

# The Development of Problem-Based Learning Grounded from Cognitive Learning Theory: Improving Students' Creative Thinking Skills

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**Abstract.** The problem under study is the students' low creative thinking ability. The objective of the study is developing problem-based learning grounded from cognitive learning theory to improve students' creative thinking skills, particularly students in social studies. Accordingly, the study employed research and development involving exploratory and quasi-experimental methods, the non-equivalent control group pretest-posttest design. The subject of the research was six schools: four public and two private Junior High Schools. The data collection was in the form of tests, observations, and focus group discussions. Meanwhile, the analysis of data acquisition techniques used quantitative and qualitative approaches (qualitative processing was to measure the effectiveness of the learning process and students' achievement in creative thinking skills which based on the result of observations). The study obtained a learning model, learning tools such as syllabus, lesson plan (RPP), learning materials, observation sheets and creative thinking skills tests. These things can be used in the subject of social studies, Junior High School. The study revealed that the development of problem-based learning grounded from cognitive learning theory could improve students' creative thinking skills.

**Keywords:** Problem-Based Learning; Cognitive Learning; Creative Thinking Skill

## 1 Introduction

Transferable skills are defined as an ability that developed in one situation and can be transferred to another. In this case, learning condition in the classroom to real life situation [1], for example, the ability to think creatively.

Creative thinking is a cognitive mental activity to generate and develop new ideas as the development of pre-existing ideas. This is to make a decision in overcoming problems. We notice that the progress in various areas of life is due to humans' creative thinking that eventually be beneficial for life. This statement shows that the creative thinking activity certainly need to be developed through educational field. If a person is accustomed to think creatively, he will easily express various ideas to find the right solution to the problems he encountered. Besides, he will easily adapt to various life crises. Accordingly, educators need to develop students' creative thinking skills. Thus, when students are graduated from school, these abilities can be a provision living in society

Based on the observations done in several junior high schools, Kuningan Regency, and based on the results of the pre-research done by the researchers, it was found some students with low creative thinking skills. This can be seen from the number of students who did not pay attention to the teaching and learning process and the difficulty in following and expressing their opinions in discussion or questioning activities. In addition, it was also found that the students could not relate the materials received. In details, the researchers present the result of pre-research, the creative thinking skills of the eighth graders in Kuningan Regency as follows:

**Table 1.** The Results of Pre-Research on Creative Thinking Ability of the Eight Graders in Kuningan Regency

Category	Aspect	Minimum Criteria of Mastery Learning (KKM)	Average Score
Low	Creative Thinking Skills	75	70

Table 1 showed that the average score for Students' creative thinking is still below the minimum criteria of mastery learning (KKM). This indicates that students' creative thinking abilities are still relatively low. This is due to several factors such as the teacher's habit of one-way materials presentation. Thus, the students could not explore and solve the problems independently related to social studies. The learning process is only directed at the students' ability to memorize and receive information without directly involved in the process of understanding the information. For example, connecting the knowledge gained to their daily lives.

The low creative thinking ability is caused by the lack of effort in shaping and inculcating the act and thinking habits from an early age. School as the main and fundamental education for individual development lacks coordination of creative attitudes and thinking. This is not in line with John

Dewey's statement [2] that "schools must teach children the right way of thinking". Thinking processes can be optimized and further developed if a teacher can ask questions with a higher level of complexity.

Bloom's taxonomy is a revision of the top domain of learning: analysis, synthesis or creation, and evaluation are higher order thinking skills. Learning and practicing HOTS in and out of school will give students the tools they need to understand, infer, relate, categorize, synthesize, evaluate, and apply the information they know. This is to find solutions to new and existing problems [3].

The above problems arise maybe due to the selection of an inappropriate learning model. There are numerous kinds of learning models. The selection and application of the right model for learning will certainly provide maximum output. Thus, the students will easily understand the materials provided by the teacher and could improve their learning outcomes.

One of the learning models that can improve creative thinking skills is problem-based learning. Problem-based learning (PBL) is one of the teaching models used to train creative thinking skills in solving problems. This can be related to the problems encountered by students in everyday life, neither in groups or individually. In addition, PBL can also provide mastery concepts and higher abilities.

Basically, cognitive learning theory is a learning theory that emphasizes more on the learning process than the results. This theory states a person does not only focus on the relationship between stimulus and response in the learning process, but also look at how a person behaves in achieving his learning goals. The principle of cognitive learning theory is the process of learning is more important than the results. In addition, the perceptions and the understanding in achieving learning goals portray the behavior of an individual, learning materials are separated into small components and then studied separately. This theory also mentions that student's active participation is a must. Besides, the learning activity also needs complex thinking process. Given that the general purpose of education is not merely transferring the knowledge but to improve learning abilities, the learning system should put more focused on learning models that can represent more effective learning criteria. This can be done by assessing various learning models such as the implementation of the PBLK Model. The development of the problem-based learning model grounded from cognitive learning theory (PBLK) aims to further improving the result of the application which still has several weaknesses. For example, the difficulty in providing personal assessments and the ineffectiveness of the discussion activity to empower students' creative thinking skills.

## 2 Methodology

The design of the study was research and development. Operationally, it begins with collecting material from the field as a basis for designing a development model. The implementation of limited field trials and the result of extensive testing of PLBK model product was carried out using exploratory and quasi-experimental methods, the non-equivalent control group pretest-posttest designs. The setting of the study was in six Junior High schools in Kuningan Regency. The subject of the study, the trial field, involved two schools for a limited trial and four schools for an extensive trial in the academic year of 2019-2020. These six schools were divided into an experimental class (using PBLK learning) and a control class (using conventionally varied lectures). The selected model class was based on the research objectives (purposive) which became the sample for the trial model learning developed by the researchers.

## 3 Results and Discussions

### 3.1. Limited Trials

Limited trials were conducted in two schools: SMP Negeri 1 Kuningan and SMP Yos Sudarso. The hypothesis being tested was PBLK learning model is effective to improve the students' creative thinking skills. The results were obtained as follows:

**Table 2.** Hypothesis Test Results of SMP Negeri 1 Kuningan Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	Df	Sig. (2- tailed)
HOT	Equal variances	5,730	,396	4,861	60	,396

assumed  
Equal variances  
 not assumed

4,861    58,729    ,396

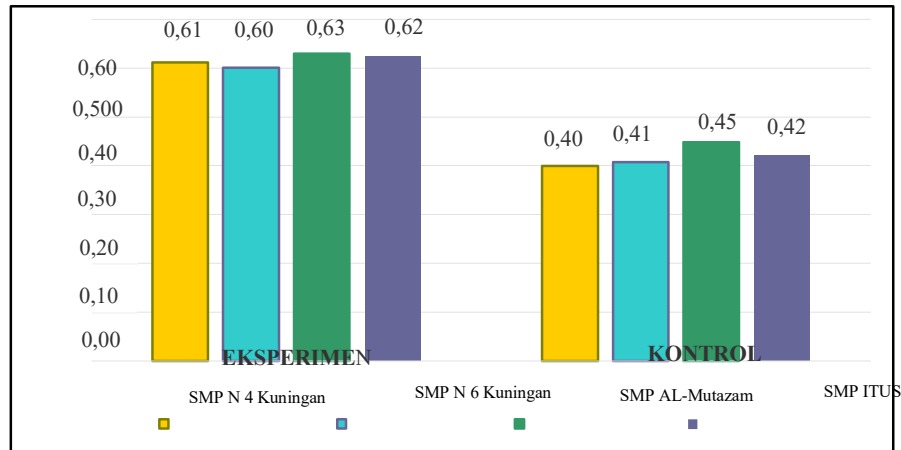
**Table 3.** Hypothesis Test Result of SMP Yos Sudarso Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	Df	Sig. (2- tailed)
HOT	Equal variances assumed	1,306	,583	3,216	47	,041
	<u>Equal variances</u> not assumed			3,216	48,685	,041

Based on aforementioned result, SMP Negeri 1 Kuningan and SMP Yos Sudarso obtained similar value of Sig. (2-tailed) of <0.05. Referring to the basis for decision-making in the Independent sample t-test, it can be concluded that the PBLK learning model is effective in improving students' creative thinking skills.

### 3.2. Extensive Trials

The revised learning tools post the limited trial were then extensively tested in four schools: SMP Negeri 4 Kuningan, SMP Negeri 6 Kuningan, SMP IT Al-Mutazam, and SMP ITUS. Referring to the obtained data, there are differences in the average improvement in students' creative thinking skills before and after learning with the PBLK model. The improvement (gain) obtained from the experimental class and control class are described more clearly through the following diagram. 0,70



**Figure 1.** Comparison of n-gain (improvement) in the extensive trial phase

The results of the n-gain values in the extensive trial stage belong to the medium category. It was also found that the n-gain obtained in the experimental class is higher than the n-gain value of the control group. This indicates that the use of the PBLK model can effectively improve students' creative thinking skills.

