Best practice to improve students' HOTS using simple tool media-based learning in group investigation model at the State Senior High School 1 Manokwari

by Irfan Yusuf

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I Yusuf[1], Mujasam[1], S W Widyaningsih [1,*] and S Djalimun[2]

[1]Department of Physics Education, Universitas Papua, Jl. Gunung Salju Amban, Manokwari 98314, Indonesia
[2]The State Senior High School 1 Manokwari, Jalan Palapa Reremi No. 1 RT2/RW2, Manokwari, 98312, Indonesia

[*]Corresponding author: s.widyaningsih@unipa.ac.id

Abstract. Classroom Action Research (CAR) has been conducted which aims to improve Higher Order Thinking Skills (HOTS) of The State Senior High School 1 Manokwari students after applying simple Group Assisted Learning (GI) learning to physics subjects of rigid body equilibrium material. The CAR model used in this study was the Kemmis and Mc Taggart models which consist of two cycles, each of which consists of 4 stages, namely planning, implementing action, observation, and reflection. The instrument used in this study was the HOTS test of students given before and after learning in each cycle and the questionnaire responses of students filled by students after learning. The data analysis technique used was descriptive analysis to describe HOTS students and Rasch model techniques using winstep and facet applications fo analyze students' responses after learning. The results showed that there was an increase in HOTS of students in cycle 1 and cycle 2. Rasch model results show that most students have a very good response to learning. Therefore, GI learning assisted by simple props media can be applied to rigid body equilibrium material at The State Senior High School 1 Manokwari to develop HOTS students.

1. Introduction

Teaching aids are one of the tools to assist in practicum activities. Teaching aids in learning have an important role in helping improve students' understanding and learning outcomes. Props can be designed using local materials available in the surrounding environment or known as simple teaching aids [1]. The product development of teaching aids is simple although simple regarding appearance but can explain the working principles and material concepts, especially in physics subjects which consist of various kinds of abstract phenomena so as not to cause misconceptions [2].

The results of observations of the implementation of physics learning at The State Senior High School 1 Manokwari showed that students were constrained in understanding the subject matter, especially about physics experimental material. Physics subjects consist of various material concepts that occur in everyday life so that the learning process needs to involve students in finding and finding themselves through practical activities [3]. Not all practicum activities can be carried out in the laboratory because of the limited supporting facilities and infrastructure so that teachers are required to be creative in the implementation of learning. One solution that can be done is to use simple media props

in learning. The use of simple teaching aids is expected to improve students' thinking skills and abilities or what is known as Higher Order Thinking Skills (HOTS).

HOTS is the ability of students to think and connect concepts learned with concepts that they have not learned before [4]. Students need to be trained in their HOTS abilities so that they can be creative and innovative in solving various problems faced [5]. One learning model that can be applied using simple teaching media is the Group Investigation (GI) model. The GI model includes collaborative stages of the investigation so that it is expected to develop the ability of students to work together to find solutions to a problem [6,7]. The GI-assisted model of simple teaching aids media involves the activities of students to find and find their concepts so that their HOTS is expected to be developed.

2. Method

This research was a type of classroom action research (CAR). The CAR model used in this study was the Kemmis and Mc Taggart models which consist of two cycles, each of which consists of 4 stages, namely planning (planning), implementing actions (action), observation (observation), and reflection (reflection) [8]. The CAR research subject was class XI Science 5 The State Senior High School 1 Manokwari of West Papua. The instrument used in this study was the HOTS test of students given before and after learning in each cycle and the questionnaire responses of students filled by students after learning. The data analysis technique used was descriptive analysis to describe HOTS students and Rasch modeling techniques using winstep and facet applications to analyze students' responses to GI-assisted learning with simple media props.

3. Result and Discussion

The implementation of GI learning assisted by simple teaching aid media was carried out in class XI Science 5 of The State Senior High School 1 Manokwari through classroom action research activities. Learning was conducted during four meetings consisting of two cycles. The learning stages follow the GI learning model which starts from identifying the topic of the material and dividing the students into groups, planning assignments, making investigations through the use of simple teaching aids, preparing the final project, presenting the final project, and finally the evaluation [9]. The situation in learning that describes the stages of activity as in Figure 1.

