JPF | Volume 10 | Number 3 | 2022 | 219 - 226

p - ISSN: 2302-8939
e - ISSN: 2527-4015

Jurnal Pendidikan Fisika

https://journal.unismuh.ac.id/index.php/jpf

DOI: 10.26618/jpf.v10i3.8812

Implementation of Students' Worksheets to Improve Critical Thinking Skills

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Received: 07 June, 2022; Accepted: July 20, 2022; Published: August 31, 2022

Abstract – *This study aims to (1) provide an overview of the critical thinking skills of students at SMAN 3 Enrekang, (2) to analyse the improvement of students critical thinking skills using the environment based students' worksheets at SMAN 3 Enrekang (3) to analyse the improvement of students' critical thinking skills using the conventional students' worksheets at SMAN 3 Enrekang (4) to compare the use of environment-based students' worksheets and conventional ones. The research is a quasi-experimental study. The independent variable is the learning model and the dependent variable is the critical thinking skills of students in learning physics. The population in this study were all students of class XI MIPA. Taken by using purposive sampling technique, class of XI MIPA I was the experimental class and XI MIPA II was the control class. Based on descriptive statistical analysis, it was found that (1) the average pretest and post-test scores of critical thinking skills in the experimental class are both in the high category, while the pretest and post-test scores in the control class was the sufficient category and the high category, respectively (2) there is an increase in students' critical thinking skills in using an environment based students' worksheets strategy at SMAN 3 Enrekang, (3) there is an increase in students' critical thinking skills using conventional students' worksheets, (4) there are differences in the use of environment based student worksheets where the* P_{value} *obtained is 0,15 smaller than α 0,05. These results indicate that there are differences in critical thinking skills of students of SMAN 3 Enrekang when using environmental-based student worksheets and without using environmental-based student worksheets.*

Keywords: *critical thinking skills; environment; learning strategies*

I. INTRODUCTION

Education is one of the factors of national development that functions as an effort to improve the quality of human life. Education can produce quality human resources. A simple process that describes the interaction of educational elements can be clearly seen in the learning process that occurs in institutions formal education, specifically in the classrooms. Educators teach science and skill scores to students. People who are directly and indirectly involved must realize that the future of the nation is largely determined by the quality of education implemented. Various efforts in order to improve the quality of education are

always carried out, adjusted to the development of the situation and conditions that occur (Mukminan, 2014; Subekti & Prahmana, 2021).

Education in the era of globalization is expected to produce human resources who have complete competencies or commonly called 21st century competencies. One of the characteristics that mark the 21st century education is the increasingly interconnected world of science and technology. Education must consider various things such as graduate competence, educational contents, as well as the learning process. Various countries in the world are trying to formulate the characteristics of the 21st century. According to Trilling & Fadel (2009) there are a number of basics of the 21st century learning, one of which is critical thinking and problem solving skills, namely skills that are able to think critically, laterally and systematically, particularly in the context of problem solving.

Education of the 21st century by some experts (Beyer, 1995; Angelo, 1995) states that critical thinking is a sense that used the criteria to disk the quality of something, from the simplest activities such as normal daily activities to compile the conclusion of a writing used by a person to evaluate validation according to the questions, ideas, arguments, and research. Critical thinking is a power and energy source in a social life and personal person, which can be earned from the human interaction with the environment.

Students have obstacles in understanding physics learning. As a result, the atmosphere in the classroom is not good and students become bored in the learning process. Based on this, teachers should use environment-based students' worksheets in order to encourage students to be more active and understand more about physics material because students can see directly the application in life.

Environmental-based learning is one of the activities that can develop critical thinking skills, because it can create an interesting learning process, and is more creative and not monotonous. student worksheets is an activity sheet for the learning process to find science concepts either through theory, demonstration, or investigation accompanied by clear instructions and work procedures. The purpose of the student worksheets is to train thinking skills and science process skills in completing tasks according to the learning indicators to be achieved, so that the mindset of these students can improve (Firdaus & Wilujeng, 2018). Several experts (Agustina, et al., 2019; Rahmatillah et al., 2017; Abdurrahman et al., 2019) stated that students' worksheets is a teaching material that contains a more focused, structured guide for students to carry out problem solving activities.

Wulandari & Surjono (2013) stated that the role of the Learner Worksheet (student worksheets) is very large in the learning

process because it can increase the activity of learners in learning and its use in learning can help teachers to direct their students to find concepts through their own activities. There are differences in science learning outcomes between classes that use the environment-based Student Worksheet and classes that do not use the environment-based Student Worksheet (Handayani et al., 2019; Suryawati et al., 2020).

