

# The Enhancement of the Learning Achievement of Science in the Material of Human Organs Structure with Problem-Based Learning Method for the Fourth Graders of SD Negeri Botoputih Odd Semester in the Academic Year 2017/2018

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## Article History

Received : 02 – 08 – 2019

Revised : 05 – 10 – 2019

Accepted : 27 – 10 – 2019

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## Keywords:

human organs structure,  
Science subject, Problem-Based  
Learning method.

## Abstract

The purpose of this research is to enhance students' ability of science subject in the material of human organs structure with the problem-based learning method for the fourth graders of elementary school. This research is conducted with the fourth graders odd semester of SD Negeri Botoputih in the Academic Year 2017/2018 as the subject. Based on the result of classroom action research on the implementation of Problem-Based Learning Model to enhance the students' learning achievement of science subject in the material of human organs structure for the Fourth Graders of SD Negeri Botoputih Odd Semester in the Academic Year 2017/2018, it can be stated that the learning outcome of science subject in the material of human organs structure in the pre-cycle with a minimum score standard of 70 is not optimal yet. The data shows 22 students in total that there are 10 students with a percentage of 45.45% can complete and pass the minimum score standard. While 12 students with a percentage of 54.55% are failed. The cause is because of the lack of evaluation method in a science subject. The result of the first cycle shows that science subject in the material of human organs structure with a minimum score standard of 70 has not been optimal yet. The data shows 22 students in total that there are 17 students with a percentage of 77.27% can complete and pass the minimum score standard. While 5 students with a percentage of 22.73%. The result of the second cycle shows that science subject in the material of human organs structure with a minimum score standard of 70 is optimal and much better. The data shows 22 students in total that there are 22 students with a percentage of 100% can complete and pass the minimum score standard. Surely, there is nobody failed with a percentage of 0%

## 1. INTRODUCTION

The role of the teacher in the teaching and learning process is not only appearing as a teacher, but also having a role as a coach, a counsellor, and a learning manager. Teaching and learning process is the core in the educational process with the teacher as the main role holder. Moreover, the teaching and learning process deals with some actions from the educator/teacher and students on the basis of reciprocal relationship that happens in an educational situation to achieve a certain goal. Interaction or can be said as a reciprocal relationship between the teacher and students is a must as a major requirement

for the teaching and learning process. Interaction in the teaching and learning process has a wider meaning, not only the common relationship between the teacher and students but also in the form of educational interaction. In addition, not only about the delivered material but also the attitude and moral value for the students.

A learning model is basically a form of learning which is illustrated from the beginning to the end of the teaching and learning process that is typically carried out by the teacher. In other words, a learning model is a frame of the application of an approach, method, and learning technique or strategy

(Syamsudin, 2003). One of the learning models is Problem-Based Learning model which is an innovative learning model that can enhance students' activeness to learn something. Problem-Based learning is also a learning model that involves students to solve a problem through the stages of the scientific method so that the students can learn and gain knowledge related to the problem. In addition, they can have the skill to solve a problem.

In Problem-Based learning model, the focus of the study is on the chosen problem so that students are able to not only learn the concepts related to the problem but also the scientific method to solve the problem. Therefore, students not only have to understand the concept that is relevant to the problem but also have to gain learning experience which is related to the skill of applying the scientific method in problem-solving and gaining critical thinking skill.

There are several ways to apply the Problem-Based Learning model. In general, the application of this model is started with a problem that must be solved by students. The problem can be from students or can be from the teacher. Then, students will focus on learning about the problem. In other words, students learn theory and scientific method in order to find a solution and solve the problem.

Problem-solving in Problem-based learning method must be in accordance with the steps of the scientific method. Thus, students can learn to solve the problem systematically and planned. Therefore, the use of Problem-based learning can provide students with the experience of doing scientific work excellently. Then, the stages of problem-solving in Problem-based learning method (Pannen, 2001) are:

(1) Identifying the problem

In the first stage, students are given a problem taken from daily life. The statement of the problem is stated in some short sentences. However, it gives a few facts related to the context of the problem. Moreover, the statement of the problem is expected to provide opportunities for students to investigate it. Then, students try to understand and share knowledge with each other between group members related to the problem that is studied. The problem that is taken from real life is very useful for students to develop their ability to find the solution to solve it.

