Problem posing skill of elementary school students

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Abstract. Children generally have a high level of curiosity, hence they often ask many questions repeatedly. Their high level of curiosity is ought to be developed by adults, which includes their parents and teachers. However, in reality, the older the children get, the more reluctant they become to ask questions due to many reasons. This results in the weakening their confidence to ask questions and diminishing their problem posing skill. By employing ADDIE (Analyzing, Designing, Developing, Implementing, and Evaluating) method, this research was conducted to illustrate elementary school students’ problem posing skill. The respondents comprised elementary school students aged 10-12 years. The research discovered that the students’ problem posing skill still needs to be developed by providing a certain facilitation that all allows the students to be more confident to ask questions. The research also found that the confidence to ask questions can be encouraged with the utilization of a student worksheet that provide situations instead of problems.

1. Introduction

Elementary school students are generally in their stage of life where they have a high level of curiosity, which makes them often ask many questions repeatedly. The question-asking process is not only motivated by their lack of understanding, but also by the desire to be sure about their knowledge. For this reason, the students need adults to help them be sure about their knowledge. On another note, the students’ high level of curiosity can still always grow should they be facilitated in their learning process. However, in reality, the older the students get, the more reluctant they become to ask questions. This results in the weakening of their problem posing skill.

Problem posing is a process of creating mathematical problems through tangible cases based on one’s mathematical experiences [1]. Problem posing includes creating new problems or developing problems based on an existing data or information [2]. Problem posing activities allow more freedom for students in learning independently by formulating and solving their own problems [3]. In conclusion, problem posing skill can be defined as students’ ability to pose problems from provided situations.

The ability of elementary school students to pose problems is believed to be low. Despite their nature of having a high level of curiosity, there are many things that make the students reluctant to ask questions. They, among other reasons, feel shy, are afraid to be made fun, do not want to be perceived as unintelligent, do not know exactly what to ask, and could not focus on the subject being discussed.

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To date, the learning methods used in the classroom emphasize more on the students to learn to answer questions and not to ask questions (pose problems), which is not the most ideal model to increase the students’ awareness about the problems. As a result, the students’ problem posing skill become suboptimal because they are not exposed to the opportunity to learn posing mathematical problems, asking, and what to ask.

In accordance with the discussion above, this research seeks to describe elementary school students’ problem posing skill when they were facilitated with a student worksheet that has been designed using Situation-Based Learning (SBL) characteristics.

2. Methods
ADDIE (Analyzing, Designing, Developing, Implementing, and Evaluating) method was used in this research to illustrate the problem posing skill of elementary school students. Analyzing phase was used to describe the definition of students’ problem posing skill and the SBL-based student worksheet. Designing phase was used to develop a frame work of the student worksheet that can facilitate students’ problem posing skill. Developing phase was used to describe the development process of the student worksheet in facilitating the students’ problem posing skill. Implementing phase was used to describe the students’ work on the worksheet to improve their problem posing skill. Evaluating phase was used to describe the quantitatively obtained data about the students’ problem posing skill. This research involved upper classes of elementary school students, aged 10-12 years old, as the research subjects.

3. Results and discussion

3.1. Analyzing
Problem posing skill is an expansion of one of the Creative Problem Solving (CPS) aspects called problem finding. Problem finding is always initiated by a divergent activity and ended by a convergent activity [5-8] as depicted in the following figure of CPS thinking process [9]:

![Diagram of Types of questions](image-url)
In problem-finding activities, students are expected to identify several existing problem and sub-problem statements and choose the most potential. Then, they proceed to problem posing activities. Problem posing activities encourage students to be more active and creative in shaping their knowledge and have better concept understanding [10].

The student worksheet that can facilitate the students’ problem posing skill is a student worksheet specially designed according to the SBL learning characteristics. SBL is a learning process that consist of four steps of learning process, namely: 1) creating mathematical situations; 2) posing mathematical problem; 3) solving mathematical problem; and 4) applying mathematics, as illustrated in the following diagram [11-14].

Creating mathematical situations is the prerequisite, posing mathematical problem is the essence, solving mathematical problem is the aim, and applying mathematics is the process of applying the learning process to new situations/problems.

In SBL, the teacher does not give any question to the students. Instead, the teacher provides the situation and the students are trained to pose problems. The situation can be implemented in a form of stories, descriptions, or even pictures provided in the student worksheet.

3.2. Designing

On this stage, the framework of the student worksheet that can facilitate students’ problem posing skill was designed. The worksheet was designed to facilitate the students in the process of posing mathematical problems in written form. In the creating mathematical situations stage, the teacher
provided a situation in a form of a story complemented by pictures as a prerequisite of SBL. Below is the form of the student worksheet.

**Figure 4.** Mathematical situation for learning cube elements in geometry.

From the situation above, the students were directed to observe first before proceeding to the next step.

### 3.3. Developing

After observing the situation, posing mathematical problem activity was done using Part A and B in the student worksheet. In Part A, the students were expected to write down the information they could collect from the observation. Then, in Part B, the students were expected to change the information they have collected into mathematical questions.

**Figure 5.** Posing mathematical problem stage.

A. **Write down the interesting information that you can get from the picture!**

1. ............................................................................................
2. ............................................................................................
3. ............................................................................................
4. ............................................................................................
5. ............................................................................................

B. **Change the interesting information above into mathematical questions!**

1. ............................................................................................
2. ............................................................................................
3. ............................................................................................
4. ............................................................................................
5. ............................................................................................
3.4. Implementing
When the students observed the situation to work on the Part A on the student worksheet, they were confused as to which part they should observe. They could not quite understand the instruction from the teacher and were not accustomed to the learning activities.

Below is the result of the students’ work on the student worksheet to develop their problem posing skill.

![Figure 6. Work results of group 4.](image)

![Figure 7. Work results of group 5.](image)

From the students’ observation above, it can be seen that their focus was not on the concept being taught yet. They were just identifying that the Kaaba in the picture was in a size of a cube, but they were not identifying the concept of geometric concept.

After all the groups were finished working on Part A, they proceeded with Part B, which was changing their observation results into mathematical questions. Below is the teacher’s instruction.

“After you are finished writing down the information from the picture, take a look at Part B. Create mathematical problems based on the results of your observation”.

The students that had not identified mathematical information before changed their observation results into problems. Not all problems posed were mathematical. For example, the following figures present the problems posed by some groups.

![Figure 8. Work results of group 4.](image)
3.5. Evaluating

Research conducted in 2014, 2015, and 2017 have found that the problem-probing skill of elementary school students only amounted to 17%, 36%, and 65%. On average, the elementary school students’ problem posing skill as a part of the problem-finding skill aspect only amounted to 39.3%, which was still considered low [4, 14].

4. Conclusion

The weak problem posing skill level of students was due to their weak problem finding skill. Therefore, it is important to keep developing them. Students’ curiosity can be trained with a student worksheet from which they can practice observing, which will result in them being more critical and more confident to ask questions. The students’ confidence to ask questions can be developed by using a student worksheet that provide situations instead of problems.

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