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Developing Mathematical Reflektive Thinki NG Skills Through Problem Based Learning

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Abstact

Reflective thinking gives the opportunity to students the chance to assess believe. That means providing relevant information on the student's belief and reflecting students' understanding of a given topic. In other words, reflective thinking provides the opportunity for student to solve a problem together with the reasons that logically, defend their opinions, analyze and reflect them. A process that facilitates student to re-think / think back when responding or choosing solutions that are useful in developing reflective thinking skills, that is a learning process which can encourage reflective thinking. One of which is a model of learning that can minimize these problems is by using problem based learning.

Key Word: Reflektive thinking skills, Problem based learning

I. INTRODUCTION

In recent years there has been conciderable concern and discussion about lack of skills that students possess. Common symptoms that occur in the students at the moment is "lazy thinking", they tend to answer a question by quoting from books or other library materials without express opinions or to analyze and reflect on the opinion. If this situation continues then the students will have difficulty applying the knowledge gained in class to real life. In other words, the class just to get grades and test scores are not necessarily relevant to their level of understanding.

Reflective thinking to give students the chance to assess beliefs. That means providing relevant information on the beliefs of students and reflect students' understanding of a given topic. In other words, in reflective thinking, students are given the opportunity to solve a problem together with the reasons that logically, defend their opinions, analyze and reflect.

Reflective thinking skills need to be developed in learning mathematics. This is what encourages writers to develop mathematical reflective thinking skills at the level of student mathematics teacher candidates. One model of learning that can minimize the problems of students and encourage students to be more active (thinking) that is using problem based learning.

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II. DISCUSSION

A. Mathematical Reflektive Thinking Skills

John Dewey (1933) defines reflective thinking that is something that is done in an active, persistent, and full consideration of a belief supported by clear reasons and can make the inference/decide on a solution to the problem given. In the process of teaching and learning, reflective thinking fosters meaningful learning and help students and educators like to develop specific skills that can help them to be more vocal and critical, and to develop expertise in their professionalism.

Lochhead (2001) says that the speak of the logical/makes sense is reflective thinking. The ability reflective thinking is one's ability to understand the thought process by looking back on what has been done to find a solution or answer that there is a problem so as to achieve the level of thinking is a student requires internalization of the two roles as provider and as a problem solving problem. Thus a person who has the ability reflective thinking will not repeat his mistake in solving a problem, because they are always evaluating what has been done in solving his problems.

According to Lipman (2003), that the reflective thinking skills is the ability to think the attention on the assumption (hypothesis/elements are known) and its implications are based on reason or evidence to support a conclusion.

Reflective thinking is to think independently and self-corrective (Scriven and Paul 2004). In other words, people who have the reflective thinking ability do the work or activity/study independently in accordance with what the demands in achieving something that is expected and always evaluate or rethink what he has done in order to find solutions and decide on solutions that took in answering a problem which exists to get a best solution.

Reflective thinking is a goal, which regulates self-assessment that generates interpretation, analysis, evaluation, and conclusion (Facionean 2007). Reflective thinking including critical thinking process, which allows individuals to analyze and

make judgments about what has happened (KAAMS resources, 2007). This suggests that the reflective thinking someone would have the ability to identify problems, choose alternative settlement/settlement strategy for to product an interpretation of the problem, analyze problems and evaluate the settlement, concluded and best decided settlement against the given problem.

From the opinions of experts, we can conclude that in any mathematical learning reflective thinking skills (in this case the mathematical reflective thinking skills) student is required to enable them to achieve the optimal capability of achieving high-level mathematical thinking skills so that learning math achievement is expected to grow. By having the Mathematical reflective thinking skills, the students who are faced with mathematical problems will always have the ability to solve them with different points of view, linking the knowledge he already has with the knowledge that is being dipelajaranya, identifies the various existing information, evaluate the solution process, so it can decide on a solution based on logical reasons/rationale for the right.

Rodgers (2002) characterized Dewey's four criteria for reflective thinking's as follows:

1. Is a meaning- making process that moves a student from one experience into the next with a deeper understanding of its relationships with connections to other experiences and ideas.

