Acceptance Finding Ability (AFA) Of Elementary School Students

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Abstract: Generally, learning process that occurs in class is that students are given exercises and then they work on the formula given by the teacher. This work process is more on the process of how students use the formula. If a formula in mathematics is only given instantaneously by the teacher to his or her students, then it persistently will not provide the real learning process. Students only become recipient objects of knowledge. This is what makes acceptance finding ability (AFA) of elementary school students low. This research employs ADDIE (Analyzing, Designing, Developing, Implementing, and Evaluating) method, which aims at describing the acceptance finding ability of the students. Subjects in this research were elementary students aged 10-12 years. The results of this research stated that students' acceptance finding ability still needs to be continuously developed by giving non-routine problems, open problems, and complex problems. These problems will require students to think divergently-convergently.

Index Terms: Acceptance Finding Ability (AFA), Elementary School Students, Mathematical CPS Problems, Various Answer

1. INTRODUCTION

GIVING mathematical formulas at the beginning of learning activities resulting in students' thinking patterns as recipients, and it does not allow students to think freely. This will result differently if students face a mathematical problem without being given a formula by the teacher. Students do not know what formula to use to answer, so that students will think what steps must be taken so that these problems can be resolved, for example by making modeling. This is significant since problems in everyday life are believed to be rich in context, so the settlement process also requires various approaches and modeling to obtain possible solutions [1], [2]. The mathematical modeling process that can be done when faced with a real-world problem is described as follows [3], [4], [5].

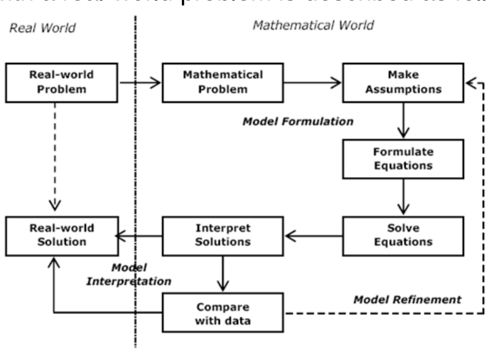

***Fig. 1**. Mathematical Modeling Process for Real-world Problem*

The modeling process starts with a real-life problem. The first step is to understand the problem and describe it into mathematical concepts or better known as mathematical terms [6], [7]. This can be done by identifying the variables in the problem and looking for interrelationships between variables. The next step is to construct a mathematical model. In this process, by making assumptions first to make the problem look simpler, so that the solution strategy is easily designed. A good solution is obtained from the assumption of the right problem. After the assumption of the problem, mathematical modeling can be made. Modeling here can be in the form of equations, set rules, or simple algorithms. After formulating a mathematical model, the next step is to solve the equations, rules, or algorithms that have been obtained. This can be solved by various methods/strategies. The result of this process is the solution of the formulated mathematical problem. The final step in this series of modeling processes is to link the interpretation of the solution to the problem (real-world problem) that exists. Included in this step is interpreting the resulting solution and comparing the solution and the data/information collection that is known.

This way of thinking is called the divergent-convergent thinking process [8], [9], [10]. This can be done by thinking of various possible things and experiment with various methods/steps, until one of the most appropriate and easy to understand solutions is chosen. It will also include thinking from various directions, until the one that is most appropriate and easy to understand solution is determined. Divergent thinking is a pattern of thinking that spreads, while convergent thinking is a pattern of thinking that collects. Divergent thinking is thinking in avariety of thoughts and of various ideas from different points of view. Convergent thinking is choosing or taking the best of these ideas. This divergent and convergent thinking pattern is depicted in the following figure [8], [9], [10].

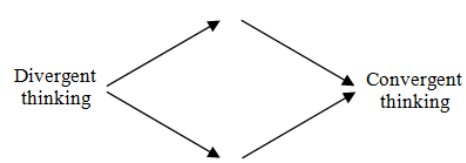

***Fig. 2**. Divergent and Convergent Thinking Schemes*

That thinking process is a part of the Creative Problem Solving (CPS) thinking process. The ability of acceptance finding is one aspect of the CPS ability. The main indicator of this ability is that students are able to answer a mathematical problem with different ways of working, steps, or answers [8], [9], [10]. Therefore, this research seeks to describe how the acceptance finding ability (AFA) of the elementary school students.

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2 METHOD

This research employed ADDIE (Analyzing, Designing, Developing, Implementing, and Evaluating) methods, which aimedat describing the acceptance finding ability of the students. Analyzing phase is to explain the definition of students' acceptance finding ability. Designing phase is to design the test questions that can measure students' acceptance finding ability. Developing phase is a description of how to develop test questions based on indicators of students' acceptance finding ability. Implementing phase is how students work on the test of acceptance finding ability. Lastly, evaluating phase is explaining how quantitative data acquisition about students' acceptance finding ability as part of CPS ability. The subjects involved in this research were elementary school students, aged 10-12 years.