(2) Defining the Problem

The next stage is defining the problem. Students define the problem by using their own words. The problem is stated with a clear parameter. Then, students make several definitions as initial information that needs to be provided. In this step, students involve their initial intelligence and abilities in understanding and defining the problem.

(3) Problem-solving based on existing data and analysis.

In this stage, students need to reopen the experience that they have gained and the initial knowledge in order to gather some facts. Then, students involve their multiple intelligence to find out

some information related to the problem. This stage requires students to organize some information using the terms "what is known (know)", "what is needed (need to know)", and "what is done (need to do)". These terms are used to analyze the problem and to know some facts related to the problem.

(4) Choosing a way to solve the problem

In this stage, students can compile temporary answers or hypothesis about the problem by involving their logical-mathematical intelligence. Moreover, students involve their intelligence to express what they are thinking, making some connections, answering their hypothesis, and thinking about some logical steps.

(5) Planning the application of problem-solving

Students conduct an investigation of the data and information obtained with the focus on the problem. Then, students involve their intelligence in understanding and interpreting the information and facts that they are found. However, the teacher makes a learning structure that allows students to use various ways to know and understand (multiple ways of knowing and understanding) their worlds.

(6) Conducting a trial of the set plan

The sixth stage is conducting a trial of the set plan. Students need to refine the problem formulation by reflecting it through a real scheme that they understand. Then, students involve the intelligence to fix up the statement of the problem formulation by using more appropriate words. However, the reformulation of the problem is more focusing on the investigation and the clear information and facts that need to be found. In addition, it provides clear objectives in analyzing the data.

(7) Taking action to solve the problem

This last stage requires students to discuss some data and information which are relevant to the problem. Each group member in a group begins discussing the problem from various points of view. In this stage, the problem-solving process is in the stage of concluding alternative solutions which have been concluded from groups. Surely, it becomes a mediation to collect a number of alternative solutions to the problem as a much better alternative rather than if it is done individually.

The first four stages above are absolutely necessary for various categories of thinking levels. However, the next stages must be achieved if the teaching and learning process is intended to achieve higher-order thinking skills. Moreover, in solving some problems that are faced every day, all stages occur and roll by themselves likewise a person's skills must be able to reach all of these stages.

The step of identifying the problem is a very important stage in Problem-based learning method. The chosen problem in order to provide a learning experience that characterizes scientific work often becomes a problem for teacher and students. It means that the way how to choose the problem is less extensive and less relevant to the context of the

learning material. However, a problem that is very distorted with the students' thinking level can lead to not achieving the learning objectives. Therefore, it is very important to have a mentor by the teacher in this stage. Although the teacher does not intervene with the problem, he or she can make the problem to be the focus through some questions so that students are able to reflect more deeply on the chosen problem. In this case, the teacher must role as a facilitator so that the teaching and learning process remains on the teaching lesson plan.

One thing that is very important to note in Problem-Based learning is the question based on not only "how" but also "why". Therefore, at each stage in problem-solving, the students' skill in that stage is not only dealing with "how", but also the skill to explain the problem and how the problem can occur. Last but not least, the stages in the problem-solving process are used as a framework or guide in the teaching and learning process through Problem-Based learning.

