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THE EFFECT OF INSTAD LEARNING MODEL ON METACOGNITION AWARENESS AND COGNITIVE LEARNING OUTCOMES OF BIOLOGY IN SMAN 12 MAKASSAR

Misilia[*1], Etty Rosmiati[2], Riski Seprida[3]

[1,2,3] Department of Biology Education, Faculty of Mathematics and Natural Sciences, Universitas Pejuang Republik Indonesia
Coresponding Email: ettyrosmiatiomy@gmail.com

ABSTRACT

This study aims (1) to determine whether the application of INSTAD learning model affects the awareness of metacognition of students in class X SMA Negeri 12 Makassar. (2) To determine whether the application of INSTAD learning model affects the cognitive learning outcomes of biology of grade X students of SMA Negeri 12 Makassar in the academic year 2013/2014. This type of research is a pseudo experiment. The study population was all students of class X SMA Negeri 12 Makassar in the academic year 2013/2014 which amounted to 290 students. Sampling was done by random sampling and the selected classes were class X1 and class X2. Hypothesis testing was done with SPSS program using Anova analysis. The results of this study indicate that (1) INSTAD learning model does not significantly affect the Metacognition Awareness of students in class X SMA Negeri 12 Makassar. (2) The INSTAD learning model affects the cognitive learning outcomes of biology students in class X SMA Negeri 12 Makassar in a significant category where the percentage increase in the average learning outcomes before and after the application of the INSTAD Learning model in the experimental class is 77.01%.

Keywords: Instad Learning Model, Metacognitive Awareness, and Cognitive Biology Learning Outcomes

INTRODUCTION

Science and Technology (Science and Technology) is developing very rapidly in the era of globalization. In order not to be left behind from other countries, Indonesia seeks to improve human resources (HR) in various ways, one of which is education. Things that need to be considered in the education process in Indonesia based on the regulation of the Minister of Education and Culture. 22 of 2016 is to teach hard skills and soft skills. One way to teach this is by learning Science (Prastio, 2019).

Science learning in schools is oriented towards solving science problems. This orientation aims to make learning in schools not only limited to knowledge but can be in the form of certain skills to solve problems in everyday life. The curriculum implemented by the government is expected to accommodate the process and product aspects, where both become the constituent components of student learning outcomes to be applied in solving everyday problems. According to Dini (2022) Learning as the main point in education studies various

branches of science. One of them is biology which focuses on direct experience by students, so that students' understanding of the surrounding nature is thicker and can be applied in everyday life. This is what we know by the term science that is practiced.

Biology learning in the field generally only prioritizes the product aspect. Memorization is a product that students must master at the end of learning. This imbalance produces students who are stuttering scientific experiences and attitudes. This inhibits the development of process skills as the character of science. Science is oriented towards the ability to construct their own knowledge through experience. Experience in learning can be carried out with observation activities. Observations can be carried out well if students have been able to compile deductions from observations and are accompanied by careful observation planning.

Learning that is oriented towards building thinking skills can be an alternative for improving the product and process aspects of biology learning. One of the efforts to build students' thinking skills can be done by developing their metacognition aspects. In developing these metacognition skills, students are required to have the ability to organize information into knowledge that is useful for themselves. Metacognition ability has indicators that reflect the level of achievement, namely when students are able to think by optimizing their thinking abilities, identifying good learning models and consciously directing their learning models.

Metacognition focuses on awareness, monitoring the results of one's thoughts and work, or simply thinking about thoughts. Metacognition is the ability to think independently and evaluate the understanding of knowledge. Therefore, metacognition is awareness of cognitive processes, which helps students control themselves and choose strategies to improve learning outcomes (Muhali, 2022).

The development of science and the challenges faced by the world in the era of globalization affect all aspects of human life, one of which is the aspect of education. Education is one of the important components in preparing the nation's generation to face the development and changes in the world. The nation's generation, in this case students, must be equipped with the life skills needed to face the challenges of 21st century life such as metacognitive skills and critical thinking skills (Keliat, 2022).

Based on the characteristics of learning based on the development of metacognition skills above, it is clear that the formation of metacognition skills is important to support the optimization of the biology learning process. Thus, cognitive learning outcomes can also be achieved more optimally. The development of metacognition skills and cognitive learning outcomes in biology learning requires the right learning model. Learning models are

influential in building and improving students' metacognition skills. One of the learning models that can improve metacognition skills as well as cognitive learning outcomes is the INSTAD learning model. INSTAD learning model is an inquiry learning model combined with STAD cooperative which aims to combine the advantages and cover the shortcomings of both.

