The Use of Virus Models to Improve Biology Learning Outcomes of Virus Body Structure

Puspani Bandrang\(^1\)
\(^1\)SMA Negeri 1 Balikpapan

Abstract. This Classroom Action Research aims to describe the improvement of Biology learning outcomes in class X IPA 3 SMA Negeri 1 Balikpapan after applying the use of the virus model to the material structure of the virus body. The object of the research is the students of class X IPA 3, with a total of 35 students consisting of 17 male students and 18 female students. The method used is two cycles starting with a pre-cycle. Each cycle consists of four stages of activities, namely: (1) planning, (2) implementing actions, (3) observing and evaluating, and (4) analyzing and reflecting. The results showed that in the pre-action there were 40% of students who completed and 60% who had not; in the first cycle there are 62.86% of students who have completed and 37.14% of students who have not completed and in the second cycle there are 85.71% of students who have completed and 14.29% of students who have not. The discussion states that learning by using the virus model can improve the learning outcomes of biological material on the structure of the virus body, which is indicated by the percentage increase that occurred since pre-action, cycle I, and cycle II. This is very relevant to the opinion of previous studies. The conclusions obtained in this study are that the use of the virus model in biology learning in class X IPA 3 SMA Negeri 1 Balikpapan can increase student learning outcomes by 45.71%, namely: in the first cycle by 22.86% and in the second cycle by 22.85%.

Keywords: Virus models, learning outcomes, biology.

1. Introduction

Teachers in carrying out learning in the classroom always try to implement the learning that can improve student learning outcomes. But in reality, teachers can still find students who have not gotten maximum learning outcomes. Teachers always try to reflect on themselves to find the cause of the condition and try to find the best solution to overcome the condition. Learning that favors students certainly accommodate collaboration between teachers and students in carrying out learning, students are given stimulus and opportunities to be able to express their ideas and opinions in the learning process.

Kemdikbud stated that the 2013 curriculum requires that the implementation of learning should: (1) utilize a scientific approach, (2) students are facilitated to actively learn to find out, not be told, (3) students learn from various learning sources, (4) competency-based learning, (5) learning that emphasizes divergent answers that have multi-dimensional truth, (6) applied skills-based learning, (7) learning that applies values by setting an example (ing ngarso sung tulodo), building will (ing madyo mangun karso), and developing students' creativity in the learning process (tut wuri handayani), (8) utilizing information and communication technology to improve learning efficiency and effectiveness [1].

One of the problems that are still faced in learning Biology at SMA Negeri 1 Balikpapan is that student learning outcomes are still lacking. Likewise, what happened in class X IPA 3 of SMA Negeri 1 Balikpapan, which is a class where students have poor learning outcomes in biology. This is based on the results of the daily assessment that the author carried out before carrying out this action. It showed that out of 35 students, with a KKM = 70, only 14 students (40%) had finished studying and there were still 21 students (60%) who had not finished studying [2]. In addition, the subject matter of biology about the shape and structure of the virus body in the Biology subject of class X
SMA is material that is rather difficult for students to understand because it is very microscopic and abstract, it can only be understood from print and electronic media without being able to see directly the living things except by using a microscope. With the help of a microscope, it is not easy to prepare virus preparations to be observed using a microscope.

In connection with this, it is necessary to make efforts to improve biology learning outcomes in the material of the shape and structure of the virus body in class X IPA 3 SMA Negeri 1 Balikpapan by improving the implementation of learning carried out by the author, the learning system needs to be updated, including by creating learning-centered to students by exploring students’ abilities so that the learning process becomes fun. Therefore, it is necessary to do innovative forms of learning so that students are motivated to learn and, in the end, will be able to improve learning outcomes. One of the efforts made by the author is to apply learning by creating and using Virus Model props.

