



Apply High Order Thinking Skills in Science Lessons in Primary School

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Abstract

The ability of teachers to make questions and in compiling a Learning Implementation Plan (RPP) that contains elements of high-level thinking skills is something that absolutely must have. Through training activities on Higher Level Thinking Skills (HOTS), it is expected that science teachers in elementary schools are able to implement these thinking skills to students in their respective schools. For teachers here is a field to explore their abilities by trying to train high-level thinking skills in elementary school students. With sufficient levels of difficulty and dynamic learning activities, students must be able to develop their minds to understand the material being studied, not enough just to follow the instructions in the book, but they also need to be able to develop each stage of learning by processing existing data and information to be developed in more ways of thinking, so that they can find various other concepts, as innovative steps.

Keyword : High Order Thinking Skills, Science Lessons, Primary School

INTRODUCTION

The science learning process is not enough to be carried out by conveying information about the concept but also must understand the process of the occurrence of natural phenomena by doing as much sensing as possible, observing events that occur directly through demonstration and experimental activities, and recording information that arises from the event. Involving students actively exploring subject matter, constructing their own ideas obtained from observations and discussions, it is hoped that students can master the material well and improve their thinking skills.

Based on the process of thinking can be grouped in basic thinking and complex thinking. The basic thinking process is a picture of the rational thinking process which contains a number of steps from simple to complex. Rational thinking activities include memorizing, imagining,

grouping, generalizing, comparing, evaluating, analyzing, synthesizing, deducing, and deducing. Complex thinking processes called high-level thinking processes are of four kinds, namely problem solving, decision making, critical thinking, and creative thinking.(Ramos, et.all:2013)

Problem solving uses the basic thought process to solve known or defined difficulties, collects facts about these difficulties and determines additional information needed. Next conclude or propose alternative solutions and test them for feasibility. Finally potentially reduces to a simpler level of explanation by eliminating opposition, and completing problem-solving testing to generalize. (Anderson, L.W. & Krathwohl :2010)

High-level thinking skills (HOTS) are the ability to think and reason to answer complex questions and or solve a case or problem. It is the responsibility of all teachers to train their students with high-level thinking exercises because only with high-level thinking skills can later be used by students to live their lives after completing education. Low-level thinking is only useful for answering test questions or exams that cannot necessarily be used in real life after school.

Higher level thinking is not only in advanced education. Since the first grade of elementary school, a student can be trained to think higher. Question $4 + 6 = \dots$ only trains low-level thinking students, while question $10 = \dots + \dots$ can train high-level thinking students. So that the same problems when delivered in different ways can change from low-level thinking exercises to high-level thinking exercises.

The ability of teachers to make questions and in compiling a Learning Implementation Plan (RPP) that contains elements of high-level thinking skills is something that absolutely must have. Teachers who are skilled at making questions and are skilled in making lesson plans that contain high-level thinking skills will be able to let their students be able to solve problems in their lives after they finish their education.

METHOD

The method used is the lesson study method (LS), with two rounds / cycles, in which each cycle consists of three main activity stages, namely: (1) the planning stage (plan), (2) the implementation stage (do), and (3) the stage of reflection (see), (Lewis, 2002) The subjects of the study were 15 teachers and principals at SD Catholic Dons Bosco Tomohon. The initial activity (plan) carried out was the dissemination of concepts containing high-level thinking skills for elementary students. Furthermore, the implementation of several types of training contains high-level thinking skills that can be included in the lesson plan. In the first cycle, what was established was the concept of high-level thinking skills in science or science learning. Whereas for the second cycle, namely the practice of preparing lesson plans that contain high-level thinking skills. After carrying out activities, followed by reflection (see). In this activity the teachers are expected to be able to provide input, advice and reflection about all the activities they have participated in.

RESULTS AND DISCUSSION

The implementation of the lesson study on high-level thinking skills can be done well and smoothly. In the first cycle, the teachers and principals were very enthusiastic so they wanted to provide a place and were very serious in accepting the material provided by the researchers. Teachers / educators at SD Katolik Don Bosco, are willing to follow all stages of high-level skills. Furthermore, they are willing to implement these high-level thinking skills in their respective classes.

In the discussion on the sidelines of the activity, the teachers reflected that students' thinking skills were indeed a serious obstacle in the process of learning science. With sufficient levels of difficulty and dynamic learning activities, students must be able to develop their minds to

understand the material being studied, not enough just to follow the instructions in the book, but they also need to be able to develop each stage of learning by processing existing data and information to be developed in more ways of thinking, so that they can find various other concepts, as innovative steps. This reflection material is also justified by other teacher friends, so that we can draw a common thread, that when learning science, most students only follow instructions and develop less high-level thinking methods.

Then in the second cycle, the teachers are equipped with several thinking skills techniques that can be trained to students. The stages that are passed on to the teachers, among others, are as follows:

1. Exercise Identification of procedural components.

The teacher needs to direct students to the specific skills and steps needed in the skill. When teaching thinking skills, students are introduced to the frame of mind used to guide students' thinking.