2. Is a systematic, rigorous, disciplined way of thinking, with its root in scientific inquiry.

3. Needs to happen in community, in interaction with others.

4. Requires attitudes that values the personal and intellectual growth of oneself and of others.

Grimmett et al (in Lee, 2005) also argues that the level of reflective thinking was composed of:

• Technical: insrumental mediation of actions

• Delibratif: delibration among competing views

• Dialectical: reconstruction of experience

Lee (2005) also argues that the components of reflective thinking is an attitude, process, content, and depth. Criteria developed by the depth of reflective thinking include:

• Recall level (R1): one describes what they experienced, interprets the situation based on recalling their experiences without looking for alternative explanations, and attempts to imitate ways that they have observed or were taught.
• Rationalization level (R2): one looks for relationships between pieces of their experiences, interprets the situation with rationale, searches for ‘‘why it was,’’ and generalizes their experiences or comes up with guiding principles.
• Reflectivity level (R3): one approaches their experiences with the intention of changing/improving in the future, analyzes their experiences from various perspectives, and is able to see the influence of their cooperating teachers on their students’ values/behavior/achievement.

Of the various expert opinions can be concluded that the level of reflective thinking skills that started from something technical or simple-minded, then consider the ideas from different points of view or from a variety of contexts, and reconstructed the results of such consideration based on experience or prior knowledge together with the reasons or basic mendukungnnya to make decisions based on the results of the evaluation.

Weast (in Paden Nita, 2008) provided a list of reflective thinking skills as follows:

• Identify the authors’s conclusion
• Identify the reasons and evidence
• Identify the vague and ambiguous language
• Identify the value assumptions and value conflicts
• Identify descriptive assumptions
• Evaluate statistical reasoning
• Evaluate sampling and measurements
• Evaluate logical reasoning

• Identifying omitted information
• Articulate one's one value in thoughtful, fair mainded way

Mazow (1999) based on the framework Weast became a guide for the class on reflective thinking which suggesting that a person engages in reflective thinking when he:

1. Determines what information is needed to understand the issue

2. Accesses available information, including reliable sources in related fields

3. Synthesizes the information gathered

4. Creates some plausible temporary meaning that may be reconsidered and modified as one learns more.

Four stages in the reflective learning cycle proposed by Rodgers (2002). The four phases are as follows:

1. Presence: This is the mean to see and observe student thinking related to the subject matter. Ongoing challenges and opportunities needed to develop student thinking and better involve them in reflection.

2. Description: Includes describe the diverse elements of the classroom experience.

3. Analysis: Generate a number of allegations, or interpretation, to explain what is described

4. Experiment: The fourth stage is generally nonlinear, especially the teachers back and forth between description and analysis, but recent experiments and are double occurs as a subsequent experience, when teachers try their new ideas to support student learning.

Reflective thinking skills in learning can not be separated from other thinking skills, including intuitive abilities. Both have a close relationship and support each other.

Skemp (1971) distinguishes between two levels of intelligence functions: 1. Intuitive. At an intuitive level, we are aware through our senses, the data from the

external environment, which is automatically classified and associated with other data, but we are not aware of the mental processes involved in these activities

2. Reflective. At the reflective level, the intervention of mental activity becomes the object of introspective awareness.

Skemp clear that this difference is a matter of differences in task (or goal) subjects. Example: Multiply 16 by 25. (i) What is the answer? (ii) Explain how you do it? To answer the second question involves the diversion of attention from the task for mental processes.

Intuitive thinking is to think of concrete, direct, inductive and rich in the ways of non-symbolic representation and processing of information, and awareness. Reflective thinking, merumusan explicitly aims of a general relationship with the procedures and common foundation, namely the general statement about objects and operations with the object. Mathematical language and symbols of the concept is needed here, not just work with objects and operations, but it reflects the activities and stated that he did.

Both ways of thinking are mutually supporting one another in knowledge creation and knowledge base. Intuition is by no means limited to the creation of knowledge alone. Combined results of intuitive and reflective activities are directly related to intuitive experience, so they do not need a broad conceptual language.

B. Problem Based Learning

To improve the quality of the process and learning outcomes, learning experts have suggested the use of constructivist learning paradigm for teaching and learning activities in class. With the paradigm shift changes the focus of learning is learning from teacher-centered learning to student-centered learning.

