Acceptance finding ability

I Isrokatun[*], N Hanifah, and M Maulana

Universitas Pendidikan Indonesia, Jl. Mayor Abdurahman No.221, Sumedang, West Java, Indonesia

*isrokatun@upi.edu

Abstract. Acceptance finding is the one of an aspect of mathematical Creative Problem Solving (CPS). The indicator of acceptance finding is characterized by students ability to answer the question by using different methods. The lower acceptance finding ability shows by the tendency from the student to use the same methods. The main goal of this research is to identify the several factors that causing the lower of acceptance finding and how to improve it. This research adopting several data that concern to mathematical CPS ability, from 2014 to 2017 on Elementary School, held on two province, Banten and West Java. The conclusion are: 1) The factor that causing the lower acceptance finding are the fact that student don't have enough opportunity through divergent thinking process; 2) Situation-Based Learning was designed to improve acceptance finding. SBL was conducted to emphasise students opportunity to analyze and trying to solve a problem, on fearless condition about mistakes. So, its possible to find the variation methods to solve the problem.

1. Introduction

Giving formula at the beginning of mathematics learning activities resulted in restricted students' thinking pattern; in which, students as recipients will not have enough opportunity to think freely. This leads students' to low acceptance finding ability.

This matter would be different if students do math problems without being given the formula by the teacher first. It would allow students to think what formula to answer the questions; hence their thinking ability are stimulated.

This type of thinking process is named divergent-convergent thinking process. This allow students to think the most possible thing sinvarious ways. The divergent thinking process is the process of thinking from different directions, while the convergent thinking process is the process of thinking to choose the most appropriate way [1].

Hence, when students are given a mathematical problem without the formula, their freedom of thought in finding solutions can be trained. Such activities need to be given to students in order to develop their acceptance finding ability.

Acceptance finding ability is one aspect of mathematical CPS ability. The main indicator of this ability is that students are able to solve a problem by using different steps or producing different answers.

1.1. Research Questions

The research questions are:

a. How is the acceptance finding ability of elementary school students in Indonesia?

b. What solutions can be undertaken to develop students' acceptance finding ability?

1.2. Problem

A situation is considered as a problem when some one is aware that a certain situation requires action, but cannot immediately find the solution [2-6]. Problems are things that require action, but difficult or confusing [7]. Thus, the problem can be interpreted as a question to be answered at the time, in which the person being asked does not have a clear solution plan.

Problem is an important, open-ended, and ambiguous situation in which one wants and needs new options and a plan for carrying out a solution successfully [8]. A problem is said to be open-ended if the problem provides a variety of answers, or in other words the answer is not single. A problem is said to be open-ended if it has more than one correct answer [3, 9, 10].

A situation is considered ambiguous if it cannot be interpreted solely, and contains various meanings. In other words, the problem is ill-structured; it does not contain all of the information needed to answer it, requires assumptions, and there is no clear process to guarantee a correct answer [9]. As a result, solving the problem also requires various ways to interpret the meaning of the situation.

1.3. Acceptance Finding Ability

Acceptance finding ability is one aspect of mathematical CPS ability. The CPS ability has six aspects, namely objective finding, fact finding, problem finding, idea finding, solution finding, and acceptance finding ability [11-14]. Each of these aspects begins with a divergent phase and ends with a convergent phase.

The design that illustrates the flows of CPS thinking process can be seen in the following figure [1]:
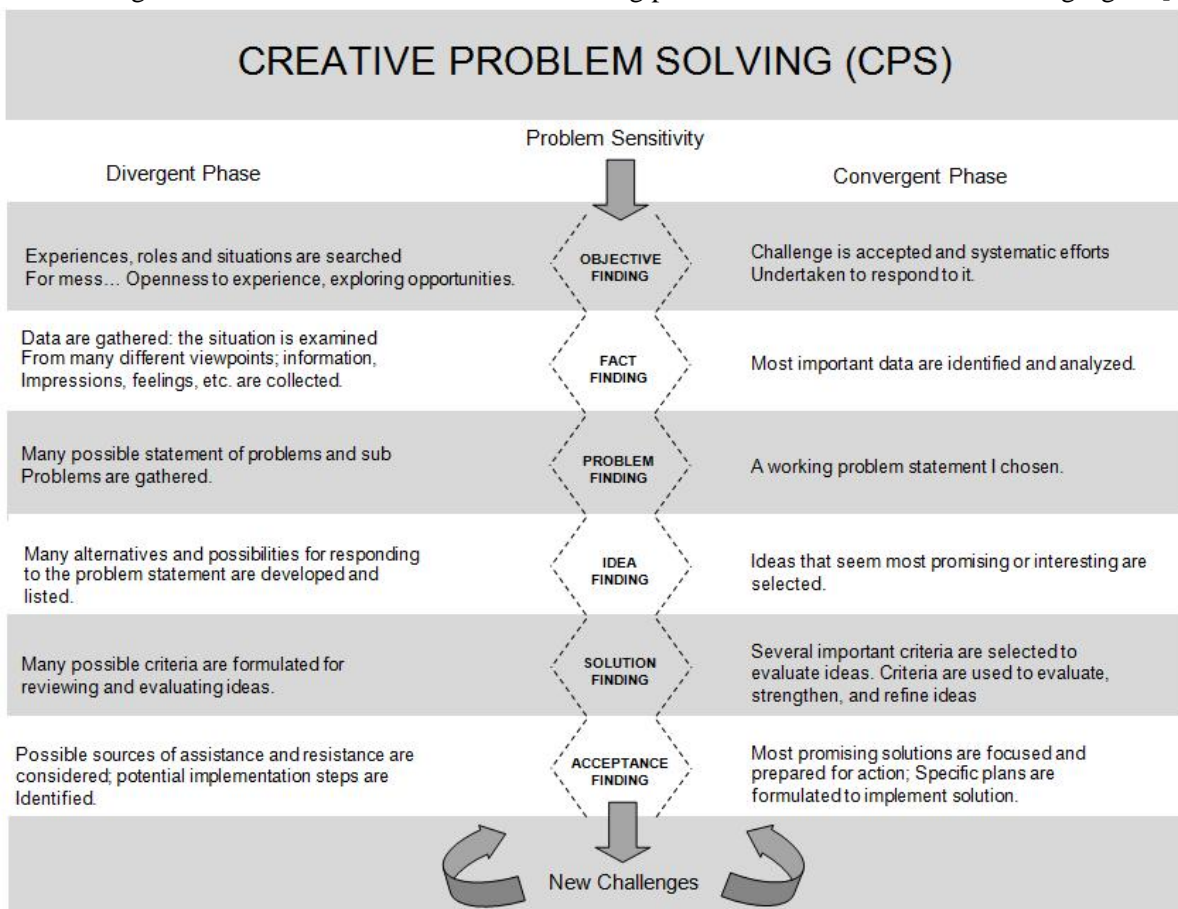