The inquiry model has various advantages but still has weaknesses in its learning activities which are carried out in a very competitive group. Competition will occur between students to achieve the competencies set by the teacher. Students with high intelligence ability will be easy to develop their thinking ability and achieve the competencies set, while students with below-average intelligence ability will have difficulty in developing their thinking ability. The weakness of inquiry can be overcome by combining the model with the Student Teams Achievement Divisions (STAD) cooperative model. STAD is one type of cooperative learning model that has the main idea to help and support group members to understand the subject matter. Group members' communication can bring up ideas to solve a problem which also affects the development of students' critical thinking skills.

The superior value of STAD with the scaffolding process in it combined with the inquiry approach with its advantages is a model that is considered effective for improving metacognition and cognitive learning outcomes in science learning, especially biology. Inquiry combined with STAD is able to bridge students to improve metacognition skills in the learning process. The syntax in INSTAD accommodates the creation of student independence to find concepts through interaction with others in the scaffolding process. In the combined model, students who are aware of their limited abilities will be facilitated through the scaffolding process, while the lack of reinforcement for the formation of science skills is substituted through the inquiry approach. The INSTAD combined strategy trains students' metacognitive abilities and science process skills and is also expected to improve student learning outcomes.

In research conducted by Ika (2023) which states that learning by applying the INSTAD learning model can improve students' metacognitive abilities, this can be seen from the data value obtained by the experimental class average of 0.73 greater than the control class with an average value of 0.51 with a moderate category. This shows that the metacognitive ability of the experimental class is more improved compared to the control class. meaning that the INSTAD learning model assisted by SLKPD can improve students' metacognitive abilities.

Based on the description above, the INSTAD learning model is seen as the right

learning model to improve metacognition and cognitive learning outcomes. However, testing the learning model on various subjects and research objects is an interesting study. Therefore, starting from the background, a study was conducted entitled "The Effect of Instad Learning Model on Metacognition Awareness and Biology Cognitive Learning Outcomes of Class X Students of SMA Negeri 12 Makassar".

METHOD

1. **Research Type and Location**

   This type of research is a quasi experiment (pseudo experiment). This research was conducted in even semester, located at SMA Negeri 12 Makassar.

2. **Research Design and Research Variables**

   The design used in this study was randomized subject pretest-posttest control-group. The data were collected using pretest and posttest.

3. **Research Variables**

   The variables in this study are independent variables consisting of INSTAD learning model and dependent variables consisting of metacognition awareness and student learning outcomes.

4. **Variable Operational Definition**

   INSTAD Learning Model is an integration of inquiry learning in the STAD learning model. The syntax of the INSTAD model used refers to Prayitno (2010) as follows: (1) teacher presentation, (2) inquiry work in STAD groups, (3) inquiry work presentation, (4) individual test, (5) team recognition. Direct learning model is a biology learning model that consists of phases: (1) conveying objectives and preparing students, (2) demonstrating knowledge and skills, (3) guiding training, (4) checking understanding, (5) providing feedback, (6) providing opportunities for further training and application.

   High Metacognition Awareness referred to in this study are students who have a categorization score of 72-100. This metacognition awareness measurement uses the MAI (Metacognitive Awareness Inventory) scale developed in Eka (2013). Low Metacognition Awareness referred to in this study are students who have a categorization score of 0-71. This metacognition awareness measurement uses the MAI (Metacognitive Awareness Inventory) scale developed in Eka (2013). Student learning outcomes are students' final grades after being given the test.

5. **Population and Research Sample**

The population in this study were all students of class X SMA Negeri 12 Makassar 2013/2014 which amounted to 290 people, which are divided into seven classes. While the research sample was taken by random sampling with class randomization technique. From class X, the samples were class X1 consisting of 40 students and class X2 consisting of 40 students, where class X1 as a class that uses INSTAD model and class X2 as a class that uses direct learning model.

6. Data collection technique

To measure metacognition awareness using the MAI (Metacognitive Awareness Inventory) scale developed in Eka (2013) consisting of 52 items given before and after learning, learning outcomes test in the form of multiple choice questions consisting of 40 numbers made based on subject matter indicators.

7. Data analysis technique

Descriptive analysis of mean and standard deviation was used to describe the profile of metacognition awareness.

Students' metacognition awareness can be done by using the formula:

Score= (Score obtained)/(Total Score) ×100 *(Arikunto 2009)*

The metacognition awareness categorization guidelines used in the study according to Ghazali in Eka (2013) are stated in table 1.

Tabel 1. Metacognition awareness

Score	Categori
0 – 71	Low
72 – 100	High

There are two kinds of data analysis techniques used in this study, namely:

1. Descriptive Statistical Analysis

Descriptive statistical analysis to describe the pretest and posttest of metacognition awareness and student learning outcomes on the subject matter of ecosystems and environmental pollution for each experimental class and control class, which consists of the average score (Mean), standard deviation.