To achieve these objectives, then the school needs to formulate a learning strategy that can develop creativity. The strategy involves choosing among approach, method or model of learning. One lesson that is currently being developed is problem-based learning. Problem-based learning is a learning activity that requires students to understand a concept of learning through the situations and problems presented at the beginning of learning. The problem presented to students is a contextual problems.

Problem-based learning, here in after referred to as PBM, is one of the innovative learning model that can provide conditions for active learning to the students. PBM is a learning model that involves the students to solve a problem through the stages of the scientific method so that students can learn knowledge related to such problems and also have the skills to solve problems (Ward, 2002; Stepien, et al., 1993).

According to Dewey (in Trianto, 2007: 67) learning on the problems is the interaction between the stimulus with the response, a two-way relationship between learning and the environment. Environment advises the students in the form of aid and problems, while the brain nervous system to function effectively interpretasion aid so that problems can be investigated, evaluated, analyzed, and sought solution well. The experience gained from the environment students will make him the material and material assistance to obtain and can be used as guidelines for understanding and learning goals.

Problem-based learning is an effective approach to teaching higher-order thinking processes. This learning helps students to process information that is already finished in his mind and devise their own knowledge about the social world and its surroundings. Learning is suitable for developing basic knowledge as well as complex.

Boud and felleti, and Fogarty (1997) stated that the PBM is an approach to learning by making the confrontation to the learners (students) with practical problems, the form of ill-structured, or open ended through a stimulus in the study. Duch, Groh, and Allen (2001), stated that the PBM is a lesson that involves the formulation of the problem, learning objectives, and assessment of inter-related.

Nurhadi (2004) stated that problem-based learning is a teaching model that uses real-world problems as a context for students to learn about critical thinking and problem solving skills, and acquire the knowledge and essential concepts of the subject matter. PBM is a model of learning-oriented theoretical framework of constructivism.

According to Arends (in Trianto, 2007: 68), problem-based learning is an approach to learning in which students work on authentic problems with a view to develop their own knowledge, develop inquiry and higher order thinking skills, develop independence and confidence.

Problem-based learning is designed with the aim to help students develop thinking skills (including higher level math skills) and develop skills in problem

solving, the problem-based learning students are required to make solving the problems presented by digging lots of information, then analyzed and sought the solution of existing problems. Solutions to these problems have one answer is absolutely not true, that means students are required also to learn creatively. Students are expected to be individuals who are knowledgeable and able to see the relationship of learning with aspects of the existing environment.

According Nurhadi (2004), problem-based learning has the following characteristics:

(1) Submission of questions or problems

Problem-based learning to organize teaching around questions and issues that are both socially significant and personally meaningful to students.

(2) Focusing on the linkages between disciplines

Investigated the problem has really tangible to the students review the problem solving of many things

(3) Investigation authentic

(4) Produce a product or work and show it off

Problem based learning require students to produce a particular product in a real work and demonstrations that explain or represent the shape of solving the problems they find.

(5) Cooperation

Ibrahim (2000) suggested that problem-based learning model consists of five main phases, starting with teachers orient students to authentic situations and problems which ended with the presentation of the work. The stages of the student in following the model of problem-based learning:

Phase 1 Orientation of students on the issue,

Phase 2 of organizing students to learn,

Phase 3 led the investigation of individual,

Phase 4 develops and presents the results of the work,

Phase 5 menganilisis and evaluate problem-solving process.

III. CONCLUSION AND SUGGESTION

Mathematical reflective thinking skills is one of the high-order thinking skills that should be developed in the students in learning, because the ability to think this can encourage students to always solve the problem by looking at the various points of view based on knowledge or previous experience together with the reasons or basis appropriate/logical, and make decisions based on the reflection of the various solutions by considering various aspects.

Mathematical reflective thinking very important developed in the students which enables them to assess the current belief, collect relevant information with confidence and continue to reflect and evaluate alternative perspectives throughout their lives. By understanding the elements involved in reflective thinking, we can combine the processes that develop these skills. Exciting process, namely through the discovery and awareness of thinking in applying his understanding is one way that is useful in the development of mathematical thinking skills reflective students, ie one with Problem-Based Learning (PBM). PBM is a lesson that presents a problem to understand the concepts being studied and to develop mathematical thinking skills that other.

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