Figure 1. CPS Thinking Process Flows

Acceptance finding stage is the stage in which possible sources of assistance are considered; potential implementation steps are identified (divergent) and most promising solutions are focused and prepared for action; and specific plans are formulated to implement solution (convergent).

At the divergent thinking phase, students will seek or identify potential ways/steps/procedures of answers that can be considered as solutions. In the convergent thinking phase, students will choose the most appropriate way/step/procedure of the answer as a solution.

The acceptance finding indicators are:

a. Students are able to look for or write down various plans/steps that can be considered as a solution.
b. Students can check the answers that are already obtained, but with different ways/steps.
c. Students are able to solve one problem (closed or open) with more than one answer.
d. Students are able to answer an open question with diverse answers.
e. Students are able to answer open questions with various ways but with the same end result.

2. Research Method

This research was conducted by collecting data from several studies on mathematical CPS ability. The data were collected from 2014 to 2017 research, with a population of elementary students in Indonesia. The sample of research was taken from two provinces, Banten and West Java, in medium-ranked and high-ranked elementary schools.

3. Results and Discussion

The percentage of elementary school students' mathematical CPS ability in Serang-Banten and Sumedang [15-17] is as follows:

Table 1. The Percentage of Mathematical CPS Ability

CPS aspects / Period	O	F	P	I	S	A
2014	28	33	17	23	22	15
2015	41	46	36	35	36	25
2017	89	80	65	66	56	50

Description:
O = objective finding
F = fact finding
P = problem finding
I = idea finding
S = solution finding
A = acceptance finding

The table above explains the percentage of scores on aspects of mathematical CPS ability. The acceptance finding aspect was the weakest ability of the students. The average score of the students' acceptance finding ability was about 30%.

The alternative solution to train and develop students' acceptance finding ability is through Situation-Based Learning (SBL). SBL is a learning process that consists of 4 stages, which are: 1) creating mathematical situations (prerequisite); 2) posing mathematical problem (core); 3) solving mathematical problem (goal); and 4) applying mathematics (implementation process), as illustrated in the following diagram [15, 16, 18-23].
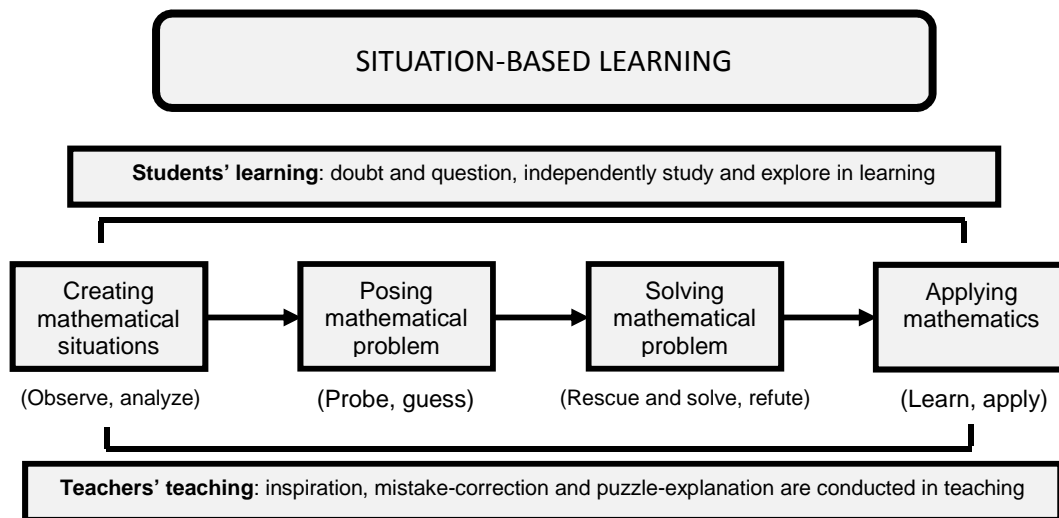
Figure 2. Situation-Based Learning

4. Conclusion

The acceptance finding ability of elementary students was still relatively low. The solution that can be done to train and develop the ability is through SBL model. The emphasis of SBL model is on the need to give students time to think and try to solve a problem, without the fear of making mistakes, and without being given a formula. Each student will have different ways, methods, steps, and procedures to find out the formula.

Acknowledgments

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