According to Prastowo (2013), in preparing student worksheets, there are several conditions that must be met by educators. Educators must be careful, and have adequate knowledge and skills to be able to make good student worksheets. An Student worksheets must meet the criteria relating to whether or not the basic competencies are mastered and understood by students. According to Purnamasari et al., (2020) states that the preparation of a good student worksheets must have three important requirements, namely didactic requirements, construction requirements, and technical requirements. There are several steps in the preparation of the student worksheets, namely curriculum analysis, competency analysis, determining the title of the student worksheets, and writing the student worksheets Depdiknas (2008). From this theory, information is obtained that student worksheets is very important for students where in compiling a good student worksheets must use the conditions. According to Toharuddin et al., (2011), the objectives of preparing student worksheets are: (1) strengthening and supporting learning objectives and achievement of indicators, as well as basic competencies and competency standards that are formulated, and (2) helping students to achieve learning objectives. Based on this description, the authors designed a study with the title "implementation of environmental-based student worksheets to improve critical thinking skills of students of SMAN 3 Enrekang"

II. METHODS

This research employs a quasi-experimental design, which is a type of research that has a control class, but cannot fully function to control external variables that affect the implementation of the experiment (Sugiyono, 2019). The research design used was a pretest-posttest control group design. The research design can be seen as follows:

Table 1. Research Design

Pre-test	Treatment	Post-test
O_1	X	O_2
O_3	-	O_4

Source: (Sugiyono, 2019).

The population in this study were all students of class XI MIPA SMAN 3 Enrekang which consisted of seven classes. The sample of this research was selected by using purposive sampling. The technique of analysis used is descriptive statistics and inferential statistics.

III. RESULTS AND DISCUSSION

The results of the pretest of students' critical thinking skills in the experimental class (XI MIPA 1), namely the percentage of students' critical thinking skills scores in the experimental and control classes can be seen as follows.

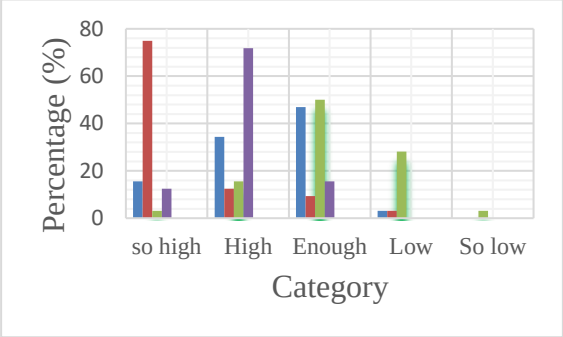

Figure 1. Percentage of Learners' Critical Thinking Skills Scores in Experimental and Control Classes Based on Frequency Distribution

In the experimental class, the result of pretest showed that the percentage of students' critical thinking skills scores were mostly in the sufficient category with a percentage of 46.88%, while the post-test result showed that the students' critical thinking skills scores were in the high category with a percentage of 75%. Furthermore, In the control class, the pretest result showed that the students' critical thinking skills scores were in the sufficient category with a percentage of 50%, while the post-test result was in the high category with a percentage of 71.87%.

Table 2. Test Results Paired Simple Test

Treatment	t_{hit}	t_{tab}	DF	p_{value}
Pre-post (exp)	5.496	2.036933	31	000
Pre-post (con)	7.649	2.036933	31	000
control-exp	1.451	2.036933	31	0.15

Table 2 reveals the results of statistical tests using the t test. In treatment 1, $P_{value}>0.05$, in treatment 2 $P_{value}>0.05$, and in treatment 3 $P_{value}>0.05.$, which means that Ho is rejected and H1 is accepted. It indicates that the use of environmental-based student worksheets is effective to improve critical thinking skills of students of SMAN 3 Enrekang.

The results of statistical tests using the independent simple test statistical test obtained $P_{value}>0,05$, which indicates Ho is rejected and H1 is accepted. This means that there are differences in the use of environment-based student worksheets and conventional student worksheets in improving critical thinking skills of SMAN 3 Enrekang students.