Figure 1. GI learning using simple props media

Figure 1 shows the activities of students during classroom learning activities. Students look enthusiastic in designing simple teaching aids and increasing their collaboration in learning. The application of the GI model can train students' collaboration and their understanding of the subject matter through a discussion process that is interwoven into the group [10]. Learning through group discussion can increase student activity in learning [11]. Students were active during learning, starting with the preparation of simple teaching aids, data collection, and group presentation stages.

The application of the GI model assisted by simple teaching aids can increase the participation of students in learning so that their HOTS can improve. HOTS is very important to be developed in physics because it consists of real problems that are often found in everyday life so that it requires the ability to think critically and creatively. HOTS can be realized in learning if the level of thinking is critical and creative thinking is integrated into the learning process and evaluation [12,13]. The use of learning models and media that involve the activities of students in learning can increase HOTS [14,15]. Table 1

shows the increase in HOTS of students during the implementation of GI learning with the help of simple teaching aids in class XI Science 5 of The State Senior High School 1 Manokwari .

Tabel 1. HOTS frequency distribution of students

Interval Class	Initial Test		Cycle 1		Cycle 2	
	Frequency	Cumulative Percent	Frequency	Cumulative Percent	Frequency	Cumulative Percent
44-52	2	6.5	2	6.5	0	0
53-61	7	29.0	9	35.5	1	3.2
62-70	16	80.6	9	64,5	4	16.1
71-79	0	80.6	4	77.4	17	71.0
80-88	6	100.0	3	87.1	4	83.9
89-97	0	100.0	4	100.0	5	100.0
Total	31		31		31	
Min	85,0		90,0		95,0	
Max	45,0		50,0		55,0	
Average	66,7		68,1		77,4	
SD	10,9		11,7		9,2	

Table 1 shows the HOTS frequency distribution of students during the implementation of simple teaching aids for media teaching aids. The number of students who actively participate in learning activities was some 31 people from 40 students of class XI Science 5 of The State Senior High School 1 Manokwari. HOTS value of students has increased in each of its meetings. On the initial test, the average HOTS 66.7 ± SD 10.9 had an increase in cycle 1, which was obtained on average HOTS 68.1 ± SD 11.7. In cycle 2, the average HOTS of students was 77.4 ± SD 11.7. HOTS assessment results of students continued to increase from before. Learning the GI model assisted by simple teaching aids can make students active in learning. The activity of students in learning can be the beginning to increase their HOTS [13,16].

HOTS can be trained in learning through the active involvement of students in finding and finding their concepts through the use of learning media prepared by educators [17]. Educators, in this case, have a very important role. HOTS emphasizes the realm of knowledge including analytical, evaluating and creating abilities to make educators have to work extra to instill in their student's high-level thinking [18]. Instill how to train critical thinking, creative thinking, and problem-solving skills, in which these three aspects are indicators of HOTS. To instill this, it certainly requires the ability of educators to create varied learning activities.

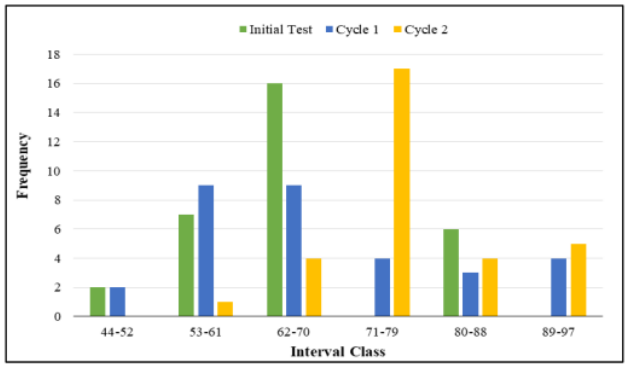

Figure 2. Increased HOTS of students in each learning cycle

Figure 2 shows that the results of the initial measurements of HOTS students were obtained that most of them were still low at the lower intervals. In cycle 1 experienced an increase in the value of HOTS measurement students began to be distributed at medium and upper intervals. The increase of HOTS students was seen in cycle 2, that was, most of the students' grades were high. This shows that the learning done can develop HOTS students.