3 RESULTS AND DISCUSSION

3.1 Analyzing

The ability of acceptance finding is one aspect of the CPS ability. Where in acceptance finding, the activity always starts from divergent activity and ends with convergent activity as illustrated in the flow of the CPS thinking process as follows [11], [12], [13], [14], [15], [16], [17], [18], [19]:

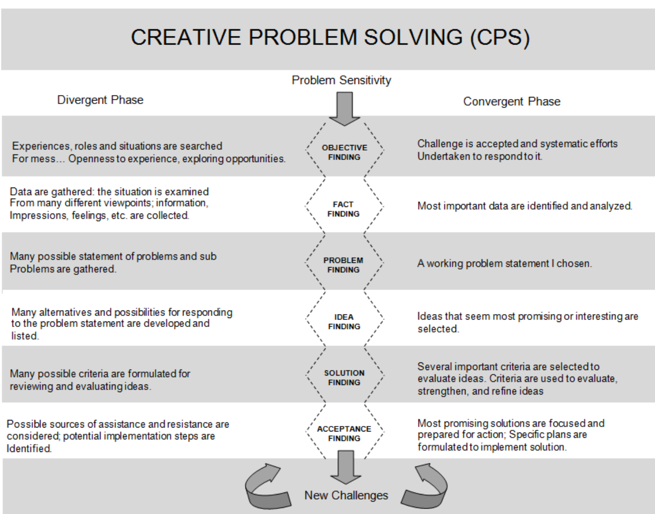

Fig. 3*. Flow of CPS Thinking Process*

At the divergent stage, students look for or identify various ways, steps, or procedures that could be the potential answer or that canbe considered as a solution to the problem. On the other hand,at the convergent stage, students choose one of the potential ways, steps, or procedures to answer the problem.

3.2 Designing

The instrument of acceptance finding ability of students is a test instrument in the form of a mathematical problem that measures acceptance finding ability based on its indicators. The indicators are [8], [9], [10]:

1. Students are able to write various plans/steps that can be considered as answers
2. Students are able tocheck the answers that have been obtained, but in different ways/steps
3. Students are able to answer one question (closed or open) with more than one answer
4. Students are able to answer one open question with a variety of answers
5. Students are able to answer open questions in various steps/ways even with the same results

3.3 Developing

The development of acceptance finding ability test questions is based on indicators of acceptance finding ability. As for the test questions that develop indicators, students are able to answer one open question with multiple answersas follows.

5. Pay attention to the picture below!
What is that thing? Make nets from the solid figure!

Fig. 4*. Math test question*

Examples of other acceptance finding ability test question, with the indicatorof students are able to answer one question (closed or open) with more than one answer, is in the following problem.

7. Yadi is 16 meters to the left of the flagpole. Ati is 4 meters to the right of Yadi, while Popy is 6 meters to the left of Ati. If the position of the flagpole is considered a zero point, how many meters is Popy from the flagpole? (Answer the question with at least two ways of answers)

Fig. 5*. Math test question*

3.4 Implementing

In answering the question in Fig. 4., most students answered the "cone" answer, not the "birthday hat" (the expected answer). The birthday hat item has the same properties as one of the solid figures, namely a cone solid figure, so it has the same nets as the cone solid figure. In the problem in Fig. 5., the students generally had not been able to answer questions by presenting two different ways. Students only answered in one way by using the number lines, even though the problem could also be solved using mixed counting operations. Thus, the scores obtained by students on this indicator werenot perfect. Here is an example of a student's answer.

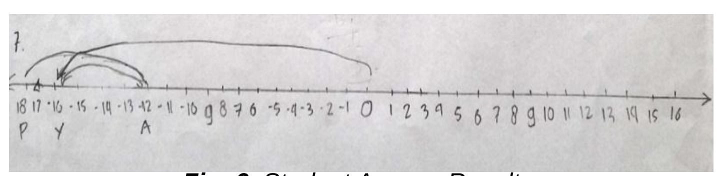

Fig. 6*. Student Answer Results*

Sometimes a problem does notonly require to befinished with one answer, but also through a comparison of solutions from various complex problems. By making linkages between concepts, new relationships that allow modeling and making various alternatives will be found and the right answers can be obtained [8], [9], [10].

3.5 Evaluating

Generally, students in Indonesia were not accustomed to working on questions with diverse answers. Even in some cases, when students found their answers different from other students, there were concerns that their answers were wrong. This was possible because they did not see every problem from the root. This means that students did not see the problem precisely from a simple perspective. Therefore, in the case of the problem in Fig. 4., if students sawthe problem with a simple perspective, it couldbe ascertained that they wouldanswer the "birthday hat" (correct answer), and did not immediately think ofanswering "cone".

The statement above is strengthened by the following research data.

Table 1. *AFA's Students*

Research year	Acceptance finding ability (%)	Description
2014	15	Acceptance finding was the weakest ability of the six aspects of CPS ability
2015	25	

From the table above, it can be seen that in 2014 and 2015, the acceptance finding ability of elementary school students only reached 15% and 25% respectively [18]. If those two years was averaged, students' acceptance finding ability wasonly 20%, and it was still in the very low category.

4 CONCLUSION

There was a tendency that the low acceptance finding ability of elementary school students was due to students not particularly exposedto seeing the problem from various points of view, which resulting in students not havingcourage to have different answers. Acceptance finding ability was still very much needed to be developed, namely by introducing more non-routine problems, open problems, and complex problems.

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