Table 3. Normalized Gain Score

Gain Score	Experi-mental	Control	Category
G>0,7	7	4	High
0,3≤g≤0,7	15	10	Medium
G<0,3	11	18	Low
Total	32	32	

Table 3 shows the n-gain scores which are divided into three, namely high, medium and low categories. There are 7 students' score of experimental class and 4 students

scores of control class categorized as high. Furthermore, almost half of the students' scores of the experimental class and 10 students' scores of the control class are in the medium category. Lastly, 11 students' scores of the experimental class and more that a half of students' scores of the control class are in the low category. Meanwhile, the average N-gain score in the experimental class is 0.43 and the average N-Gain score for the control class is 0.36. It indicates that there is an increase in students' critical thinking skills when using environmental-based student worksheets and without using student worksheets. environment based.

The results of the analysis of the experimental class and the control class reveal that there is an increase in critical thinking skills in the experimental class, both in pretest and post-test, compared to the control class. The low score obtained by the control class is due to the fact that students do not have prior knowledge of a concept, so it is difficult to relate one concept to another (Ivie, 2001; Wahyuni et al., 2021).

As stated by Docktor & Mestre (2014), when students come to a class, they actually bring something in the form of fragmented knowledge, so students have difficulty when relating a concept to one another. In addition, study habits can also give effects because students are more likely to feel comfortable with the teacher's explanation without further questioning what they have heard, so that they do not develop their critical thinking skills.

From some of these opinions, it can be seen that critical thinking skills factors such as physical conditions, learning methods and interactions between students and educators can affect students' critical thinking skills.

Critical thinking students really need to be developed for their success in education and in society (Uki, 2017). Educators must use learning methods so that students can easily understand the lessons delivered. One of the methods used by researchers is environmental-based student worksheets.

Based on the analysis of the experimental class and the control class, it can be concluded that there is an increase in students' critical thinking skills using environment-based student worksheets and ordinary student worksheets. There is an increase in students' critical thinking skills due to several factors. One of them is learning using environmental-based worksheets that make students play an active role in the learning process. In this case, students are active in asking, answering, and active in group learning.

The use of environment-based student worksheets really supports the improvement of students' critical thinking skills because the student worksheets contains conditions that exist in the environment that students often encounter everyday, both from the school environment and where they live. The use of environment-based student worksheets is easy

to understand because the materials used are found in everyday life and can motivate in doing practicum, the potential and problems are actually shown.

Furthermore, there are differences in students' critical thinking skills of SMAN 3 Enrekang students when using environmental-based student worksheets. This is because the use of environmental-based student worksheets teachers carry out the learning process by forming students into several groups. Then, the teacher gives freedom to students to think, find references from various sources, and collect data that has been obtained and conduct trials of completion of the ideas that have been obtained so that students are more active, enthusiastic and motivated to go directly to solving problems in the process of learning.

The research conducted by Kurniawan (2017) revealed that there is an increase in students' critical thinking skills because they are allowed to find the problem itself, so that students better understand the problem. Furthermore, according to (Izza et al., 2016; Mustika et al., 2020), the improvement of students' critical thinking skills on learning outcomes is because learning activities involve a scientific approach guided by teachers and aspects of critical thinking skills that are trained through observation and experimentation activities guided by LKS.

Dhina & Mubaroq (2017) also found that critical thinking skills increased due to the treatment of group investigation learning according to the application of environmental-based student worksheets. According to Mariani (2014), the learning outcomes achieved by students through an student worksheets-based guided discovery learning model make students motivated in following learning materials and students do not feel bored in learning a subject, especially Physics subjects, because students are active in discussing, asking questions, doing questions and there is a multi-directional interaction both between students and students and between educators and students. This can be seen from the high motivation of students to complete each task given at a predetermined time.

IV. CONCLUSION AND SUGGESTION

Based on the results of the research and discussion in the previous chapter, it can be concluded that an overview of the critical thinking skills of students of SMAN 3 Enrekang, namely: The pretest results of the student's experimental class are in the sufficient category with a score range of 5-6 and a percentage of 46.88%; The post-test results of the student's experimental class were in the high category with a score range of 7-8 and a percentage of 12.5%; The pretest results of the control class of students are in the low category with a range of 3-4 and a percentage of 28.12%; The post-test results of the student's control class were in the high category with a score range of 6-8 and a percentage of 71.87% . There is an increase in

students' critical thinking skills after using environment-based student worksheets where the P value obtained (0.01) is less than α 0.05; There is an increase in students' critical thinking skills by using conventional student worksheets where the P value obtained (0.01) is less than α 0.05; There are differences in the use of environment-based student worksheets where the P_{value} obtained is 0,15 smaller than α 0,05. Based on the results and discussion, it can be concluded that student's critical thinking skills can be improved by using student worksheets.

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