The Role of Students’ Intuition in Solving Basic Mathematical Problems in Mathematics Department of Education Faculty of Muhammadiyah Cirebon University

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ABSTRACT

This study was conducted using qualitative approach, which aims to determine the role of students’ intuition in solving basic mathematical problems. Polya problem-solving steps were used for data collection followed by in-depth interview towards the subject of the study. The interview was conducted to know whether the subjects solve the problems intuitively or not. The subjects of the study are the first semester male students of Muhammadiyah Cirebon University. The result of this study indicates the role of mathematics student intuition in solving basic mathematics problems as follows: (1) in the process of learning basic mathematical problems, the subjects learn some basic mathematical problems intuititively and (2) in making problem-solving plans, subjects tend to use the role of direct intuition. In making plans and applying mathematical problem, the subjects solve some problems without the role of intuition.

INTRODUCTION

Intuitive is a tool used to predict a thought / theory and is very effective for finding the right strategy when face up or are doing specific tasks (including when facing and finding strategies in solving mathematical problems). This means that intuitive roles can work together (spontaneously) with both analytical and synthesis work processes. From time immemorial, experts viewed the term intuitively with different views. Fischbein (1987: 12)
In the literature that the author traces, it appears that philosophers and psychologists such as Plato and Aristotole (2004). Distinguish between inferential thinking types whose processes are discursively undertaken and the thought that the process does not take place non-discursively. The last thought of Plato and Aristotle called it. Philosophers view intuition as rational and superior in analytic thinking, some philosophers view intuition as something that can not be wrong. Philosopher: Bergson (Henden.G, 2004) distinguishes the intuition from analytic reasoning. According to him, the two terms do not have a different cognitive system, but there are two sides in the activity of thinking. And he said that "A number of respondents emphasize mutually reinforcing an intuitive analysis”.

Argues differently that intuitive is not just a psychological fact, but has become one of the methods of epistemology. It is therefore an intuition to be active and productive in the process of discovering and acquiring knowledge. According to him knowledge acquired through the process of intuition can be used as a hypothesis which can then be analyzed to find out the truth of the proposed statement. This means intuitive and analytical activity can work to help each other in discovering the truth, where intuitive activity helps reveal the hidden or inaccessible knowledge. While analytical activity helps generate the knowledge generated by intuitive roles. Mujamil (2005).

Supporting the above statement, Winerman in Nicholas, (2010: 3) says that ”Intuition as the act or process of coming to direct knowledge or certainly with little reasoning or inferirng”. It can be concluded that the intuition is the act or process of acquiring knowledge directly or is believed to be true with a guess or a little reasoning. Thus an intuition role has greater potential that can provide ease in understanding and simultaneously guiding in verifying the truth when faced with problems that can not be reached both by the mind and the senses.

According to some of the above understanding (Muniri 2015), illustrates that intuition is a cognitive or mental process when understanding information in the form of capturing, uncovering or exposing ideas or knowledge based on feeling or feelings of subconscious and mixed with prior knowledge and immediate experience, immediately, all of a sudden that happens automatically (its occurrence occurs so unnoticed its origin) without being thought of before.

Fishbein (1983, 1999) says that intuition is a mental process (cognition) that has certain characteristics. According to him, the role of intuition is seen as a role of type of cognition. The knowledge built through this mental process is called intuition knowledge. On the other hand, intuition is defined as immediate cognition (immediate cognition) and has characteristics in between; self-evident and immedia, (the subject of seeing their statements directly accepted without the need for extrinsic justification by formal evidence or empirical support), intrinsic certainty, perseverance, (commonly excluded as unacceptable) globality, (intuitively offering a global view of unity, in contrast to explicit, analytical and discursive thinking) extrapolativaness, (indirectly exploring), implicitness, (intuitive processes are generally unconscious and the person is aware only of the final product) and theory status, intuitive is a theory, never just a skill or a perception.

From the results of research Fischbein and Grossman (1997) showed that intuitive is always based on the structure of a particular schemata. And it is found that intuitive is a spontaneous guess which is a fact behind the schematic screens. Henden (2004) suggests that of the Top 150 Managers studied, the strategic thinking used with intuitive roles will evolve rather than using the role of analysis. The strategic thinking illustrates a form that focuses on future review, new ideas and synthesis. And John Keith undertook a study of Scoenfeld’s research results, to show an intuitive role in solving geometrical problems and to generate an intuitive mechanism of geometry. The result of his research showed that intuitive geometry is used during transitional planning and episodes in the business of problem solving. The basic idea in the problem-solving stage is explained by Polya (1973) which is in the form of four stages in problem solving, namely: understanding the problem, making problem-solving plan,
implementing problem solving plan and re-examine problem solving by involving basic math problems.

The results of this study is expected to be useful for some parties below:
1. It is hopefully helpful for students to understand, to provide experience and insight in solving some basic mathematics materials.
2. It is hopefully helpful for campus parties as an effort in contributing to the development of mathematics learning.
3. It is hopefully helpful for the researchers who will conduct research on the role of student intuition in solving basic mathematics problems.