Problem-Based Learning is one of the learning models which supports the principles of active learning. The learning principles stated by Sagala (2006: 54) are as follows: (1) Law of Effect. It is about when the relationship between stimulus and response occurs. Moreover, it is followed by satisfying circumstances. Then, the relationship is strengthened. (2) The Spread of Effect. It is about the emotional reaction that goes with a satisfaction which is not limited to the main source of satisfaction. However, it is about the satisfaction of getting new knowledge. (3) Law of Exercise. It is about the relationship between stimulant and reaction strengthened by the mastery and some exercises. Otherwise, the relationship is getting weak if it is practised and used. (4) Law of Readiness. It happens when the components in the nervous system are ready to conduct. Then, the relationship occurs and it will become satisfying. (5) Law of Primacy. It is the learning outcome that is obtained through the first impression. It will be difficult to be moved on. (6) Law of Intensity. It deals with an effort of learning to give a deep meaning when pursued through the dynamic activities. (7) Law of Recency. It is about "the newer of the material learned, the easier of the material to be remembered". (8) The phenomenon of exhaustion. It is a cause that becomes a significant concern in the teaching and learning process. (9) Belongingness. It is true that the interrelation of the material learned to the learning situation will make it easier to change behaviour and attitude. It is about the learning outcome that gives satisfaction during the teaching and learning process. To sum up, it can be concluded that this kind of process will enhance students' learning achievement.

Tirtonegoro (2001) says that "achievement is an effort that is done to the maximum, produces change, and is expressed in a form that shows the children of their ability to achieve work performance

within a certain time". Meanwhile, according to Hariyanto (2003), an achievement is what is created and obtained from the result of work and the pleasant result which is obtained by means a way of tenacity. Based on the result of the students' learning achievement of science subject in the material of human organs structure, there are 12 of 22 students who get the scores under the KKM (minimum score standard). It means that there are 54.55% of students who failed to pass the KKM. Based on the result of the problem analysis, the writer tries to provide an alternative problem solving which aims to enhance the students' learning achievement of science subject in the material of human organs structure through problem-based learning model for the Fourth Graders of SD Negeri Botoputih Odd Semester in the Academic Year 2017/2018.

This research is expected to enhance insight and knowledge in an educational environment, especially for the educator to know more about problem-based learning. Moreover, it can be as a reference for further research in the future. Then, the Practical Benefit for the Students is in relation to problem-based learning method. It is expected that students can understand more and better in learning science so that they can implement it both at school and at home. Then, the benefit for the teacher deals with the use of problem-based learning method. It is expected that the teacher is able to understand more and better about some learning methods and strategies which are varied. Last but not least, it is expected that the teacher can encourage students to implement what they get from the teacher in their everyday life.

## **2. RESEARCH METHODS**

### **a. Subject, Place, Time, and The Helpers of the research**

The subject of this research is the fourth graders odd semester of SD Negeri Botoputih in the Academic Year 2017/2018 which are 22 students. Then, the place used in this research is in class IV of SD Negeri Botoputih in the academic year 2017/2018. Moreover, the research is planned to be carried out in the odd semester on September to November 2018

### **b. The Design of Learning Evaluation and Improvement Procedure**

This research is expected to improve students' logical thinking abilities and give better benefits when the teaching and learning process is carried out. Moreover, the design of this research is carried out in 2 cycles.

### **c. The Technique of Data Analysis**

In this classroom action research (CAR), the data is analyzed since the learning action was carried out. Then, it is developed during the reflection process to the process of writing the report.

Moreover, critical descriptive analysis is used dealing with the continuity and depth in teaching data in this research. By using critical descriptive analysis, the writer describes some various weaknesses and strengths of the learning method used. Then, to know whether the method is effective or not, the data is gained as follows:

1) Research Data

Data is an important thing that is collected from the research. In this research, the data which is used is as follows:

- a) the students' learning achievement of science subject in the material of human's bones and five senses that is applied in the society
- b) The process of teaching and learning activity by using the Problem-Based Learning method with collaborative learning (grouping).

2) Source of the Data

Source of the Data is something that shows where the data is obtained. it can be obtained from students, teacher, interactions between teacher and students, place, event or activity where the teaching and learning process is carried out, and documentation.

