BIOEDUPAT:
Pattimura Journal of Biology and Learning
https://ojs3.unpatti.ac.id/index.php/bioedupat
e-ISSN 2775-4472

Research Article

Learning creative problem-solving model with guided inquiry strategy to improve student's concept mastery

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Received: December 20, 2024 Revised: February 02, 2024 Accepted: April 11, 2024

ABSTRACT

Categories of learning outcomes include acceptance, response, assessment, organization, and pattern formation. Thus, the essence of learning is a change in thinking that affects behaviour. The results of interviews with teachers at SMA Kartika XIII-I Ambon show that current students have not shown an environmentally conscious attitude. Therefore, research was conducted to improve the mastery of the concept of class X students on environmental pollution material using creative problem-solving learning models with guided inquiry strategies. This study used a classroom action research method that took place in two cycles for one month. The subjects in this study were 26 students. The research data were processed descriptively on the results of cognitive, affective, and psychomotor assessments. The results showed that in cycle I there were still 65.4% of students who had not achieved mastery of concepts on environmental pollution material. Therefore, the research was continued in cycle two with the action of using the creative problem-solving learning model based on guided inquiry strategy and coupled with audio-visuals media, as well as a stimulus in the form of giving rewards to active students. It was proven that in cycle II there was an increase in students' mastery of concepts in environmental pollution material in students by 100% so that the series of class action research was no longer continued. In conclusion, the use of learning models

Keywords: CPS Learning Model, CAR, environmental pollutions

To cite this article:
Kurnia, S.T., Leiwakabessy, F., Awan, A., Kotala, S. (2020). Learning creative problem-solving model with guided inquiry strategy to improve students' concept mastery. *Bioedupat: Pattimura Journal of Biology and Learning,* Vol 4 (1), 146-152. DOI 10.30598/bioedupat.v4.i1.pp146-152

INTRODUCTION

Mastery of students' concepts is one of the goals of the teaching process by teachers towards their students. For this reason, teachers usually formulate learning implementation plans that include certain strategies, methods, and learning models. The definition of concept mastery is the ability of students to understand and apply the theories they have learned to solve certain problems. In Indonesia, the level of student mastery of concepts is used to measure the level of teacher success in teaching. Students' ability to actively construct their knowledge and understanding is closely related to their mastery of concepts in learning (Astuti and Fauziah, 2021).

One component that represents students' cognitive and psychomotor abilities is creativity. Creativity is closely related to students' divergent thinking ability in dealing with problems (Malisa et al. 2018). Students must always be taught and encouraged to hone their creativity in solving a problem or problem (Pramestika et al. 2020). This

aspect is known as creative thinking. Students' creative thinking abilities can be stimulated by using appropriate learning strategies, methods, and models.

The learning model that is relevant to the characteristics of honing students in creative thinking is the Creative Problem-Solving Learning (CPS) Model. This learning model is very relevant because, through the steps of the Creative problem-solving learning model, students are confronted directly with real problems (Malisa et al. 2018). Apart from that, this learning model can increase student activity in the learning process in class so that it can be a stimulus for increasing students' mastery of concepts (Bahrudin, 2020).

Apart from the learning model, a teacher must also prepare the right strategy for implementing the learning model for students. Learning strategies are an important aspect of the process of achieving learning goals (Choirul Amri and Dimas Kurniawan, 2023). The learning model applied to students is one part of the learning design combined with certain strategies. One strategy that can be combined with the Creative Problem-Solving learning model is the guided inquiry strategy. The goal of the guided inquiry strategy is to hone students' thinking skills. This strategy focuses on the student learning process, namely motivating, and encouraging students to find for themselves everything needed to solve a problem, so that students will be able to find their solutions to the problems they face (Ardhita et al. 2019). Therefore, the combination of guided inquiry strategies with Creative Problem-Solving learning models is believed to be able to increase students' mastery of concepts.

Currently, the environment is a separate object of study in biology. This is because more and more problems regarding the environment arise due to human activities and these problems also have an impact on humans. Environmental pollution is a problem that receives great attention. Therefore, the study of environmental pollution is also included in high school biology learning materials. As one of the main materials taught at the secondary education level, the concept of environmental pollution of course has competency standards that must be achieved by students. In fact, from year to year, an increase in mastery of concepts in environmental pollution material is highly expected. This is very important, because if students can increase mastery of the concept of environmental pollution, then awareness of protecting the environment will be embedded in every student. Therefore, efforts to improve mastery of concepts in environmental pollution material must continue to be pursued.

