

# Improving Problem Solving Skills Through Problem-Based and Problem-Solving Learning Models Viewed From Cognitive Style in Social Science Learning

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**Abstract**— This study aimed to examine (1) the significance of the difference in the influence of problem-based and problem-solving learning models for solving problems in social studies learning in Yogyakarta State Junior High School, (2) the significance of the difference in the influence of field-dependent and independent cognitive styles to solve problems in social studies learning in Yogyakarta, and (3) the significance of the interaction of influence between learning models and students' cognitive styles on problem solving skills in social studies learning in Yogyakarta State Junior High Schools. This study used a quasi-experimental quantitative approach with a 2x2 factorial design. The subjects of this study were two learning groups, namely class VIII E of State Junior High School 2 Yogyakarta who learn to use the problem-based learning model and class VIII G of State Junior High School 16 Yogyakarta who learn to use problem-solving learning model. The results of this study indicate (1) there is no significant difference in the influence of problem-based and problem-solving learning models on improving problem-solving skills in social studies learning in Yogyakarta State Junior High School with a significance value of  $0.117 > 0.05$ , (2) there is no significant difference in the influence between field-dependent and independent cognitive styles on improving problem-solving skills in social studies learning in Yogyakarta State Junior High Schools with a significance value of  $0.332 > 0.05$ ; and (3) there is no interaction in the influence of the learning models and cognitive styles on improving problem-solving skills in social studies learning in Yogyakarta State Junior High School with a significance value of  $0.117 > 0.05$ .

**Keywords:** *problem-based learning, problem-solving learning, social studies*

## I. INTRODUCTION

A Problem-solving skill is a high-level of competence as a basic capital in social life and is a fundamental part of soul maturity. As Holmes said that "people who are skilled at solving problems will be able to race to fulfill their needs, become productive workers, and understand complex issues local or global society" [1].

One of the means to create skilled human resources in solving problems is through the education process. The government always strives to improve the quality of education in the form of issuing regulations related to curriculum development, namely Regulation of the Minister of Education and Culture of Republic of Indonesia Number 58 of 2014 article 1 concerning 2013 Curriculum of Junior High Schools/Madrasah Tsanawiyah. The 2013 curriculum aims to have students with better

skills to: (1) observe, (2) ask questions, (3) collect information, (4) associate, and (5) communicate.

Related to these objectives, the 2013 curriculum mandates the application of a scientific approach in learning, which following the Minister of Education and Culture Regulation No. 103 of 2014 concerning learning in Elementary and Middle School by using a scientific approach. Learning with a scientific approach is a learning process that is designed to make students actively develop concepts, laws or principles through the following stages: (1) observing (to identify or find problems), (2) asking questions related to the results of the observation, (3) collecting information with various techniques, (4) analyzing data or associating, then drawing conclusions logically, and (5) communicating what is "discovered" [2].

One of the subjects in junior high school that can be a means of scientific thinking is Social Studies. Social studies are integrated learning from several scientific disciplines, including geography, sociology, history, economics, and anthropology which are packaged in certain themes. Social studies and scientific learning have mutually supportive goals - which can facilitate students' problem-solving skills. Research on the Scientific Approach Model of Learning Social Studies for Improving Learning Quality showed that social studies subject to a scientific approach is more effective than using traditional learning [3].

Social studies learning using a scientific approach is expected to be able to guide students in solving social problems. The need for social studies learning is not just to get high scores in examinations, but students are also more able to solve problems so that students will also be able to think systematically, logically, and critically in solving life problems in society. The result of Maryam's research revealed that "The process of problem-solving is one of the important elements in solving real-life problems" [4].

The process of solving problems between one student and another student is different. Therefore, teachers must realize that each student has a different style in solving the problems. One of the students' characteristics that must be considered in choosing and implementing a learning model is the difference in students' cognitive styles [5]. Thus, the position of cognitive style in the learning process cannot be ignored. Involving cognitive style is very important for problem-solving since students who have different

cognitive styles can use different strategies to solve the same problem [6].