Increased HOTS students have been seen at each meeting during the learning. Students were always active in asking questions and working in groups. Learning can develop students' curiosity, so they were interested in learning. Students can connect, manipulate, and transform the knowledge and experience they already have to think critically and creatively to make decisions and solve problems in new situations. Students effectively gain a deep understanding of the material learned through the use of simple media props. As when conducting experiments determining the weight of homogeneous objects by using used cardboard as a homogeneous object media, students seemed enthusiastic in conducting experiments. Experiments carried out using simple props media were very effective because the materials were easy to obtain and do not require expensive costs to design a practical activity [1,19]. Students try themselves in conducting experiments without them having to worry about damage to the tools and materials used because the materials were easily obtained. Active involvement of students in conducting experiments can be seen when they observe, record, process data, summarize experimental results and report on the results of activities. This is also due to GI learning, presenting material through stages of inquiry so that students are directly involved in learning [20].

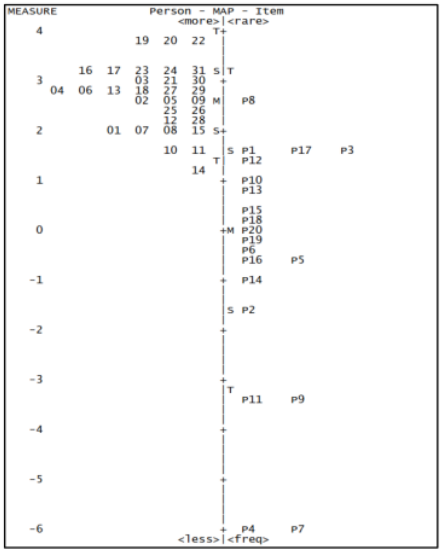

Figure 3. The results of the analysis of students' responses to the learning that has been done

Students try to investigate problem solutions through the process of collecting data, analyzing, and evaluating activities and drawing conclusions and applying their understanding of new knowledge in achieving group problem solutions. In the final stage of GI learning, students present their work. The application of the GI model has several advantages, among others, can develop students' thinking ability in learning the subject matter, develop the ability of students to collaborate in groups actively and express opinions in group discussions, and students can develop good skills in interacting and communicating in groups. Presentation of students' work was done in groups through presentation slide

shows using computer media. The use of computer media in displaying student work is very effective because students can present and display every detail of their findings during the experiment using simple props [21].

At the end of the learning, students' responses were evaluated to find out their responses during the learning activities. The students' responses to learning using the GI-assisted model of simple teaching aids are shown in Figure 3.

Figure 3 shows that on the map on the left 17 students have a high level of ability to approve all statement items in the response questionnaire given. There is one statement on the right map, namely P8 about a simple teaching-based GI model creating an independent learning atmosphere. This is because the classroom learning method is applied so that students are expected to cooperate in finding solutions to a problem. Through this collaboration, it is hoped that it can improve the HOTS 'abilities of each student [22]. At the bottom left of the map, there is one student with a low level of ability or the lowest level of agreement compared to other students. On the right side of the map, it can be seen that most of the statements given were approved by students so that overall students showed a very good response to the learning carried out.

4. Conclusion

The application of a simple teaching-based GI model was very instrumental in increasing HOTS of students of class XI Science 5 The State Senior High School 1 Manokwari . In the initial test, the average HOTS 66.7 ± SD 10.9 has increased in cycle 1, which was 68.1 ± SD 11.7, and in cycle 2, the average HOTS of students was 77.4 ± SD 11.7. Students' responses to general learning were also very good, so it can be concluded that the application of simple teaching-based GI models can train HOTS students.

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