Data in this research is obtained from the interaction between the teacher and students in the teaching and learning process about science. Moreover, the data is also in the form of learning action or learning behaviour that is resulted from the teaching process. Besides, the obtained data is collected as follows:

a) Observation Method

Observation is a technique that is done by doing observation accurately and systematically (Arikunto, 1998). The data collection through observation is carried out by the writer in a classroom that is used as the sample to get a real picture or scheme of teaching and learning process in the classroom.

b) Test Method

Arikunto (1998) states "test method is a series of questions and exercises or other tools that are used to measure skills, knowledge, intelligence, abilities, or talents possessed by individuals or groups". Thus, the test method is used as a research instrument in collecting data to know about the students who want to do the questions or exercises and who don't want to do the questions or exercises. The test used in this research is used to obtain the data about students' learning achievement both in cycle I and in cycle II.

c) Documentation Method

Documentation is a method for obtaining and knowing something through books and archives that are related to the research. Moreover, documentation is used to obtain the school data and the names of students in class 4 (fourth graders). Then, it is also used to get some photos during the research.

The performance indicators in this classroom action research are measured based on the following things: (1) The students' learning achievement or

score of science subject which is obtained by the students who pass the minimum score standard which is 70. (2) The activeness of students during the teaching and learning process is by following the learning objectives. (3) Students become interested and well-motivated in participating in the teaching and learning process.

### 3. RESULTS AND DISCUSSION

Problem-based approaches to learning have a long history of advocating experience-based education Hmelo-Silver (2004). Problem-based learning is a learning approach that uses real-world problems as a context for students to learn about the skill of critical thinking and problem solving as well as to obtain essential concept and knowledge from the subject matter. In conclusion, problem-based learning method is used to stimulate higher-order thinking skills level in a problem-oriented situation (Nurhadi, 2004). Problem-based learning is a learning method which the main feature is asking questions or problems, focusing on interdisciplinary linkages, authentic inquiries, collaboration, and resulting works (Ibrahim, 2000). In addition, Ismail (2004) states that problem-based learning method presents authentic and meaningful problems so that students can investigate and find their own problems. Savery (2015) stated that PBL is an instructional (and curricular) learner-centered approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem.

Problem-based learning is a learning process that requires students' mental activities to understand the concept of learning through situations and problems that are given at the beginning of learning. Problems given to students are problems that come in daily life (contextual). Thus, problem-based learning is designed in order to help students in developing their thinking skills and problem-solving skills. In addition, they also learn some important roles through their involvement in their real experiences. In problem-based learning, students are required to solve the given problems by digging up as much information as possible. Then, they analyze and find solutions to solve and overcome the problems. However, the solutions to these problems absolutely do not have only one correct answer. It means that students are also required to learn creatively. Moreover, students are expected to be individuals who are broad-minded and able to see the relationship of learning with some aspects that exist in their environment.

Research results from Sungur et al. (2006) revealed that PBL instruction caused a significantly better acquisition of scientific conceptions than the traditional instruction. PBL students appeared to be more proficient in the use and organisation of relevant information, in constructing knowledge and moving toward better conclusions. These findings

were in agreement with the literature. In their meta-analysis, Dochy et al (2003) showed that students in PBL has slightly less knowledge, but remembered more of the acquired knowledge and applied it more efficiently. Moreover, they reported that the effects of PBL are moderated by the way the knowledge and skills are assessed. Similarly, in the current study PBL students outperformed on the items requiring higher order thinking skills and could better use relevant information in addressing the problems, interpret information and use the principles to judge objectively. In fact, Krynock and Robb (1996) stated that PBL does increase higher-level thinking skills by requiring students to think about a problem critically and analyse data to find the solution. Nowak (2001) reported that the PBL increases critical thinking skills, problem solving skills, and decision-making skills. According to Karabulut (2002), PBL creates an environment in which students actively participate in the learning process, take responsibility for their own learning, and become better learners in terms of time management skills, ability to identify learning issues and ability to access resources.

In the face of the data collected and the evaluations made in the research by Akınoğlu & Tandoğan (2007) it was determined that the implementation of problem-based active learning model had positively affected students' academic achievement and their attitudes towards the science course. It was also found that the application of problem-based active learning model affects students' conceptual development positively and keeps their misconceptions at the lowest level.

From the data result, it can be known that the problem-based learning method can enhance students' learning achievement of science subject especially in the material of human organs structure. Therefore, the importance of Problem-Based Learning in the teaching and learning process needs to be known by educators in order to be able to take various forms of action or help to students. Last but not least, Problem-Based Learning is able to enhance the learning achievement of science subject in the material of human organs structure for the fourth graders of SD Negeri Botoputih.