Cognitive style is very closely related to how to receive and process all information, especially in social studies learning. The results of research conducted by Ngilawajan showed that there were significant differences between subjects with different cognitive styles in understanding the problem [7]. Related to this, it can be understood that students do not learn from the way we teach; hence, we need to teach them the way they learn [8]. Understanding the process of students' thinking is very significant to be considered, so that the teacher can easily design appropriate learning and can develop students' problem-solving skills.

Given the importance of problem-solving skills for students, the teacher needs to continually strive to innovate learning strategies so that students are not only able to remember the material but can think and apply it to solve problems in their daily life. For this purpose, it is very necessary for learning models that can shape problem-solving skills of students with different cognitive styles. The selection of the right learning model is expected to improve the quality of learning. The government recommends using a scientific approach in learning.

In its practice, scientific approach can be combined with several learning models. Several learning models that are considered in line with the principles of scientific approach which contain 5M activities (observing, asking, gathering information, associating, and communicating), and some of them are problem-based and problem-solving learning models [9]. Both of these learning models teach students to recognize problems, formulate problems, find solutions, and draw conclusions and present verbally or in writing. Through a scientific approach, students do not only get knowledge, but they will also get the skills and attitudes needed in everyday life.

Based on the description above, problem-based and problem-solving learning can be two appropriate learning models to observe students' problem-solving skills in social studies learning. Although there have been many studies on problem-based and problem-solving learning, but there were many pieces of research done on the effectiveness of problem-based and problem-solving learning models – that develop problem solving skills in terms of the students' cognitive style in social studies learning. This indicates that the problem-solving skills in social studies learning needs to be optimized and further investigated. To test the effectiveness of these learning models an experimental study was conducted.

## II. LITERATURE REVIEW

Problem-based learning model is a learning strategy designed to provide solutions and improve learning by requiring students to learn subject matter while solving problems [10]. This is a previous research about the effect of the problem-based learning model to solve the problem written by Siswanto et al. with a quasi-experimental design of the pretest-posttest control group. The study found that there is a significant effect of the application of the problem-based learning model to problem-solving

abilities. It was indicated by the value of  $P < \alpha = 0,000 < 0.05$  [11].

Problem-solving learning model is also a learning model that makes the problem as the main issue. In using problem-solving, students will be able to solve problems that exist in their environment by constructing students' initial knowledge with new knowledge found in groups [12]. The results of Mahilda's research, et al. about the effect of problem-solving learning models on the ability to solve problems showed that there is an effect of using problem-solving models on problem-solving abilities. It was indicated by the difference in the average posttest score with the pretest (O2 –O1) average score of 38.04. The influence of the problem-solving model on problem-solving ability is 2.89 with a high category [13].

Cognitive styles describe the information processing habits representing the learner's typical mode of perceiving, thinking, problem-solving and remembering [8]. The results of research conducted by Ngilawajan showed that there were significant differences between subjects with different cognitive styles in understanding the problem [14].

## III. METHODOLOGY

This study used a quasi-experimental quantitative approach with a 2x2 factorial design. Three variables were consisting of two independent variables namely learning models (X1) and cognitive styles (X2), and the dependent variable (Y), namely problem-solving skill. The population in this study were students of the State Junior School in Yogyakarta. The sampling was done randomly, and State Junior School 2 Yogyakarta and State Junior School 16 Yogyakarta were chosen. The choice of learning models was also determined randomly, which selected State Junior School 2 Yogyakarta with problem-based learning and State Junior School 16 Yogyakarta with problem-solving learning. Data collection used the Group Embedded Figures Test (GEFT) to classify students who are classified as field-dependent and independent cognitive styles, as well as written tests to determine students' problem-solving skills after learning with problem-based and problem-solving learning models. Testing the hypothesis used a Two-Way Variant Analysis (ANOVA).