Learning by using teaching aids will be more effective, and efficient and the results will be much better and students will more easily absorb the subject matter, especially abstract concepts [3], [4]. Through learning by making and using the Virus Model props, it will stimulate students' creativity in understanding the material about the shape and structure of the virus body as outlined in the form of making and using the Virus Model props, there will be good communication between teachers and students and between students and students. other students can exchange opinions verbally, and share ideas and opinions so that learning communication can occur in multiple directions, students become active and enthusiastic in learning, so it is expected that student learning outcomes are high, or at least can reach the KKM that has been set [5].

In connection with this, the formulation of the problem made is: "How is the use of the Virus Model to improve biology learning outcomes in class X IPA 3 SMAN 1 Balikpapan?" Thus, the purpose of this Classroom Action Research (CAR) is to find out how to use the Virus Model to improve learning outcomes of Model biology in class X IPA 3 SMAN 1 Balikpapan.

2. Method

This research is a Classroom Action Research (CAR) with the research subjects being students of class X IPA 3 with 35 students, consisting of 17 male students and 18 female students. The place of research is in SMA Negeri 1 Balikpapan. The time of research was carried out on September 1 to December 1, 2019. The actions were carried out in two cycles, preceded by pre-cycle activities. Each cycle includes four stages of activity, namely (1) planning, (2) implementing actions, (3) observing and evaluating, and (4) analyzing and reflecting as shown in the following Picture 1.

![Picture 1. The flow of the activity stages of cycle 1 and cycle 2](image-url)
The data collection techniques used in this research are observation techniques, written tests, performance tests (performance), and document studies. The instruments used are Learning Implementation Observation Sheet, Written Test Sheet, and Performance Observation Sheet [6]. Data analysis techniques are carried out starting from the stages of data collection, data reduction, and conclusions or verification [7].

1. Data from the observation of the implementation of learning, which includes activities: introduction, core, and closing activities are analyzed by calculating the average value for each activity for three meetings or overall, then given the categories: Very good (3.50–4.00), Good (2.50–3.49), Enough (1.50–2.49, Less (1.00–1.49)

2. Data on student learning outcomes, analyzed with the following steps: (a) Changing test scores and performance to a scale of 100 with the formula $N = \frac{\text{Number of scores earned}}{\text{Maximum number of scores}} \times 100$, and (b) Calculating the percentage of many students who have completed (having interest and practical value at least enough (≥ 70)), with the formula $P = \frac{\text{Number of all students who have completed}}{\text{Minimum completion}} \times 100$

3. Results and Discussion

3.1 Research result

The initial condition of student learning outcomes was obtained from the results of the assessment of biology subjects on the previous learning material. This initial condition is used to calculate the increase in learning outcomes that will be obtained in the first cycle as shown in table 1 and picture 2 below.

<table>
<thead>
<tr>
<th>Score</th>
<th>Category</th>
<th>Student learning outcomes</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value &lt; 70</td>
<td>Not Complete</td>
<td>Student Street</td>
<td>21</td>
</tr>
<tr>
<td>Value 70</td>
<td>Complete</td>
<td></td>
<td>14</td>
</tr>
</tbody>
</table>

Source: Pre-Cycle Assessment Results (2019).

Table 1 above shows that out of all 35 students, only 14 students (40%). This result is still far from the expected classical completeness of 85%. Therefore, the authors are increasingly motivated to achieve these expectations by applying learning by using the virus model in the next lesson, in accordance with the first cycle action plan that has been prepared.

Action there is a stage of the cycle I include the teacher together students carry out learning by using the virus model, according to the planned learning scenario and according to the applicable schedule at school. The implementation of the first cycle of action was carried out in 3 meetings (6 hours of lessons @ = 45 minutes). The results of the observation of the implementation of the learning cycle I obtained the average value of the implementation of learning that applied the use of the virus model in the first cycle =2.56 (Good) and there are still sufficient learning implementation components so that it needs to be improved in the second cycle is the core activity component. Activities that have been good in the implementation of the first cycle of learning include: (1) some students already have ideas and creativity in designing virus models, ask each other questions and collaborate well. Some of the shortcomings that still occur include: (a) The formation of groups in the first cycle is less effective. At the first meeting, the students did not want their groups to be formed in an absent sequence, so the class atmosphere...
became noisy. At the second meeting students tend to be busy and busy playing alone because they are in groups with their close friends, (b) Students still have not carried out discussions well in designing virus models. There are still students who work individually while others just follow.