It shows that the use of a good method and in accordance with the learning objectives is one of the strategies that can be used by a teacher to encourage and foster students' learning achievement. Thus, it means that it can be used to answer the action hypothesis. The action hypothesis is proved that problem-based learning method can enhance the students' learning achievement of Science related to the material of decision making for the fourth graders of SD Negeri Botoputih.

The result of learning in the pre-cycle of science subject in the material of human organs structure with a minimum score standard of 70 is not optimal yet. Then, in the pre-cycle it can be known from the total 22 students that there are 2 students

who get score of 50, 3 students get score of 65, 6 students get score of 70, 3 students get score of 75, and a student gets score of 80. Therefore, a percentage is 45.45% for the students who are able to pass or complete the minimum score standard and 54.55% for the students who are failed. It is assumed that students who get low scores are because of the lack of evaluation in teaching and learning science methods.

Then, the result of the first cycle (cycle I) shows that the students' learning achievement of science subject in the material of human organs structure with a minimum score standard of 70 is not optimal yet. Therefore, in the first cycle, it can be known from the total 22 students that there are a student who gets score of 60, 4 students get score of 65, 6 students get score of 70, 3 students get score of 75, 2 students get score of 80, 2 students get score of 85, 2 students get score of 90, and 2 students get score of 95. Therefore, a percentage is 77.27% for the students who are able to pass or complete the minimum score standard and 22.73% for the students who are failed. It is assumed that students who get low scores is because of the lack of evaluation in teaching and learning science methods.

Next, the result of the second cycle (cycle II) shows that the students' learning achievement of science subject in the material of human organs structure with a minimum score standard of 70 is being optimal after some evaluation and improvement from the previous cycles. Then, in the second cycle it can be known from the total 22 students that there are a student who gets score of 70, 4 students get score of 75, 5 students get score of 80, 3 students get score of 85, 4 students get score of 90, 2 students get score of 95, and 2 students get score of 100. Therefore, a percentage is 100% for the students who are able to pass or complete the minimum score standard and 0% for the students who are failed.

#### **4. CONCLUSIONS AND RECOMMENDATIONS**

The result of this research shows that in order to enhance the students' learning achievement in learning science, problem-based learning method is used. The use of problem-based learning method can make interaction between the teacher and students and between students and students. Moreover, it can be seen from the discussion that appears and runs in the classroom that students are more active in expressing their opinions, in asking questions to the teacher, and having more arguments and opinions. Then, the improvement of students' learning achievement can also be seen from the result of the research.

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Last but not least, the result of the second cycle (cycle II) shows that the students' learning achievement of science subject in the material of human organs structure with a minimum score standard of 70 is being optimal after some evaluation and improvement from the previous cycles. Then, in the second cycle it can be known from the total 22 students that there are a student who gets score of 70, 4 students get score of 75, 5 students get score of 80, 3 students get score of 85, 4 students get score of 90, 2 students get score of 95, and 2 students get score of 100. Therefore, a percentage is 100% for the students who are able to pass or complete the minimum score standard and 0% for the students who are failed.

After doing a research, the writer wants to offer some suggestions. The suggestions that can be given are as follows:

a. For Teachers

Teachers need to apply problem-based learning method in teaching and learning science because this learning method can enhance the students' learning achievement.

b. For the other researchers

Further research needs to be carried out in order to determine the effectiveness of learning by using problem-based learning model as a way to improve students' learning achievement by modifying the research design. As example is by doing an experimental study in the teaching and learning process. Moreover, by doing experimental study students are given opportunities to experience, do, follow the process, observe an object, analyze, prove, and draw conclusions by themselves about an object, state, and process of something. Thus, students are required to experience it by themselves,

look for the truth or try to find a law or proposition, and draw conclusions or the process they have done.

c. For Schools

Schools surely need to provide adequate facilities and infrastructures so that the teaching and learning process in schools can run well.

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