## IV. RESULT

This study tested differences in learning models for problem-solving skills, differences in cognitive styles towards problem solving skills, and interactions between learning models and cognitive styles. The average problem-solving skills for each group to be compared is shown in the following table.

TABLE I. AVERAGE PROBLEM SOLVING SKILLS  
Source: data processed, 2019

Learning Model \ Cognitive Styles	Problem Based Learning		Problem Solving	
	Pre test	Post test	Pre test	Post test
Field Dependent	57,69	82,05	66,37	83,01
Field Independent	66,89	82,74	67,54	75,88
Total	62,29	82,48	66,91	77,94

### A. Normality Test

One of the conditions that must be met is the residual data used in normal distribution. The normality test was carried out using the Kolmogorov-Smirnov test. The normality test provides information that the residual data have a significance value greater than alpha, which is  $0.177 > 0.05$ . Based on these results, it is concluded that the residual data are normally distributed.

### B. Homogeneity Test

Once it is known that the residual data is normally distributed, it was continued by conducting another analysis requirement test, namely the homogeneity test. Homogeneity of data that needs to be tested is the posttest value obtained after the experiment ends. The homogeneity test was performed using Levene's Test. Through the homogeneity test, it can be known that the significance value is greater than alpha, which is  $0.404 > 0.05$ . Thus, it can be concluded that the posttest value has the same or homogeneous variant.

### C. Hypothesis Test

The analysis prerequisite tests that have been carried out produce normal distribution data and come from the same variant (homogeneous). Then the hypothesis test used a Two-Way Variant Analysis (ANOVA). An overview of two-way ANOVA calculations is presented in the following table.

TABLE II. OVERVIEW OF TWO-WAY ANAVA

Data	Sig.	Explanation
Learning Model	0.117	There's no difference
Cognitive Styles	0.332	There's no difference
Learning Model * Cognitive Styles	0.151	There's no difference

The two-way ANOVA calculations can be seen in the appendix. Based on the calculation results as listed in table II, it is obtained that:

1.  $H_{0A}$  cannot be rejected since the significance value is greater than alpha, which is  $0.117 > 0.05$ . This means that there is no significant difference in the influence between problem-based and problem-solving learning models towards problem-solving skills in social studies learning.
2.  $H_{0B}$  cannot be rejected as the significance value is greater than alpha, which is  $0.332 > 0.05$ . This means that there is no significant difference between the field-dependent and independent cognitive styles of problem-solving skills in social studies learning.
3.  $H_{0AB}$  cannot be rejected because the significance value is greater than alpha, which is  $0.117 > 0.05$ . This means there is no interaction of influence between learning models and cognitive styles together on the problem-solving skills in social studies learning.

## V. DISCUSSION

### A. There is no difference in Learning Models towards Problem-Solving Skills in Social Studies Learning

The results of the two-way ANOVA test showed that  $H_{0A}$  cannot be rejected, which means there is no

difference in the model of problem-based and problem-solving learning models to the students' problem-solving skills in social studies learning. So, it can be concluded that the two learning models, there are problem-based and problem-solving learning models, are each effective in improving problem-solving skills. Looking at the pretest and posttest scores in table I, improvement in problem-solving skills does occur in students of problem-based and problem-solving groups. The results of this study were strengthened by research conducted by Hardy et al. [15]. Research conducted by Hardy obtained a significance value for learning strategies amounting to  $0.986 > 0.05$  so it can be concluded that there is no difference in the average score of students' problem-solving skills that is influenced by learning strategies.

The effectiveness of the problem-based learning model can be proven by the Wilcoxon test results on the pretest and posttest value data. Wilcoxon testing results in significance values is smaller than alpha, which is  $0.000 > 0.05$ . This proves that there are significant differences between the pretest and posttest scores of problem-based learning groups. So, it can be concluded that there is a significant influence on the application of problem-based learning models for improving students' problem-solving skills in social studies learning.