Student learning outcomes and improvements in the first cycle obtained based on the results of the assessment carried out during and at the end of the action cycle, as well as by comparing the results of the assessment in the initial conditions (pre-cycle), students' learning outcomes and improvements in the first cycle were obtained as shown in Table 2 and Picture 3 below.

**Table 2: Student Learning Outcomes and Their Improvement in Cycle I**

<table>
<thead>
<tr>
<th>Value (N)</th>
<th>Category</th>
<th>Pre-Cycle Learning Outcomes</th>
<th>Learning Outcomes in Cycle I</th>
<th>Improved Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Student Street</td>
<td>%</td>
<td>Student Street</td>
<td>%</td>
</tr>
<tr>
<td>N &lt; 70</td>
<td>Not Complete</td>
<td>21</td>
<td>13</td>
<td>37.14</td>
</tr>
<tr>
<td>N 70</td>
<td>Complete</td>
<td>14</td>
<td>22</td>
<td>62.86</td>
</tr>
</tbody>
</table>

Source: Cycle I Assessment Results (2019).

Table 2 above shows that the results of the first cycle of action from all students are 35 students, who have completed learning as many as 22 students (62.86%) which means an increase of 8 students (22.86%) compared to the results of the pre-cycle (initial condition/before subject to action). Based on the results of the researcher's discussion with the observer on the data analysis of observations and assessments of student learning outcomes in cycle I, as well as comparing them with indicators of research success, it shows that although there has been an increase in learning outcomes, there are still shortcomings in the implementation of learning cycle I and classical learning completeness has not reached 85%.

Therefore, the researcher will continue the action of Cycle II, by making changes and improvements in the learning that will be carried out, namely: (1) Increasing guidance and direction so that all group members can work well together, (2) Creating a pleasant but controlled discussion atmosphere in the presentation of the virus model that was made, (3) Motivate so that students are more confident in expressing their opinion and speaking in front of the class in providing constructive comments and input for other groups in presenting the virus model that has been created and used.

As in cycle I, at this stage the teacher together students carry out learning by applying the discussion method in the use of the virus model, according to the planned learning scenario and according to the applicable schedule at school. The implementation of the second cycle of actions was carried out in 3 meetings (6 hours of lessons, @ = 45 minutes). Based on the results of observations by observers for three meetings, the average value of the implementation of learning that applies the discussion method in cycle II = 3.86 (Very Good) and all components of the implementation of learning have achieved a score of 3.00 (Good and/or Very Good).

Based on the results of the assessment carried out during and at the end of the second cycle of action, as well as by comparing the results of the assessment in the first cycle of action, students' learning outcomes and improvements in the second cycle were obtained as shown in Table 3 and Picture 4 below.
Table 3: Student Learning Outcomes and Their Improvement in Cycle II

<table>
<thead>
<tr>
<th>Value (N)</th>
<th>Category</th>
<th>Learning Outcomes in Cycle I</th>
<th>Learning Outcomes in Cycle II</th>
<th>Improved Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Student Street %</td>
<td>Student Street %</td>
<td>Student Street %</td>
</tr>
<tr>
<td>N &lt; 70</td>
<td>Not Complete</td>
<td>13</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>N 70</td>
<td>Complete</td>
<td>22</td>
<td>30</td>
<td>8</td>
</tr>
</tbody>
</table>

Source: Results of Cycle II Assessment (2019).