2. Instruction training and direct modeling

Next, the teacher gives instructions and modeling explicitly, for example about when these skills can be used. This instruction and modeling is intended so that students have a brief description of the skills being studied, so that these instructions and modeling must be relatively concise.

3. Guided training

Guided practice is often seen as multilevel instruction such as a ladder. The purpose of guided training is to provide assistance to children so that later they can use these skills independently. In this stage the teacher holds control of the class and makes repetitions.

4. Free practice

The teacher designs activities in such a way that students can practice their skills independently, for example in the form of homework. If the first three steps have been taught effectively, it is expected that students will be able to complete this task or activity 95% - 100%. Independent training does not mean something challenging, but something that can train the skills that have been taught.

As with other skills, in thinking skills students need to repeat to practice it even though this skill actually has become part of the way of thinking. Routine exercise carried out by students will have an impact on the efficiency and automation of the thinking skills that students have. In the learning process in the classroom, the teacher must always add new thinking skills and apply them in other lessons so that the number or type of thinking skills of students increases.

In relation to the development of thinking of elementary / MI students, teachers need to know the true characteristics and characteristics of students in order to provide guidance properly and accurately. Changes that occur in children aged 6-12 years are related to cognitive development according to Jean Piaget, first describing the concrete stages of operation, second, various approaches that are focused on the process of information on increasing memory (memory) and communication and problem solving; and all three measures of intelligence to be able to estimate academic abilities. In the concrete operation phase children are able to understand many concepts of mathematics, natural sciences, and social sciences intuitively and concretely. In line with this, Cottrell, S. (2005) states that intellectual development is very substantial, because of the egocentric nature, children become more logical.

Primary students are students who still need great attention and very high curiosity. For teachers here is a field to explore their abilities by trying to train high-level thinking skills in elementary school students. Basically, high-level thinking skills can be applied in various disciplines, one of them is Science. The superiority of high-level thinking skills can support student academic achievement (Conklin & Manfro, 2012: 9).

The main characteristics of high-level thinking skills are critical and creative (Conklin & Manfro, 2012: 14). The demands of the 2013 curriculum are to make students more critical and

creative, so it is very important to practice high-level thinking skills in elementary school students. The important role of high-level thinking skills in mathematics learning lies in the learning process. Students will be accustomed to thinking critically and creatively both in decision making and problem solving related to analyzing, evaluating and creating (Anderson & Krathwohl, 2001: 79)

Implementing high-level thinking skills in the classroom is not an easy thing, of course there must be a maximum effort to make it happen. Teachers in the classroom have an important role in regulating and motivating students to think higher, here are some motivations that teachers can do in class according to Conklin & Manfro (2012: 18): Open the lesson with questions that lead to HOTS to initiate discussion and debate. B. Ending the lesson with HOTS questions that are used as assessment tools. C. Placing brainstorming activities in the middle of the lesson to encourage students to find ideas and think creatively. D. Providing open-ended based tasks as homework to find out their creativity and understanding of the lessons learned.

There are so many learning methods that can be used to be able to train high-level thinking students, for example with a scientific method combined with a Problem Based Learning learning model or commonly abbreviated as PBL. Furthermore, according to (Heong, Y.M, et al. :2011) states that PBL can train students to solve complex problems and develop alternative answers, and that is all a feature of higher-order thinking.

The scientific approach has several steps as stated in Permendikbud No. 22 of 2016 stating that the scientific approach is a learning process designed so that students actively construct concepts, laws or principles through stages of observing, asking questions to gather information, manipulating and communicating. The advantages of the scientific approach include increasing high-level thinking skills, can shape students' skills in solving problems systematically, creating learning conditions where students feel that learning is a necessity, obtaining high results, training students in communicating ideas, and developing student character.

CONCLUSION

Consciously it is not easy for teachers to create and train high-level thinking students, especially in making open questions and the use of appropriate question words, because not all science questions are easily made open questions. It is necessary for teachers to train themselves to make adequate open questions. Rich questions are needed, questions that ask students to conclude, hypothesize, analyze, apply, synthesize, evaluate, compare, contrast or imagine, showing high-level answers. To answer Higher Order Questions (rich questions) high-level reasoning is needed, namely high logical thinking, high logical thinking is needed by students in the learning process in the classroom, especially in answering questions, because students need to use the knowledge, understanding, and skills they have and connect it to a new situation.

Primary students are students who still need great attention and very high curiosity. For teachers here is a field to explore their abilities by trying to train high-level thinking skills in elementary school students. Basically, high-level thinking skills can be applied in various disciplines, one of them is mathematics. The superiority of high-level thinking skills can support student academic achievement. The main characteristics of high-level thinking skills are critical and creative. The demands of the 2013 curriculum are to make students more critical and creative, so it is very important to practice high-level thinking skills in elementary school students.

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