form of answers to questions that are asked, but more importantly students know and understand the thought process or steps to get an answer. Problem posing approach is one approach that can be used in measuring abilities. This approach emphasizes activities to form their own questions by students and solve them based on the experience they have. Problem posing aims to stimulate students to study hard, be diligent and diligent in solving problems so as to clarify, enrich and deepen the material provided in the classroom. So the teacher should have professional competence in applying the problem posing approach. Professional competence in this case is the ability of teachers to master mathematical material, especially problem solving stories with a broad and deep problem posing approach that allows them to guide students in mastering the material being taught.

The process of solving a story problem is closely related to how the story problem is made. The question of the story can be resolved well also depends on the understanding of the problem story. Students' understanding of Mathematical Word Problems is determined by the language structure used whether it is easy to understand, according to context, grade level and material or not. In this case the teacher is expected to have the ability to compile math word problems and meet the criteria for the compilation of good math word problems.

From previous research conducted by researchers and also field observations conducted on students, teachers and even community members (parents), researchers found that there were still many mistakes in the making and solving of math word problems, especially in the material fractions and numbers. In making Mathematical Word Problems teachers sometimes make questions that don't fit into the context of good language. The context of a good language is when the language used refers to daily activities. In addition to the context, errors that often occur are also usually found in questions that are not appropriate to the age or level of the student. So students are not able to understand the language construction used in compiling math word problems. This of course will impact on the inability of students to solve math word problems properly.

The basis of learning fraction material and chopping numbers using math word problems is taught at the Elementary School level. So the erroneous understanding of the making and completion of Mathematical Word Problems on this material can be assumed to begin with the lack of understanding of teachers at the elementary school level. Based on this problem, the researcher will carry out research with the title "Profile of the Ability of Elementary School Teachers at Al Khairaat Elementary Center in Palu in Compiling Mathematical Word Problems and Solving them with a Problem Posing Approach on Fractional Materials and Count Numbers.

### **Method**

This type of research is qualitative research with participants observation research design. Participant observation (PO) is one of the most important methods in qualitative data collection (Scheibelhofer, 2018) Data collection is carried out using three approaches, namely: 1. Observation; 2. Interview; and 3. Documentation. Observation is the systematic description of the events, behaviors, and artifacts of a social setting (Marshall & Rossman, 1989). Researchers make observations on how the subject understands, makes and completes story problems. The purpose of the research interview is to explore the views, experiences, beliefs and / or motivations of individuals on specific matters (Gill, et al., 2008). Interviews in this study were carried out to find out more about the reasons or the results of the subject's treatment of story questions. Document analysis was a complementary data collection procedure in support of triangulation and theory building (Bowen, 2009). The documentation in this study is a text given to the subject and other supporting data based on interviews and field notes.

The subjects of this study were 9 teachers from 27 teachers who had previously received pretreatment in the form of observation and test work. The subject was taken because it was considered to have represented the responses of all existing teachers, so it was sufficient to only take 9 teachers as samples as to identify important common patterns that cut across variations (Palinkas L.A. et al., 2016)

Data analysis in this study was carried out during and after data collection. The stages of qualitative data analysis activities are 1) reducing data; 2) presenting data; and 3) drawing conclusions and data verification (Miles dan Huberman, 1992). Indicators that show the success of learning are (1) if the teacher can make a story problem; (a) according to contextual, (b) according to grade level; (c) according to the teaching material and can solve the problem using the problem posing approach correctly, so that the teacher reaches  $\geq 90\%$ , (2) if the teacher is interviewed about the questions that are made and completed is able to explain the answer or the process of making questions and get the answer with correct.

### **Results**

Based on the data obtained in solving story problems with the application of the problem posing approach the subject is 9 people who are elementary school teachers. The problem is given in 10 question numbers with details of questions number 1 to 5 about the story material for integers and numbers 6-10 on fractions. Questions 1 and 6 explore the teacher's ability to ask questions based on the information (problems) provided and solve them using Polya's steps. Problems number 2 and 7 are to explore the ability to make and solve contextual problems as well as for questions number 3, 4, 5, 8, 9, 10 with a gradual difficulty level on each number. The data obtained are as follows:

#### **Solving the Problems of Subjects of Class VI Teachers Namely Teachers Alf, Nr. And Nrs**

The solution to the problem raised in number 1 was answered correctly by the three subjects, but only 2 subjects used the pattern steps and 1 subject, namely NRS, answered briefly. Problem number 1 leads to getting answers to a question by asking several questions that are in accordance with the context of the problem. As problem posing is the formulation of problems related to the terms of the questions that have been solved or alternative questions that are still relevant (Ermandkk. 2003) Subjects ALF and NRS solve problems with Polya steps. This is in line with Polya's theory which states that the solution to a problem is four steps that must be taken: (1) Understanding the problem, which is being able to reveal what is known and what is being asked from the question, and being able to understand whether the information provided is sufficient to find what is being asked; (2) Devising the plan, namely being able to compile mathematical models, including the ability to

formulate problems in everyday situations in mathematics, as well as determine alternative problem solving; (3) Carrying out the plan, namely being able to choose and develop problem-solving strategies, being able to come up with alternative problem-solving methods and prior knowledge that can be used to support problem-solving activities; (4) Looking a back, namely being able to identify calculation errors, use formulas, check the match between what was found and what was asked, and be able to make the right conclusions (Milles danHuberman, 1992).