The problem-solving learning model can also be proven effective by the results of the Paired Sample T-Test on the data of the pretest and posttest values. The test reported a significance value lower than alpha, which is  $0.001 < 0.05$ . This proves that there are significant differences between the pretest and posttest scores of problem-solving groups. Thus, it can be concluded that there is an effect of the application of the problem-solving learning model for improving students' problem-solving skills in social studies learning.

Thus, problem-based and problem-solving learning models are similar one another. The problems presented in the problem-based learning model are real problems that occur in the society, while the problems presented in the problem-solving learning model are problems that are not real or do not occur around students. The problems presented in learning make students feel challenged to learn and work together to solve problems. These problems stimulate and guide students independently in the investigation and discussion until students understand a learning material. Students can use their background knowledge and seek new knowledge to solve problems, so that they will be more enthusiastic in learning.

### B. There is no difference in Cognitive Styles towards Problem-Solving Skills in Social Studies Learning

The two-way ANOVA test indicated  $H_{0AB}$  cannot be rejected, which means there is no difference in cognitive style towards problem-solving skills, both in the problem-based group or problem-solving group. This result is not following the hypothesis that has been formulated previously, namely there are significant differences in cognitive styles on the ability of problem-solving in social studies learning. So, there is no need to compare the categories of students' cognitive styles. The results of this study are strengthened by the findings of Suparman which states that the cognitive style of the field-dependent and

independent categories does not affect the learning outcomes of students [16].

There is no significant difference between the field-dependent and independent cognitive styles due to the limitations of this study which are unable to control other variables outside the students' cognitive style. One of them is filling in a dishonest GEFT test that is possible to be the reason of less accurate cognitive style data. Factors that influence the ability to solve problems consist of external and internal factors. In this study, researchers cannot control all the factors that influence the ability to solve problems, such as family factors, intelligence factors, environmental factors, economic factors, and others. In addition, students also cannot utilize their abilities in overcoming problems.

*C. There is no interaction of Influence between the Learning Models and the Students' Cognitive Style on the Problem-Solving Skills in Social Studies Learning*

The interaction in this study means the cooperation of two variables in influencing the dependent variable. Interaction occurs when an independent variable has different effects on a dependent variable at various levels from another independent variable. Based on the results of hypothesis testing, it can be concluded that  $H_{0AB}$  cannot be rejected, which means there is no interaction of influence between learning models and cognitive styles on students' problem-solving skills in social studies learning. Thus, the self-learning model influences problem-solving skills, so the cognitive style of working alone affects problem-solving skills. The accuracy of the research results of this study are strengthened by the findings of previous studies, Kasim stated that there is no influence of strategies with cognitive style on problem solving abilities [17].

This indicates that the learning models and cognitive styles together do not contribute to students' problem-solving skills. The results of this study provide information that the learning model has its impact on students' problem-solving skills. The Cognitive style of the field-dependent and independent do not give a different effect on students' skills. Based on the description of various theories and research findings, it can be concluded that there is no interaction in influence of the learning models and cognitive styles towards problem-solving skills.

## VI. CONCLUSION

The results of this study indicate (1) there is no significant difference in the influence of problem-based and problem-solving learning models on improving problem-solving skills in social studies learning in Yogyakarta State Junior High School with a significance value of  $0.117 > 0.05$ , (2) there is no significant difference in the influence between field-dependent and independent cognitive styles on improving problem-solving skills in social studies learning in Yogyakarta State Junior High Schools with a significance value of  $0.332 > 0.05$ ; and (3)

there is no interaction in the influence of the learning models and cognitive styles on improving problem-solving skills in social studies learning in Yogyakarta State Junior High School with a significance value of  $0.117 > 0.05$ . The further researches are needed to test the effectiveness of the problem-based learning model and problem-solving by involving other aspects as controls, such as cognitive style, adversity quotient, locus of control, and others.

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