The target for implementing learning strategies, methods, and models to improve students' mastery of the concepts or material studied is in educational institutions such as schools or campuses. SMA Kartika XIII-I Ambon is one of the schools that is open and accepts researchers who want to conduct research at the school. This is because SMA Kartika in this way, all problems faced by teachers in implementing the learning process in the classroom can be resolved professionally and are generally carried out through Classroom Action Research (CAR).

The results of interviews with biology subject teachers at SMA Kartika One of them is that students still like to throw paper at each other or throw paper on the floor instead of choosing to throw the paper into the trash bin that is provided so that the class looks messy with scattered papers. Furthermore, it is said that in the learning process about environmental pollution, students can be faced with cleanliness problems in their surroundings, so that students can be trained to find solutions to problems that are often faced in their surroundings. Furthermore, it was also added that in class Students often get poor learning results, which is a problem that needs to be solved. For this reason, classroom action research (CAR) has carried out the application of Creative problem-solving learning models with guided inquiry strategies to increase students' mastery of concepts in environmental pollution material.

METHODS

This research is descriptive research using a classroom action research design. This research was carried out at SMA Kartika XIII-I Ambon and lasted for one month. The subjects in the research were Class X_4 students at SMA Kartika XIII-I Ambon with a total of 26 students. Problem identification was carried out through interviews with biology subject teachers at schools. The research instrument is a learning outcomes test consisting of preliminary and post-test questions, as well as affective and psychomotor observation sheets to observe student activities. The learning process and learning model are applied in groups. However, student activities are observed individually. The research data were analysed descriptively and qualitatively and presented in table form based on the calculation of the average percentage score or value. Students' cognitive learning outcomes refer to the minimum completeness criteria (MCC) for biology subjects set by the school, namely 64. The research procedure was carried out in cycles according to the stages of classroom action research with one cycle consisting of two meetings. The cycle will repeat itself if the results of the cycle evaluation show that there has not been a significant increase in students' mastery of concepts. If there has been an increase in students' mastery of concepts, the cycle will stop. The stages of research implementation according to Arikunto (2012) can be described in the form of a flow chart as follows (Figure 1).

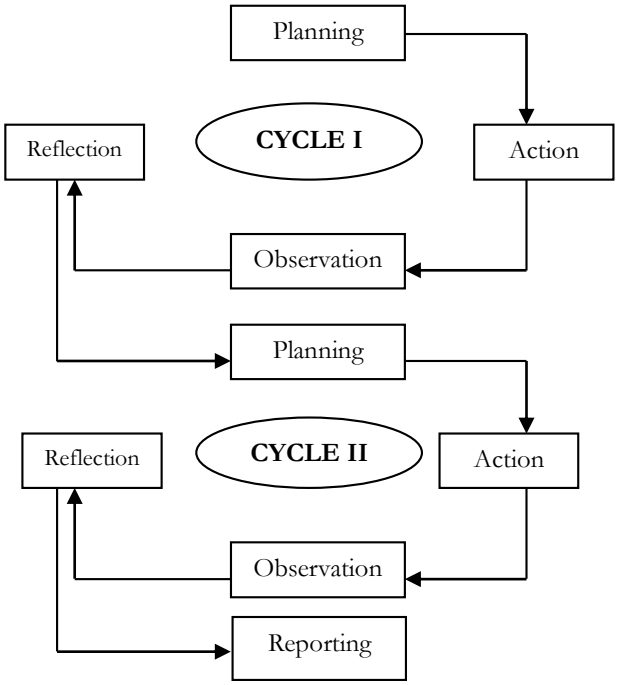

Figure 1. Research stages (Arikunto, 2012)

RESULTS AND DISCUSSION

In the planning stage of cycle 1, a preliminary test (pre-test) was carried out on 26 students. Preliminary test results show that 65.4% of students have not mastered the concept of environmental pollution. Meanwhile, only 34.6% of students were able to master the concept of environmental pollution. Based on these results, the researcher began planning actions, namely compiling learning tools according to the steps of the creative problem-solving (CPS) learning model combined with guided inquiry strategies. Apart from that, the researcher also prepared observation sheets for teachers to assess the researcher's performance during the teaching and learning process. Everything that has been planned is then implemented in the classroom learning process at the action stage of cycle 1.

