Jurnal Pembelajaran Sains
VOLUME 5 Number 2, December 2021

http://journal2.um.ac.id/index.php/
ISSN: 2527-9157

ANALYSIS OF LEARNING ACTIVITIES AND OUTCOMES THROUGH STATIC FLUID LKPD BASED ON VIRTUAL LAB ON STUDENTS OF MAN 1 JEMBER

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Abstract
Static fluid material is one of the materials in school where some students still have difficulty understanding concepts. The learning process using LKPD is more effective than without using LKPD because the use of LKPD allows students to be active in learning activities. The research method used by the author is descriptive qualitative. This study used pretest and posttest to determine the development of students' science process skills. Based on the results of the analysis that has been carried out, it has been proven that the virtual lab-based LKPD has a positive effect on the activities and learning outcomes of MAN 1 Jember students. This is evidenced by the post-test value which is higher than the pretest value. Besides that, With LKPD students become more active and have a higher interest than without using LKPD. Based on the analysis that has been done, it can be concluded that the use of Static Fluid LKPD has a positive influence on the activities and learning outcomes of MAN 1 Jember students.

Keywords*: PjBL Model, Learning Achievement, LKPD*

Received: June 2022, Revised: July 2022, Published: July 2022

INTRODUCTION

Physics is a field of science that deals with abstract concepts. Physics has an abstract nature because it is difficult and some physical materials cannot be described directly with the five senses. Therefore, physics subject matter should be explained properly so that students easily understand the concepts taught by educators(Wahyuni et al., 2021).

Static fluid material is one of the materials in school where there are still many students who have difficulty and confusion in understanding the concept. The mistakes that students often encounter in static fluid materials are understanding the concepts of hydrostatic pressure, absolute pressure, and buoyant force. These problems arise because teachers do not relate the concepts in static fluid material to everyday life and often teachers still use conventional methods that are commonly used namely lectures (Zani et al., 2019).

Mastery of concepts is an important part of what teachers teach students. Solving physics problems requires mastery of concepts. If the new concept is by the previous concept, then meaningful learning occurs. In addition to mastery of concepts, science process skills are also important, because physics requires science process skills. The properties of physics are the same as those of the general sciences so learning physics cannot be separated from the scientific process starting from mastering the basic concepts of ps. Connecting previous experiences and putting them into practice is one of the characteristics of physics that requires science process skills. In addition, the nature of physics in the scientific field requires process skills in identification, analysis, concluding, and decision making (Yadaeni et al., 2018).

Science process skills are very important skills to develop students' skills in solving problems. Science process skills can make students creative, critical thinking, open, innovative, and competitive, so they can compete in the global era(Nosela et al., 2021). Science process skills are very important skills in the science learning process, especially for studying physics which reflects the behavior of scientists. In Indriani's research (2017) the science process skills used in the experiment resulted in students' pretest scores being lower than students' post-test scores.

Project-based learning (PjBL) is a student-centered learning model. By carrying out learning activities, there is a comprehensive collaboration between teachers and students according to their respective abilities(Muslem et al., 2019). The implementation of project-based learning has succeeded in increasing students' academic achievement. Project-based learning facilitates students in investigating problems according to the facts, productive discussions, and enthusiasm for learning, thus making learning effective (Novianto et al., 2018).

One of the learning steps carried out in project-based learning (PjBL) is experimentation with the help of a virtual laboratory. A virtual laboratory is a virtual laboratory that integrates media components in the form of text, images, animation, sound, and video. Virtual labs can be run with the help of the internet (Anggelino in Nosela et al., 2021). Virtual laboratories can be used to support a practicum system that runs routinely and provides visualization of how practicums are carried out, as well as overcoming obstacles that make it difficult for practicum activities to experiment with physical materials in a real laboratory due to limited tools (Nosela et al., 2021).

Learning media is an important tool to support teaching activities(Ode and Ambarwati, 2021). Learning media is very diverse, one of which is LKPD. LKPD aims to assist students in learning so that students can easily understand the concept of the material through these learning activities. Based on the study of literature, learning media helps students understand the subject matter and also provides reinforcement to students about the subjects being taught(Musdar et al., 2015).

LKPD is a sheet that usually contains assignments in the form of instructions or steps that must be completed by students(Maryani et al., 2017). LKPD can increase student engagement and achievement. Research (Yildirim et al., 2011)shows that the use of LKPD is more effective than the learning process without LKPD because the use of LKPD allows students to play an active role in learning activities.

RESEARCH METHODS

The research used descriptive qualitative. This study used pretest and post-test to determine the development of students' science process skills. The research process was carried out by direct observation to the intended school. The sample in the study were students of class XI MAN 1 Jember, totaling 28 students, with a research time of 3 meetings starting in mid-May 2022. First, students took a pretest or preliminary test before receiving treatment in the form of working on LKPD. Then, in the second stage, students learn in the form of a virtual lab-based practicum regarding static fluid material in the available LKPD. At the third meeting, students did a post-test on understanding static fluid material.

RESEARCH RESULTS AND DISCUSSION

Based on the results of the research with the LKPD trial, the results of the pretest and post-test scores are shown in Tables 1 and 2 below.

Table 1. Pretest Data

Category	Score	Frequency	
		F	%
Very good	81 - 100	4	14.29
Well	71 - 80	7	25
Pretty good	61 - 70	7	25
Not enough	≤60	10	35.71

Source: (Primary Data, 2022)

Based on table 1, it can be seen that the results of the pretest scores for static fluid materials in the very good category are 14.29%, good as much as 25%, quite good as much as 25%, and not good as much as 35.71%. Based on these data, it can be seen that the unfavorable category has the highest frequency as many as 10 students with a percentage of 35.71%.

Table 2. