Problem solving ability of the PS teachers of Ungaran based on the ability of mathematical connection

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Abstract
The purpose of this research is to get the analysis result of the problem solving ability of PS teachers in West Ungaran by benchmarking of Mathematical Connection ability. The method is done by qualitative research. Activities: (1) Data retrieval. (2) Data analysis. (3) Interviews. (4) Triangulation. (5) Interpretation and conclusion. The result, based on the analysis results of the problem solving ability of PS teachers in West Ungaran with benchmarks on the Mathematical Connection ability, then the problem solving ability of PS teachers have tendency categorized of Enough.

1. Introduction
Problem solving ability for elementary students obviously require mathematical connection ability. These abilities must be started from the teacher first. How can primary students do the problem solving tasks if the teacher who teaches them has no good reasoning and problem solving abilities?

In the preliminary study, the research team had photographed the teaching activities in Primary School (PS) and the results were: (1) PS teachers did not specifically train students' mathematical connection skills. (2) Teachers did not relate math problems with other subjects or apply in everyday life. (3) Teachers did not give enough exercise problems that were used as a tool to train students the problem solving ability. From these facts, it is necessary to trace what is the cause and need to find a way out. Thus, this Excellent University Research was considered very feasible and suitable to be implemented for a long-term goal, in accordance with the Renstra of research field at UNNES. The long-term goal of this Educational Research was to develop a Training Model which able to analyze and reveal Problem Solving Ability of PS Teachers in Ungaran Barat with their Mathematica Connection Ability’s benchmark.

This research problems were as follows. (1) How was the analysis Problem Solving Ability of PS Teachers at Ungaran Barat with Mathematical Connection Ability’s benchmark? (2) How was the analysis of mathematical connection ability of PS Teachers at Ungaran Barat? (2.a) What was the analysis of the mathematical connection ability of type A of PS Teachers at Ungaran Barat? (2.b) What was the analysis of the mathematical connection ability of type B of PS Teachers at Ungaran Barat? (2.c) What was the analysis of the mathematical connection ability of type C of PS Teachers at Ungaran Barat? (2.d) What was the analysis of the mathematical connection ability of type D of PS Teachers at Ungaran Barat?

The purposes of this educational research activities were as follows. (1) We got analysis results on Problem Solving Ability of PS Teachers at Ungaran Barat with Mathematical Connection Ability’s benchmark. (2) We got analysis results on mathematical connection ability of PS Teachers at Ungaran Barat.

The contribution of this research on the development of IPTEKS of Education were as follows. First, mathematical connection ability of PS Teachers everywhere were very important to be revealed. Secondly, this research trace the growth of mathematical connection ability as benchmark of problem
solving ability for PS Teachers at Ungaran Barat, it was very urgent and needed for mapping the academic strength of PS Teachers at Ungaran.

Problem Solving Ability is a person’s ability to solve problems, especially problems/tasks in mathematics. Mathematical problems which are used to express Problem Solving Ability must be problematic, non-routine, and the solution is not known.

However, the mathematical problems which must be done, according to Satchakett and Sitthipon (2014) [1] should be mathematical connections, which include problems which use the formulas being discussed (type A), problems which use the formulas had been discussed (Type B), problems which are related to other subjects (type C), and problems which are related to everyday life (type D). The previous research wrote that teachers and students should be able to connect the contents or problems with various disciplines, technologies, and benefits for the community to solve the certain mathematical problems [2-4].

Mathematical connection ability of PS teachers is very important, if PS Teachers will teach and solve problems which are related to mathematical problems. In the course of good work, PS teachers should be able to find the elements which are known in the problem, the elements are asked in the questions, to write the formula or strategy that will be used, to solve the problem with the appropriate algorithm, and to check back the results of the solution.

Another researcher wrote that PS Teachers should be able to connect the materials from various disciplines and technologies, and their application to the community to solve the certain mathematical problems. Thus, the teaching contents which chosen in numeracy, elementary algebra, or number operations need to be mastered by PS teachers in order to solve problems or tasks related to geometry. In addition, in order to broaden the knowledge of PS teachers then the math problems of PS need to be connected with the sciences teaching contents, connected also with examples of everyday life, or applied to the field of simple technologies, according to the PS level [5,6].

According to Botty et al. (2016) [7], problem solving ability is needed by every PS teachers and it is a higher level thinking skill. A problem, is not always can be used as a tool to reveal problem solving ability. If a problem has been trained to PS teachers, and PS teachers already know the algorithm to solve the problem, and on other day, the same problem (for example, the numbers are only changed) is given again to the PS teachers, then the new problems are clear that it can not be used to express problem solving ability for PS teachers.

According to Atteh et al. (2017) [8], a problem/task that can be used as a tool to express the problem solving ability if: (1) the prerequisite teaching content for answering the questions has known or studied; (2) the algorithm to solve the problem has not been given; (3) the solution is affordable; (4) the learner (teacher or student) wants to solve the problem.

According to Caesar et al. (2016) [9], the problem solving solution usually contains four steps of solving phase, namely: (1) understanding the problem, (2) devising a plan, (3) carrying out the plan, and (4) looking back to all the steps that have been done. While Ozturk and Guven (2016), stated that PS students/teachers would feel more confident if they could find their own solution to the problem given to them [10].

We will be shown an example of an PS Mathematics Problems that the solution requires mathematical connection ability.

Problem example related to everyday life:

Budi plays with inserting the unit cube into the glass box, as shown at Figure 1 on the side. How many unit cubes are still needed to fill the glass box as shown in the figure?

Figure 1. Problem example related to everyday life: cubes in the glass box
Solving the above problem is related with mathematical connection. (1) If students have low mathematical connection ability, they will have difficulty to count how many unit cubes which still required to fill in the glass box as shown in the figure above. (2) This mathematical problem is connected to everyday life.

In the research of Suyitno et al. (2015) concluded that the competence of PS teachers at Semarang in mathematics teaching was characterized by scientifically mathematical literacy still in fairly Enough Category [11].

In addition, in teaching mathematics, teachers should be able to provide opportunities for students to engage in problem solving, and teachers should encourage this process while being responsive to students responses and feedbacks. This was reinforced by the opinion of Suyitno et al. (2016) [12] who disagreed if the teaching mathematics was dominated by memorization activities. Another researcher wrote that in improving the quality of learning, the teacher's ability is a very important in supporting factor. This includes problems involving spatial abilities, mathematical connections, and problem solving. Students ability to work on different types of questions was a significant component of their mathematical progress [13,14].

2. Methods
2.1 Research Approach, Subjects, and Location
This research used qualitative approach. The subject of the research were the PS teachers of Ungaran Barat who taught upper grade classes (4, 5, and 6) of 2018/2019 School Year.

The location of the research was in the working area of Korcam of Basic Education Office of Ungaran Barat.

2.2 Data Analysis and Interpretation
Data analysis in this research used the rules of Matthew B. Miles and Huberman (2014) wrote that the activities in data analysis included: data reduction, data display, data interpretation, and drawing conclusion or verification [15].

2.3 Data Validity
In qualitative research, data collection tool is the researcher himself. Data collected was tested its validity in order to obtain data which is really objective. There are several data validity tests that will be used in accordance with their needs. The triangulation may consist of: (1) theory triangulation, (2) source triangulation, (3) method triangulation, and (4) triangulation of research findings.

2.4 Research Procedure
Here are the research procedure that illustrate what will be done with the stages of preparation, implementation, and fulfillment of the target outcome. Preparation stage includes: Management Research Permit, Preparation of Research Instruments, Collecting Teachers as research subjects. While the implementation stage: Data retrieval, Data analysis, Interpretation and Drawing Conclusion. Output targets, including publications in International Seminars and Publications in reputable International Journals.

The way of scoring and interpretation of the average scores obtained was as follows. The way of scoring is quantitative to qualitative, with a range of scores ranging from 0 to 100, hence:

- Average Score 51 – 60 : Problem Solving Ability of PS Teacher, Less.
- Average Score 61 – 80 : Problem Solving Ability of PS Teacher, Enough.
- Average Score 81 – 85 : Problem Solving Ability of PS Teacher, Good.
- Average Score 86 – 100 : Problem Solving Ability of PS Teacher, Very Good.

3. Results and Discussions
3.1 Results
After a series of quantitative data collection activities, data analysis, interviews, and triangulation, the results of this research are as follows. Look at Table 1, Category of Score.
Table 1. Category of score

| No. | Analysis of:                                      | Average Score | Category |
|-----|--------------------------------------------------|---------------|----------|
| 1.  | Mathematical Connection of Type A               | 83            | Good     |
| 2.  | Mathematical Connection of Type B               | 72            | Enough   |
| 3.  | Mathematical Connection of Type C               | 75            | Enough   |
| 4.  | Mathematical Connection of Type D               | 76            | Enough   |
| 5.  | Problem Solving with Mathematical Connection Ability’s Benchmark | 78            | Enough   |

3.2 Discussions

Pujiastuti and Mulyono (2016) wrote that in improving the quality of learning, the teacher's ability is a very important as supporting factor its. Based on the results of the research above, the results of Problem Solving Ability analysis of PS teachers at Ungaran Barat with Mathematical Connection Ability’s Benchmark were still in the Enough Category [16]. This means that the Mathematical Connection Ability of PS teachers at Ungaran Barat on problems that used the formulas being discussed (type A), was good. While problems that used the formulas had been discussed (type B), problems related to other subjects (type C), and problems related to everyday life (type D), ability of PS teachers at Ungaran Barat need to be improved. According to Sugiharti and Suyitno (2015), if the results of research in the field of education show the existence of teacher weaknesses, then this research needs to be followed up [17]. Similarly, the impact of this escort is the Problem Solving Ability of PS teachers at Ungaran Barat needs to be further improved.

PS teachers at Ungaran Barat need to practice on problems that used the formulas had been discussed (type B), problems related to other subjects (type C), and problems related to everyday life (type D). With these exercises, it is hoped that Problem Solving Ability of PS Teachers at Ungaran Barat can be further increased.

4. Conclusion

Based on the results of the analysis of problem solving ability of PS Teachers at Ungaran Barat with Mathematical Connection Ability’s Benchmark, the problem solving ability of PS teachers have tendency categorized of enough.

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