The creative problem-solving (CPS) learning model has been combined with guided inquiry strategies and applied to class X_4 middle school students at Kartika XIII-I Middle School Ambon. The results of the post-test after taking action in cycle 1 showed that there had been an increase in students' mastery of concepts, namely that 52.8% of students had reached or even exceeded the minimum completeness criteria (MCC). However, there are still 46.2% of students who have not yet reached the minimum completeness criteria (MCC) or have not been able to master the concept of environmental pollution. Therefore, research still needs to be continued in cycle 2.

The first stage in cycle 2, namely the planning stage, is carried out by conducting a preliminary test because learning continues with different learning indicators but still on the same material. The results of the preliminary test for cycle 2 showed that as many as 53.8% of students had not reached the minimum completeness criteria (MCC). Researchers also redesigned the lesson plans, using audio-visuals media, and combined the learning process with giving prizes to students who answered questions correctly. The results of the final test of cycle 2 showed a drastic increase in students' mastery of concepts regarding environmental pollution material, namely that all students had reached or even exceeded the MCC (100%). Therefore, the research ended in cycle 2. The detailed preliminary and post-test results of cycle 1 and cycle 2 according to research data can be seen in the following Table 1.

Table 1. Results of the initial test and final test of cycle 1 and cycle 2

Cycle	Test	Value Range	Number of Students		Category
			Number (person)	Percent (%)	
1	Pre	≥ 64	9	34,6	Completed
		< 64	17	65,4	Incompleted
	Post	≥ 64	12	46,2	Completed
		< 64	14	53,8	Incompleted
2	Pre	≥ 64	14	53,8	Completed
		< 64	12	46,2	Incompleted
	Post	≥ 64	26	100	Completed
		< 64	0	0	Incompleted

The preliminary test and post-test scores are indicators of mastery of concepts for cognitive aspects. Meanwhile, the affective and psychomotor aspects were obtained from the scores obtained from observations using the affective and psychomotor observation sheet. The affective assessment in cycle one showed quite good results, but the psychomotor aspect was still low. Therefore, along with the cognitive aspect, in cycle 2 the affective and psychomotor aspects are still a concern. The results of the Affective and psychomotor assessments can be seen in the following Table 2.

Table 2. Results of affective and psychomotor assessments for cycle 1 and cycle 2

Cycle	Aspect	Value Range	Number of Students		Category
			Number	Percent (%)	
1	Affective	≥ 64	22	84,6	Completed
		< 64	4	15,4	Incompleted
	Psychomotor	≥ 64	10	38,5	Completed
		< 64	16	61,5	Incompleted
2	Affective	≥ 64	26	100	Completed
		< 64	0	0	Incompleted
	Psychomotor	≥ 64	26	100	Completed
		< 64	0	0	Incompleted

The results of observations of students' affective aspects in cycle 1 showed that the percentage of students completing was greater than the percentage of students who had not achieved completeness. However, the results of observations of students' psychomotor aspects in cycle one showed that the percentage of students who achieved completeness was smaller when compared to the percentage of students who had achieved completeness. Therefore, researchers still must continue taking action to increase the percentage of student completion in affective and psychomotor aspects.

As for cycle 2, the assessment of students' affective and psychomotor aspects has increased. The observation results show that the scores obtained by each student in the affective and psychomotor aspects of cycle 2 have completed or exceeded the minimum completeness criteria. Therefore, the research was not continued to the next cycle. The learning outcomes and improvement in concept mastery of class X_4 students at SMP Kartika XIII-I Ambon can be seen in the following graph (Figure 2).