In question number 2, the three subjects can complete the questions and answers. This is in line with the problem posing approach which states that students or teachers can make several questions from a statement determined by the problem posing model by formulating problems related to the conditions of the problems that have been solved or alternative questions that are still relevant (Suharta, I.G.P., 2000).

In question number 3, the three subjects can make story questions but the answers are not in accordance with the problem posing approach, namely asking questions based on existing information to improve their ability to solve the problems given and solve them. As Abu Elwan stated, "Mathematics teachers might use one or more strategies to formulate new problems or encourage their students in mathematics classes to be good problem posers as well as a good problem solvers." (Abu-Elwan, R. 2002)

In question number 4, the ALF subject who is able to make story problems but solving the story questions does not apply the problem posing approach. Problem number 5, not one subject can make a story problem using 4 basic counting operations on whole numbers.

Problems number 6 and 7, only 2 subjects can solve the story problem correctly, but only 1 subject who finished with Polya's steps in question number 6 and in number 7 did not use the problem posing approach in its solution. Problem number 8, only 1 subject can solve the whole number problem correctly by using the problem posing approach. while questions number 9 and 10 no subject can solve them.

Based on the above discussion, it can be stated that the three subjects are only able to solve story problems by applying Polya's steps and cannot solve them by applying the problem posing approach. Subjects are able to ask questions from a statement which is limited to one to two questions, basically there are unlimited questions that can be made from a statement. In addition, the three subjects can make problems that involve one and two basic arithmetic operations on whole numbers but on fractions have not been able to make the problem. However, the solution did not apply problem posing steps. This shows that the teacher has not been able to express his thoughts in the form of sentences.

#### **Solving the Problems of Class V Subjects, namely RH, DH and HD**

The solution to the problem in question number 1 by the three subjects was to solve it correctly, two subjects finished with Polya's steps, RH answered the questions briefly. Problem number 1 leads to getting answers to a question by asking questions or questions that are in the context of the problem. As problem posing is the formulation of problems related to the terms of the questions that have been solved or alternative questions that are still relevant. DH and HD subjects solved the problems using Polya's steps. This was in line with Polya's theory with the steps (1) Understanding the problem; (2) Devising the plan; (3) Carrying out the plan; and (4) Looking a back.

Problem number 2 these three subjects can complete the questions and answers. This is in line with problem posing which states that students or teachers can make several questions from a statement determined by the problem posing model by formulating problems related to the conditions of the problems that have been solved or alternative questions that are still relevant.

Problem number 3 all subjects can solve only the solution is not in accordance with the problem posing approach but uses Polya steps. This is in line with problem posing which is expected by students or teachers to make questions according to the question instructions. For example, problem number 3 makes a problem that involves 2 basic arithmetic operations on whole numbers. Problem number 4, two subjects, namely HD and DH, can make story problems by involving 3 basic arithmetic operations on whole numbers. This is in line with problem posing which is expected by students or teachers to make questions according to the question instructions. But this is not the case in question number 5, no subject can solve it, namely in making a story problem that involves 4 basic arithmetic operations.

In solving problems number 3 and 4, the subject ignores the rules for solving basic counting operations that use parentheses and not brackets and the rules for basic counting operations do not apply to solving story problems. So that in completing the final result it is not correct because it does not follow the story line in the calculation process.

In question number 6, that the three subjects can finish correctly but two subjects use Polya's steps. Likewise in question number 7, that the two subjects could solve it correctly but HD could not solve the problem correctly.

In question number 8, HD and DH subjects can make a story problem correctly which involves 2 basic arithmetic operations on fractions but the solution only uses Polya's steps, there is no problem posing approach. Questions number 9 and 10 of these three subjects, namely RH, DH and HD, have not been able to solve them.

Based on the above discussion, the three subjects, namely RH, DH and HD, were able to solve story problems by applying Polya's steps but were unable to solve them by applying the problem posing approach. Furthermore,

being able to ask questions or arrange questions from a statement is limited to only one to two questions, which are basically unlimited questions that can be made from a statement. In addition, the three subjects were able to make questions that involved one, two basic counting operations on whole numbers but only two subjects were able to make questions and answer using Polya steps. However, it has not been able to create and complete those involving three to four basic arithmetic operations.