2. Inferential Statistical Analysis

Inferential statistical analysis is used to test the truth of the hypothesis tested. Before conducting inferential statistical analysis, as a prerequisite test, the normality test and homogeneity test were carried out using SPSS.

a. Normality test, used to determine whether the data studied comes from a normally

distributed population. Testing the normality of student data was calculated using the help of SPSS with the One-Sample-Kolmogorov-Smirnov Test analysis. Testing criteria: if the significance (ρ) obtained is greater than = 0.05 then the data comes from a normally distributed population and vice versa.

b. Homogeneity test is used to determine whether the two samples taken are homogeneous (have the same variance). This homogeneity test is calculated using SPSS assistance with One-Way ANOVA analysis. With testing criteria: If the significance value (ρ) obtained is greater than = 0.05 then the data is homogeneous.

c. Hypothesis Test, Before hypothesis testing is carried out, testing is carried out on the pretest to see the similarity of students' initial abilities. The hypothesis test formulation used is the t-test.

RESULT AND DISCUSSION

Result

Knowing the effect of the application of the INSTAD learning model can be seen by comparing the pretest and posttest scores of students taught in the experimental class, namely students taught using the INSTAD learning model, and students taught in the control class, namely students taught with the direct learning model. This data description is intended to provide an overview of the pretest results before and after being treated in the experimental class, as well as the pretest and postest results in the control class, which are presented in the following description.

1. Pretest of Students' Metacognition awareness in Biology Subjects

The results of the data analysis of students' metacognition pretest in Biology subjects before the application of the INSTAD learning model on the subject of ecosystems and environmental pollution in the experimental class with 40 students of class X1 SMA Negeri 12 Makassar analyzed can be seen in the following table.

Table 2. Descriptive Pretest of Students' Metacognition Awareness in Experimental Classes

Statistic	Statistic Value
Subject	40
Ideal Score	100
Highest Score	92.31
Lowest Score	42.31
Score Range	50
Average Score	69.18
Standard Deviation	12.18

Based on the table above, it is known that the highest score obtained by students before the application of the INSTAD learning model was 92.31 and the lowest score obtained by students was 42.31, the average score was 69.18 with a standard deviation of 12.18. This is related to the opinion of Wiratama (2022) which states that effective learning will be created when teachers are able to choose the right learning model for their students. If students' metacognition awareness is grouped into the metacognition awareness categorization guidelines used in the study according to Ghazali in Eka (2013), it can be seen in the following table.

Table 3. Experiment Class Pretest Metacognition Categorization Guidelines

Scor	Categori	Frequency	percentage (%)
0 – 71	Low	25	63
72 – 100	High	15	37

Based on table 3, it is known that of the 40 students in class X1 of SMA Negeri 12 Makassar, 25 students or about 63% were in the low metacognition category, while 15 students or about 37% were in the high metacognition category. For more clarity, the following authors present a pie chart of metacognition awareness of experimental class students before the application of the INSTAD learning model.

2. Posttest of Students' Metacognition Awareness in Biology Subjects

After the application of the INSTAD learning model, researchers analyzed students' metacognition awareness on the subject of ecosystems and environmental pollution in the experimental class with 40 students of class X1 SMA Negeri 12 Makassar which can be seen in the following table.

Table 4. Descriptive Pretest of Students' Metacognition Awareness in Experimental Classes

Statistic	Statistic Value
Subject	40
Ideal Score	100
Highest Score	94.23
Lowest Score	50
Score Range	44.23
Average Score	73.13
Standard Deviation	10.99

Based on the table above, it is known that the highest score obtained by students after the application of the INSTAD learning model is 94.23 and the lowest score obtained by students is 50, the average value is 73.13 with a standard deviation of 10.99. If students' metacognition awareness is grouped into the metacognition awareness categorization guidelines used in the study according to Ghazali in Eka (2013), it can be seen in the following table.

Table 5. Experiment Class Pretest Metacognition Categorization Guidelines

Scor	Categori	Frequency	percentage (%)
0 – 71	Low	16	40
72 – 100	High	24	60

Based on the table above, it is known that out of 40 students in class X1 SMA Negeri 12 Makassar, 16 students or around 40% were in the low metacognition category, while 24 students or around 60% were in the high metacognition category. For more clarity, the following authors present a pie chart of metacognition awareness of experimental class students after the application of the INSTAD learning model.

CONCLUSIONS AND SUGGESTIONS

Based on the results of data analysis and discussion, it is concluded that:

1. INSTAD learning model does not significantly affect the Metacognition Awareness of students in class X SMA Negeri 12 Makassar.
2. The INSTAD learning model affects the cognitive learning outcomes of biology students in class X SMA Negeri 12 Makassar in a significant category where the percentage increase in the average learning outcomes before and after the application of the INSTAD Learning model in the experimental class is 77.01%.

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