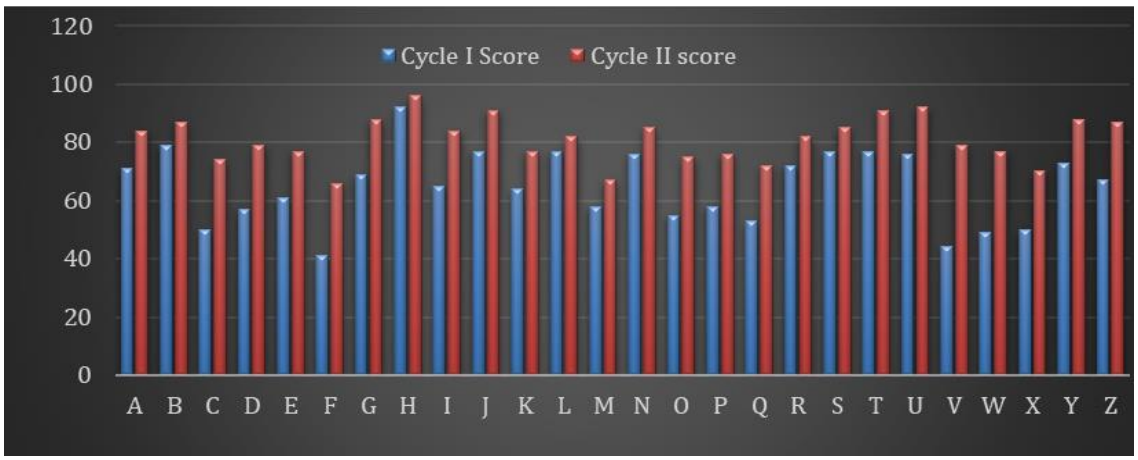

Figure 2. Graph of learning results for environmental pollution topic for class X_4 students at SMA Kartika XIII-I Ambon

Before starting the classroom action research (CAR) series, a preliminary test is carried out to determine the student's initial abilities. Initial learning activities in the form of initial tests are important to always carry out every time you start new material because they will provide an overview of students' understanding of the learning material before it is given. The preliminary test can be carried out by the teacher according to the technique they each choose (Magdalena et al. 2021).

The preliminary test results show that most students have not mastered the concept of environmental pollution material, and only a small number of students have a good initial understanding. Therefore, researchers began to develop learning plans using the Creative Problem Solving (CPS) Learning Model as an effort to increase students understanding which will have an impact on improving learning outcomes (Sumaryati et al. 2022). At the action implementation stage, the Creative Problem Solving (CPS) learning model is applied by posing problems related to environmental pollution to students and asking them to look for creative and innovative solutions while being guided and guided by researchers (Asmidar, 2019; Bahrudin, 2020).

In cycle 1, the main material, namely environmental pollution, is packaged in one lesson plan with 2 meetings (2 meetings for 1 cycle). Next, the learning steps carried out in class are then adapted to the steps of the Creative Problem Solving (CPS) learning model combined with guided inquiry learning strategies. In cycle 1, it can be seen in Table 1. It shows that there has been an increase in students' mastery of concepts, namely that 53.8% of students have reached or even exceeded the minimum completeness criteria (MCC). However, there are still 46.2% of students who have not yet reached the minimum completeness criteria (MCC) or have not been able to master the concept of environmental pollution.

Reflection on the implementation of actions in cycle 1 shows that several factors influence students' mastery of concepts regarding environmental pollution material, namely 1) students in this class are somewhat difficult to direct in following the learning process so most students in this class often get results learning is still lacking, 2) lack of student involvement in learning, 3) lack of student readiness in receiving lessons even though they have previously been informed about the material to be studied, 4) student learning motivation is still low, and 5) inadequate application of learning models, methods and strategies suitable with the material that will be taught to students (Merta, 2021; Putri, 2020) The optimal development of students' concept mastery abilities is closely related to the teacher's way of teaching; therefore, teachers need to find the right solution to empower students to increase their understanding of a concept (Putri, 2020). Therefore, to monitor the development of students' mastery of concepts further, it is continued to cycle 2.

The follow-up to cycle 2 is based on reflection in cycle 1. In learning in cycle 2, corrective action is taken for all problems in learning in cycle 1. The research stages that will be carried out in cycle 2 are the same as in cycle 1. The learning process in cycle 2 is packaged into 2 meetings with different learning indicators but still on the same material, namely, environmental pollution. The results of the preliminary test for cycle 2 showed that as many as 53.8% of students had not reached the minimum completeness criteria (MCC). Researchers also redesigned the lesson plans, using audiovisual media, and combined the learning process with giving prizes to students who answered questions correctly. The results of the final test of cycle 2 showed a drastic increase in students' mastery of concepts regarding environmental pollution material, namely that all students had reached or even exceeded the minimum completeness criteria (MCC) (100%).

