

## **Implementation of Problem Based Learning Model to Improve Students' Problem Solving Skill and Self-Efficacy (A Study on IX Class Students of Smp Muhammadiyah)**

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**Abstract:** This study aims to know (1) the improvement of students' problem solving skill by the implementation of PBL model, (2) the improvement of students' self-efficacy by the implementation of PBL model. There are 22 people as the study subjects. The data collected in this study is the data on students' problem solving ability and self-efficacy. The data is collected by distributions of test, observation and questionnaires, the data is analyzed by Class Action Research. The study results show (1) the implementation of PBL model can improve the students' problem solving skill where in the 1<sup>st</sup> cycle, it is 69%, in the 2<sup>nd</sup> cycle, it is 73%, (2) the implementation of PBL model can improve the students' self-efficacy where in the 1<sup>st</sup> cycle, it is 61%, in the 2<sup>nd</sup> cycle, it is 43%. The study results show that the implementation of Problem Based Learning (PBL) model can improve the students' problem solving skill and self-efficacy.

**Keywords:** problem based learning, problem solving skill, self-efficacy

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### **I. Introduction**

Today, the curriculum development focuses on students competencies, including attitude, knowledge, skill competencies which will give basic learning experiences including observation, asking, collecting information, association and communication. This has changed the old paradigm saying that in the learning process, the most dominant one is the teacher, the teacher explains concepts informatively, gives problem examples, then gives exercise items. The students tend to be passive, so in the case, the learning cannot develop the students' skill in problem solving.

Students requires the problem-solving skill. The problem solving is done to assist individual in facing any changes and adjustments in life [1]. Ellison [2] stated that regular practice and teaching strategies on problem-solving skill will improve students' problem-solving skill. This will result in students' ability to resolve similar or different problems appropriately because they obtain concrete experience from previous issue [3]. One of students' experiences in managing a problem is by the implementation of *problem based learning*. In PBL, students learn to solve problems reflecting their experiences [4]. In this process, students must also apply their existing knowledge and skills, or find the necessary and relevant knowledge to the problem [5]. PBL is also a student-centered approach in which students determine what they need to learn. The students acquire the key issues from the problems they face by themselves, then explain their knowledge gaps, pursue and acquire the missing knowledge [6] and [7].

If the terms of type of problems solved, Kirkley [8] mentioned that there are three types of problems, namely: (1) *well structured problems*, (2) *moderately structured problems*, and (3) *ill structured problems*. The strategy to solve well structured problems can normally be expected, having one correct answer, and all of the initial information is usually part of the problem statement. The moderately structured problems often have more than one suitable solving strategies, have one correct answer, and still need additional information to solve. The ill structured problems have unwell-defined and unpredictable solutions, have many perspectives, many purposes, and many settlements, and still need additional information to complete.

PBL is well-suited to help students to become active learners because it puts the learning in real-world problem and make students be responsible for their learning. It has a dual emphasis namely to help learners develop strategies and build knowledge [9], [10], [11], and [12]. These lead to students' ability to learn to think critically in analyzing and solving a problem. Students with critical thinking are students with ability to identify, evaluate, and construct an argument and ability to solve problem appropriately [13]. Students who think critically will be able to help themselves or others in solving the problems faced, will indirectly increase students' confidence because they are able to actualize their potentials. If someone has confidence in social arena, so he or she will not be anxious and will be more comfortable with himself and is able to develop behavior in social situations [14]. It is said that people with a high degree of confidence can control their destiny, not as individuals with a low level of confidence, they can be controlled by others [15] and [16].

Based on observations conducted, it is found that in SMP Muhammadiyah 4 in Malang, particularly in IX class, there is lack of students' problem-solving skill and self-efficacy. When teachers ask for questions in analyzing or *ask about thinking*, the students tend to answer the question directly by quoting from literature books without expressing their own opinions. The students also tend to be shy and not confident, show fear, anxiety in facing something and do not get excited during the learning. They have a habit of cheating. They often do not complete the homework assignment given. They often give no response when given the opportunity to ask. Also, they have no effort to compete with friends at class. These are the behavior due to the low level of problem-solving ability and self-efficacy in learning, so these will impact on the value obtained in the study.

The low level of confidence relates to the learning process, such as low achievement and this relates to students' background which average student are from families with middle class economy. Their parents on the average give less attention and have no care in terms of education. Suarni [17] stated that, in the life, human behavior is influenced by two major factors, namely internal factors and external factors. The internal factors are all things within the students such as; attention, intelligence, motivation, attitude, thought, memory, confidence, interest, aptitude and personality. The external factors include the community, family and school. So the family serves a very important role in shaping students' self-efficacy.