Based on the results of the independent sample t-test, it was found the value of Sig. (2-tailed) of the four research subjects of  $0.000 < 0.05$ . Referring to the basis for decision-making in the Independent sample t-test. This means that the PBLK learning model is effective in improving students' creative thinking skills.

To discuss with, the authors focus on several things related to the results of the study, such as: The PBLK model is a potential and relevant model in the social studies of Junior High School.

Haladyna and Shaughnessy in Stahl [4] stated that teacher's strategies and learning environments play an ultimate role in shaping students' thinking skills. An effective strategy will stimulate the students to analyze, interpret, respond, evaluate, and create [5]. Therefore, learning must be changed from learning to remembering the way of thinking. To facilitate the teachers' need in achieving educational goals, the development of the PBLK model can be directly applied in the learning process in the classroom. Furthermore, the results of this study are supported by relevant previous research by Hasmiati, Jumadi, Rachmawaty [6] entitled the implementation of the Problem Based Learning (PBL) in improving students' creative thinking skills and learning outcomes. based on the studies, the PBL model is able to improve higher creative thinking skills. Similarly, the development of the PBLK model in this study is able to facilitate and meet teachers' needs. This includes the continual application of 21st-century learning and forming the students' character and shaping the students' creative-thinking orientation. Thus, they are accustomed to involving creative thinking in decision-making and problem-solving. Most educators understand and realize that the effective learning reflects the effectiveness of student learning. We have long realized that it is important to train children to think creatively. Thus, the children become intelligent, creative, and are able to solve the problems related to their daily lives. This awareness has also underpinned curriculum development.

Accordingly, our curriculum prioritizes contextual learning involving social (children's daily life) and cognitive contexts (children's learning process).

The limitations of the research are: 1) In the process of achieving the objectives of this research, the researchers had optimally tried to provide the best result and they realized the weaknesses and limitations still applied; 2) The research instrument developed to obtain data on the results of student's creative thinking skills has not revealed all the desired aspects. Even though, the trials have been conducted prior to obtaining the data in this study; 3) The researchers' limited ability in empowering model teachers and directing the observer to observe the students' and teachers' activities; 4) The error on data analysis was still presented even though the researchers had tried to minimize it; 5) There are deficiencies in learning tools. Thus, the researchers expect further research to complement the weakness. Accordingly, perfection can be achieved; 6) The research has a limited scope which is in the classroom and in the school environment. In addition, other variables such as parents and social influences have not been significantly associated in this study. On the other hand, the researchers realize that these variables greatly affect the effectiveness of the model application. In addition to the limitation, the strengths of the research are: 1) This learning model effectively improves the students' creative thinking skills in Junior High School; 2) This PBLK model learning tool can develop multiple intelligences of Junior High School students such as social intelligence, spatial intelligence, interpersonal intelligence, and linguistic intelligence; 3) In social studies learning, the implementation of this model can arouse students' interest and enthusiasm. This is because it empowers students to think creatively and dynamically; 4) The activity and the level of students' understanding of the teaching material increased. This certainly affects their learning outcomes, creativity, and mastery of learning; 5) this research brings a positive impact. The students and teachers have a new awareness to respect and love the social environment. This study frees the school environment from various social problems due to the diversity of Indonesian society. In addition, this study influences educational policy to design a higher perspective of learning curricula, from elementary school to university level.

## 4 Conclusions

Based on the results of the study, the following conclusions can be drawn by researchers:

1. The development of problem-based learning grounded from Cognitive Learning Theory (PBLK) can improve students' creative thinking skills.
2. The product of the PBLK model has been verified and is relevant to be implemented in the subject of social studies at SMP. The PBLK model presents effective learning criteria.
3. The implementation of the PBLK model is highly effective in improving students' creative thinking skills. This is shown from most students starting to show high enthusiasm, confidence, determination, and trying to create new things or ways after the PLBK implementation.
4. The use of the PBLK model in social studies received positive responses from all components of education. This includes teachers and students as test subjects for the implementation of the PBLK model.

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