Reflection on the implementation carried out in cycle 2 shows the achievement of successful mastery of concepts by class X_4 students at SMA Kartika XIII-I. This means that there has been an increase in students' mastery of concepts from cycle 1 to cycle 2 because of the learning process that has been carried out. This increase can be seen clearly in Table 1, which shows that all students in the class were able to achieve the standard of completion. Based on what was found in cycle 1, corrective actions were taken in cycle 2, namely the researcher redesigned the lesson plan, namely by using audiovisual media, and the learning process was coupled with giving prizes to students who answered questions correctly. By implementing additional actions in cycle 2, students increasingly actively participate in learning. That means students are more motivated to play an active role in learning.

Based on reflections on the implementation of cycle 2, increasing students' mastery of concepts provides evidence that the implementation of the Creative Problem Solving (CPS) learning model combined with guided inquiry strategies can be well received by students, especially in environmental pollution material and this shows that this learning model and strategy is suitable and can have the effect of increasing student's mastery of concepts (Merta, 2021). Students' mastery of concepts can be measured through preliminary, and post-tests carried out by researchers with the percentage of completeness in the preliminary cycle 2 test, namely 53.8%, and then increasing drastically to 100% in the post-test. This can happen because of the implementation of guided inquiry learning strategies. This can be achieved because the guided inquiry learning strategy is student-oriented, meaning that students play an important role during the learning process. Students receive various instructions, namely, in the form of questions that can direct and guide students to find answers to the problems they are facing so that they can reduce students mistakes in understanding the concepts of the material they are studying. That is the

goal of the guided inquiry learning strategy (Ramadhan, 2021). Apart from that, this inquiry strategy is also able to develop students' science process skills for those with high, medium, and low academic abilities and can involve students' activeness in the learning process (Sarumaha and Harefa, 2023).

Such mastery of material concepts can occur because 1) students are maximally involved during the teaching and learning process. In this way, students are increasingly aware that knowledge is tentative (knowledge is always open to continuous study (Lewe et al. 2020); 2) the direction of activities and learning takes place logically and systematically; and 3) students develop a confident attitude about what they are learning so that students can design and discover their learning concepts through direct experience (Sarumaha and Harefa, 2023). From the discussion above, the Creative problem-solving (CPS) learning model combined with guided inquiry learning strategies has a very important role in improving students' mastery of concepts. The implementation of guided inquiry learning strategies can significantly influence students' cognitive learning outcomes and this is in line with findings in previous research (Asni et al. 2020; Halek et al. 2016; Sumaryati et al. 2022)

This research not only looks at cognitive learning outcomes (mastery of concepts) but also looks at the affective and psychomotor development of each student in class X_4 SMA Kartika XIII-I. Affective learning outcomes are related to attitudes, values, interests, attention, etc. Learning outcomes in this affective aspect emerge after mastering cognitive learning outcomes. Categories of affective learning outcomes include acceptance, responding, assessing, organizing, and forming lifestyle patterns. Then the psychomotor learning outcomes, namely, the assessment of student activities/practices (motor) such as sports, skills, laboratory work, etc. related to student motor skills (Sarumaha and Harefa, 2023).

Reflections on the implementation of affective and psychomotor learning outcomes can be seen clearly in Table 2 and Figure 1, which show very significant changes. In cycle 1, the affective aspect only reached 84.6% completeness, while the psychomotor aspect only achieved 38.5% completeness, which is quite a low percentage. Because of this low percentage, it was followed up by carrying out cycle 2 and the results were very satisfactory, both aspects achieved 100% completeness, and all students were able to master the learning concept very well, seen from three aspects, namely, cognitive, affective, and psychomotor. As previously discussed, when students' cognitive aspects are fulfilled, it will greatly influence the student's affective and psychomotor aspects. This means that the implementation of the Creative problem-solving learning model combined with guided inquiry learning strategies greatly influences student mastery of concepts and learning outcomes.

CONCLUSION

Based on the results of the research and discussion, it can be concluded that the use of a skilled Creative Problem-Solving (CPS) Model combined with guided inquiry strategies can improve the concept mastery of class X_4 students at SMA Kartika XIII-I Ambon regarding environmental pollution material. This method and strategy are very effective if its implementation is combined with the use of audiovisual learning media and stimulus for students in the form of giving appreciation to students who are active in the learning process.

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