The implementation of PBL model can help students to be more aware of teaching material, encourage to be able to solve problems, and can motivate students to learn. The proponents of PBL believe that the investigation and resolution on real-world problems will motivate student engagement. They find that the students engaged in PBL will establish the critical thinking pattern, creative thinking skills, and learning in terms of independent leadership skills [18]. PBL is designed with several important purposes [19]. PBL is designed to help students, (1) establish broad and flexible knowledge base; (2) develop effective problem-solving skill; (3) improve independence, as a lifelong learning skill; (4) be an effective collaborator; and (5) be motivated to learn.

The final aim of PBL is to help students become intrinsically motivated. Students are also more motivated when they believe that the learning outcomes are under their control [20] and [21]. Students are more motivated when they appreciate what they have learned and when their learning activities engage in significance personal tasks [22] and [23]. Based on this background, this study aims to improve the students' problem solving skill and self-efficacy by the application of *Problem Based Learning* (PBL) model in IX class SMP Muhammadiyah4 Malang.

## **II. Research Methods**

Mettetal[24] stated that class action research is a method to find out the best thing in a classroom so that teachers can improve the student learning. To maximize the student learning, teachers must find out the best thing in a particular situation. Shortly, teachers jointly (1) develop an action plan, (2) act (3) observe individually and (4) conduct reflection. Then, the teachers jointly redraft the plan based on more complete and more critical information. These are the four principal aspects in the action research [25].

The details of PTK cycle designed by the researchers consist of two cycles. The first cycle includes four phases, namely planning stage, in this stage, there are an action plan preparation by preliminary observational, identification on the existing problems in research sites, preparing pre-test and post-test items as an evaluation tool of PBL model learning outcomes and making test on solving problem skill, self-efficacy test, observation sheet of teaching activities by teachers and questionnaire containing students' responses on the learning process of PBL model. In the action implementation phase, the researchers act as teachers conducting the learning process by using PBL model. The learning is conducted based on the Learning Implementation Plan (RPP). In the observation phase, it aims to determine the process of action implementation by the researcher. At this stage, there is an evaluation on students' problem solving skill, students' self-efficacy, and students' responses on PBL model by filling on the questionnaires and observation sheets.

At the reflection stage, it is conducted an analysis on research process and its action impacts. The findings of the action implementation in I stage are also conducted in this stage. The reflection stage aims to determine the research goal achievement during the action implementation, if there are weaknesses and deficiencies in the actions, so it there will be improvement in second cycle. The activities conducted in the second cycle are principally similar to the ones in I cycle. In this cycle, the actions taken are actions as refinement of the first cycle so that there are improvement for the actions in the second cycle; in other words, it is able to achieve the planned and implemented goals in this study. Then at the end of the second cycle, there is a reflection as the final activity to formulate results from all activities.

The data are collected by tests including problem solving test as multiple choice questions given at the beginning of the cycle (pre-test) and the end of the cycle (post-test). Both tests aim to measure the students' ability after there are material concept and actions. There is question guideline using Bloom's Taxonomy which Bloom divides the students' learning achievement in cognitive domain into six levels, namely knowledge, comprehension, application, analysis, synthesis, and evaluation [26].

The following test is problem-solving skill test with aim to measure the students' problem-solving skill. The test is made by adopting *problem solving inventory*. The problem solving subjects are assessed by *problem solving inventory*[27], consisting of 32 self-measuring items. Then, to determine the students' confidence level during the learning process, there is self-efficacy test by adopting a scale of self-efficacy measurement created by Lauster[28], there are 32 items. The data collection is using an observation with aim to see the teachers' activities in the learning process and to determine the students' response on the learning process by PBL models. It is then analyzed using Likert scale, because Likert scale is commonly used to measure one's attitudes, opinions, and perceptions [29]. Likert scale is composed of 5 response options, namely strongly agree (SS), agree (S), doubtful (RR), disagree (TS), and strongly disagree (STS). Each option has a feedback score; 5 score is for SS selection; 4 score is for S selection; 3 score is RR selection; 2 score is for TS selection, and 1 score is for STS selection.

### **III. Research's Result and Discussion**

This classroom action research is conducted in two cycles, which each cycle consists of two meetings held from January 19<sup>th</sup>, 2016. The learning implementation is based on the lesson plan, but in the learning process, it is still found students who are not active overall, where there are still students making jokes and passive students in the learning implementation. The research findings in the first cycle show that there is improvement result from the students' pre-test to the post-test seen from the problem-based question results. The average percentage of students' problem-solving test results increases of 54% from the pre-test of 14% to 68% in the post-test in I cycle. For the average percentage, the students' problem-solving skill is 69% in I cycle.