Table 3 above shows the results of the second cycle of action from all 35 students, who have completed learning as many as 30 students (85.71%) which means an increase of 8 students (22.85%) compared to the results in the first cycle. Based on the results, the researcher's discussion with the observer on the analysis of observational data, the assessment of student learning outcomes in cycle II, and comparing it with the indicators of research success, shows that there has been an increase in student learning outcomes as expected. Therefore, researchers and observers agreed not to proceed with the Cycle III action. The increase in student learning outcomes in cycles I and II can be seen in table 4 and figure 4 below.

Table 4: Student Learning Outcomes and Their Improvement in Cycles I and II

<table>
<thead>
<tr>
<th>Completeness of Student Learning Outcomes</th>
<th>Enhancement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Cycle</td>
<td>Cycle I</td>
</tr>
<tr>
<td>40.00%</td>
<td>62.86%</td>
</tr>
</tbody>
</table>

Source: Research Results (2019)

From table 4 above, it shows that after the implementation of learning by creating and using viral model props in Biology learning in class X IPA 3 SMAN 1 Balikpapan there was an increase in student learning outcomes by 45.71%, namely: in the first cycle of 22.86% (from 40.00% in Pre-Cycle to 62.86% in Cycle I), in cycle II of 22.85% (from 62.86% in Cycle I to 85.71% in Cycle II).

Discussion

In the pre-action, only 14 students (40%) of the total 35 students had achieved the criteria for success. This is because the learning carried out is still teacher-oriented, students have not been given the stimulus to develop their creativity in making virus models, understanding of the structure of the virus body is only based on literature studies, while viruses are very microscopic organisms, so teacher innovation is needed in designing learning that can overcome these conditions [8], [9].

In the first cycle, the students who achieved the success criteria increased to 22 students (62.86%) from 35 students. In this first cycle, biology learning has implemented learning by using a virus model, students are stimulated to design a virus model according to the structure of the virus body so that students experience directly designing the virus body parts in the design of the virus model they make.

At the end of the second cycle, there were still 5 students who had not reached the success criteria out of a total of 35 students. This is because these students do have lack confidence and are still dependent on friends, so it takes enough time for them to adapt to their friends in making virus model designs. Based on the results of observations and reflections made by the teacher, the implementation of biology learning by using the virus model has been as expected, as evidenced by the decrease in the number of students.
who have not experienced learning mastery and students who have experienced learning mastery have increased. Most of the students have demonstrated their ability to design the shape of a virus and have succeeded in making a virus model.

The results also show that students can carry out learning by using teaching aids properly so that student learning outcomes gradually increase. Yelianti stated that the application of actual teaching aids was very effective in improving learning outcomes. The virus model is also an actual teaching aid that can improve the learning outcomes of the biology of the material structure of the virus body [5]. These results are also in accordance with the results of Hamansah’s research which states that the application of teaching aids has an increasing effect on the learning process in the classroom [4]. This shows that learning with the use of viral models which can be referred to as teaching aids can also improve biological learning outcomes on the material structure of the virus body, which is very relevant to these studies. The virus model is an actual and contextual form that was designed by students themselves as a form of student creativity, the original work of students made by themselves and collaboration with other students with the spirit of mutual cooperation, and the virus model was presented in learning that really sided with the students [10]-[13]. The design and manufacture of virus models made by students are in accordance with students' creativity according to their interests, talents, and learning profiles so that learning by using the virus model is real evidence of the implementation of differentiated learning that is realized by teachers in the classroom which can improve student learning outcomes in order to realize Profile of Pancasila Students, carried out with the spirit of independent learning [14]-[16].

4. Conclusion

The use of the virus model in learning the biology of viral body structure material in class X IPA 3 SMA Negeri 1 Balikpapan can increase student learning outcomes by 45.71%, namely: in the first cycle by 22.86% (from 40.00% in the pre-cycle to 62.86% in Cycle I and 22.85% in Cycle II.

References