METHODS

This research is a descriptive qualitative study aimed to know role of students’ intuition of mathematics education in solving some basic mathematics problem. This research was conducted at Muhammadiyah University of Cirebon. The subject of this study is a student of mathematics education faculty who possesses the role of intuition. The subject was chosen based on the questionnaire and the test of early mathematics ability given to him.

In this research, some data used are (1) basic mathematical problem solving data, (2) written answer from problem solving test and (3) then data of interview result to research subject. Data of problem solving test is used to determine the subject of research, while data of interview result is used to describe the role of intuition of mathematics education student in solving basic mathematics problem. The data was analyzed using Polya steps such as: (1) transcript the verbal data collected, (2) review all available data, (3) perform data reduction, (4) reveal data exposure, (5) analyze the role of student intuition in solving basic mathematics problems.

To find out whether the subject use some basic mathematical problem solvings intuitively or not, the statement, expression and written data were figured out. The following will describe the kind of intuition of mathematics education students in solving mathematical problems according to the type of intuition, which is expressed by Fischbein (1987) as follows.

| No | Polya Steps                  | Intuitive type and its characteristics                                      |
|----|------------------------------|-------------------------------------------------------------------------------|
| 1. | Understanding the Problem    | **Affirmatory Intuitive:** Intuitive with the following characteristics: Intuition that emerges as a statement directly accepted without justification by formal evidence or empirical support (*self evident*). Intuitive use of force effects on individual reasoning strategies and on the selection of hypotheses and solutions (*coerciveness*). Intuitive that appears will be very sturdy and stable (*perseverence*). Intuitively related to the ability to foresee an empirical supporter (*Extrapolativeness*). Intuitively opposed to the cognition obtained logically and analytically (*globality*). |
| 2. | Create a troubleshooting plan| **Anticipatory Intuitive:** Intuitive to the traits, the appearance of a vision when trying hard to solve the problem. intuitively contrary to the allegations in general. Feeling confident, although no detailed justification or evidence has yet been found. Presents globally against the steps in the problem-solving plan. |
| 3. | Implement problem-           | **Anticipatory Intuitive:** Intuitive to the traits, intuition contradicts the allegations in |
No | Polya Steps | Intuitive type and its characteristics
---|---|---
1 | solving plan | general, really feel confident, although no detailed justification or evidence has yet been found. Presents globally the steps in implementing the problem-solving plan.
4. | Check again | *Constant Intuitive:* Intuitive with traits, Takes conclusions directly, sums up generally with the basic idea of a problem that has previously been occupied.

After obtaining, collecting, and summarizing the data, the results of in-depth interview analysis will be used to describe the role of mathematics student intuition in solving basic mathematics problems. It can be seen from the process that flows in each stage of problem solving according to Stages of problem solving in Polya.

**RESULTS AND DISCUSSION**

The results and discussion of basic math problems given to the students to be solved through the Polya problem stages are as follows: a candy company has three warehouses in each City. Each warehouse stores 100 boxes of candy. One box consists of 15 large packs. A large pack of 12 small packs. The price of a small pack of candy is Rp. 7,500,-. From each warehouse, the company set aside 25% of the sale of candy to pay employee salaries, 20% for capital and raw materials, and 10% for warehouse operational costs. What is the net profit of the candy company?

Subjects of male students of mathematics education; in solving basic math problems are as follows: in solving the problem ie the stage of understanding the subject matter using the role of intuition, it is proven that subject can still understand the problem directly even though it has read the problem given by the researcher, by first giving the desired result of the problem. The subject immediately replied:

The sale of candy (from 1 warehouse) = 100 x 15 x 12 x 7,500,- = 135,000,000,-
Net profit (%) = 100 - 25 - 20 - 10 = 45
Advantages of 3 warehouses = 3 x 45 x 135 million,- = 182,250,000,-

From the answers given by this subject is an immediate cognition. So the subject in understanding the problem of using the role of intuition.

In making a problem-solving plan use a direct intuitive role by writing there are three warehouses, each warehouse with profit Rp135,000,000,- then multiply 3 and multiply 45% net profit resulting in Rp182,250,000,- This is written in a simple way according to the subject's thinking.

In making plans and implementing problem solving the subject does not use an intuitive role. Because the subject repeats according to the stages in answering the matter according to the formula that he uses without any leap of thinking directly.

**CONCLUSION**

Based on the analysis and data collection, there found three findings as follows:

1. In the process of learning basic mathematical problems, the subjects learn some basic mathematical problems intuitively.
2. In making problem-solving plans, subjects tend to use the role of direct intuition.
3. In making plans and applying mathematical problem, the subjects solve some problems without the role of intuition.

Due to the research findings, the researcher draws some conclusion and suggest:
1. For lecturers, by knowing the characteristics and types of the role of students' intuition described by Fisbein, they can design learning activities by using mathematocal problem solving-oriented.
2. For students, choose some basic mathematical problems or problems that can train students to use the role of intuition in solving problems so they can guess and predict answer correctly.
3. For further research, the results of this research can be used as a useful information to make a broader research about the role of intuition of mathematics education students in solving basic mathematics problems, with different students' learning style, intelligence, gender, and personality.

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