The self-efficacy test is made to know the students' confidence level during the learning process. The self measuring items is by adopting a measurement scale of self-efficacy created by Lauster, namely 32 items. Based on the self-efficacy test results, the average percentage of students' self-efficacy is 61% at the end of the first cycle, showing that the students often feel less self-efficacy on their ability. The findings from the implementation in the second cycle show an improvement of pre-test results post-test results. The average percentage of students problem-solving test results increases by 9% from the pre-test, namely it is 86% increasing to be 95% on the post-test in II cycle. The percentage of students' problem solving skill increases by 4% to be 73%, indicating that the students are better trained in facing the problems in everyday life so that the students will try to find the best solution.

In the second cycle, the average percentage of students' self-efficacy is 43%. Based on the score processing on the negative score from self-efficacy scale, it shows that the lower percentage of students' self-efficacy, the increasing the students' self-efficacy. There is an increasing self-efficacy because the PBL model is able to develop the students' confidence so that the students can adapt to its environment, considering the best option and make own decision that they are able to do something appropriately.

#### **3.1 The Implementation of PBL Model Can Improve The Students' Problem Solving Skill**

By the implementation of PBL model in this study, it is proven to be able to improve students' problem solving skill in I cycle and II cycle. This has similar opinion with Hmelo[30] saying that rationally, to encourage students to develop flexible knowledge and effective problem-solving skill, so the teachers should present the learning in contexts taking the use of problem-solving skill. Because the problem-based learning (PBL) is a learning period with a problem-solving skill in real life, this will help the students to acquire knowledge and skill needed in workplace [31]. Students will be able to build new knowledge when they can relate anything to what they already know [32].

To get better understanding on what is meant by problem solving, seeing closer to nature of problem will be very useful, because one indicator of effective problem-solving skill is the ability to transfer reasoning strategies for new issues [33]. Also, when any situation requires more thinking, then problem solving must be used [34].

The measurement of problem solving skill in this study is using *problem solving inventory* (PSI), here, the subjects respond on PSI by reflecting behavior and attitudes commonly related to the successful problem solving. They are also likely to assess themselves as better problem solvers and they are more satisfied with their solving problem skill [35]. Attle and Baker [36] stated that to maximize the students' skills, they must cooperate in dealing with solving problems they face by active participation in group in a competitive environment.

#### **3.2 The Implementation of PBL Model Can Improve Students' Self-efficacy**

The implementation of PBL model also improve students' confidence. There is still low students' confidence on the implementation of the first cycle, then there is an increase in the second cycle where most of the students already have high confidence. This is well-suited to the Dunlap statement, [37] stating that the collaborative process in PBL provides explicit feedback to students on their performance, functions as a source

of information to enhance the *self-efficacy* development. Self-efficacy is a competence assessment in a specific context to perform certain tasks, concerning one ability to present certain behaviors in certain situations [38]. Dunlap [39] showed that the quality based on the learning experiences project will directly impact on the students' self-efficacy. Therefore, the development of students' self-efficacy can be resulted from participation in PBL which can be observed directly.

The self-efficacy is an individual efficacy and self-assessment levels on the ability to organize and conduct necessary actions to work more effectively [40] (Schunk, 1989a). Because the use of PBL is a practical activity driving the students to learn, the students engaged in PBL environments must have experience performance affecting on overall on their self efficacy[41]. The belief in self-efficacy will motivate the use of students' learning strategies [42].

#### IV. Conclusions and Recommendations

Based on this research, it can be concluded that the implementation of PBL models can improve students' problem solving skill in IX class SMP Muhammadiyah 4 Malang. The students can assess their own ability as better problem solvers because in the model PBL, the students have to find solution and they also will be trained in dealing with problems, because the problems presented in the learning process reflect their real problems faced in everyday life. By continuous practices, the students' problem-solving skills will be more honed.

The implementation of PBL model can also improve students' self efficacy from the first cycle to the second one. This indicates that the students have developed the skill to adapt to their surroundings and be able to possess self control, this can be seen from the appearing students' courage to give opinion, the ability to think positively, and the self efficacy in communicating at class. The students are also more enthusiast to the implementation of PBL model in learning process, because it creates more interesting and not boring learning activities, the students can freely express their opinions and discussions resulting in brainstorming, the students can learn by more discipline and can work with other students in group so that the students are being active in learning.

Despite, teachers still have to maximize its function as facilitators and mediators, provide clear guidance to students regarding the implementation of PBL models so that the discussion will still be directed to the subject matter.

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