### **Solving the Problems of Class IV Subjects, namely FT, ST and VV**

The solution of the three research subjects to question number 1 is that the three subjects can solve it correctly using Polya's steps. But FT answered questions briefly. Question number 1 guides students to get answers to a question by asking several questions that are in accordance with the context of the problem. As problem posing is the formulation of problems related to the terms of the questions that have been solved or alternative questions that are still relevant (Suharta, 2000). Subjects ST and VV solve problems with Polya's steps, this is in line with Polya's theory with the steps (1) Understanding the problem; (2) Developing a settlement plan (Devising the plan); (3) Carry out the completion plan (Carrying out the plan); and (4) Re-checking (Looking a back)

Question number 2, these three subjects can solve questions and answers based on questions from question number 2. This is in line with problem posing which states that students or teachers can make several questions from a statement determined by the problem posing model by formulating problems related to the requirements - problem conditions that have been solved or alternative questions that are still relevant (Suharta, 2000).

Question number 3, only subject VV made a story problem by involving 2 basic arithmetic operations. The other 2 subjects only used 1 basic arithmetic operation using Polya's steps.

Question number 4, 2 subjects have not been able to make a story problem by involving 3 basic counting operations that they solve should be in accordance with question number 3. But the subject VV in question number 4 is able to make a story problem by involving 3 numerical count operations with Polya steps. .

Question number 5, these three subjects have not been able to solve question number 5, which is a story problem that involves 4 basic arithmetic operations.

Question number 6, only 2 subjects, namely VV and FT, were able to solve the questions correctly.

Question number 7, these three subjects have not been able to solve question number 7, which is a story problem that involves basic counting operations on fractions.

Question number 8, only 1 subject can make the problem by involving 2 basic counting operations on fractions. While the two subjects have not been able to complete it and did not answer question number 8.

For questions number 9 and 10, these three subjects, namely FT, ST and VV, have not been able to solve these questions.

Based on the above discussion, it can be stated that the three subjects, namely FT, ST and VV, are only able to solve math word problems by applying the steps to solve math word problems according to Polya, they cannot solve them by applying the problem posing approach. Furthermore, it has been able to compile questions from a statement which is limited to one to 2 question numbers, which should be an infinite number of questions that can be made from a statement. In addition, the three subjects have been able to make problems that involve one, two basic counting operations on whole numbers but fractions have not been able to make the problem. However, the problem solving made does not apply problem posing steps.

Based on the above discussion of the nine research subjects, it was found that some weaknesses were not understood by the teacher, namely the teacher was not yet capable, namely: (1) composing sentences, (2) making questions from a specified statement, (3) rules for completing basic counting operations using parentheses and does not use brackets, (4) basic arithmetic operation rules do not apply to solving math word problems, (5) unable to express his thoughts in the form of sentences, (6) problem posing approach, (7) steps to solve math word problems according to Polya and (8) make math word problems involving 3 and 4b basic arithmetic operations on whole numbers and on fractions.

Based on the above analysis, it is better if you teach math word problems through the problem posing approach first, then proceed with solving the math word problems with Polya's steps so that students can make math sentences based on the specified questions.

Based on the results of the research that has been carried out, the following conclusions are obtained: 1) the teacher's ability is still low in solving questions that lead students to make questions that guide students or teachers by asking several questions that are in accordance with the context of the questions; 2) all subjects can arrange questions from a specified statement, but only 1 and 2 questions which should have an infinite number of questions that can be made from one statement; and 3) all subjects have been able to make math word problems involving 2 basic arithmetic operations and 3 basic arithmetic operations on whole numbers but are still not able to make math word problems by involving 4 numerical count operations on whole numbers and also on fraction numbers.

## Conclusion

Based on the results of the research that has been carried out, it is concluded that the Alkhairaat Primary school teacher has not been able to make and complete story lines on whole number material, especially on fraction material. The use of the problem posing approach is as follows: 1) the teacher's ability is still low in solving questions that lead to making questions in asking several questions that are in accordance with the context of the questions; 2) all subjects can compile questions from a specified statement but only one or two which is basically an infinite number of questions that can be made from one statement; and 3) all subjects have been able to make story problems involving two basic arithmetic operations as well as three basic arithmetic operations on whole numbers and fractions but are still not able to make story problems by involving 4 numerical count operations on whole numbers and also on fractions. The lack of ability in making story questions is one of the reasons for the dependence of teachers on textbooks so that they are less trained in making story questions and in solving story questions only know the solutions based on Polya or directly answer them briefly.

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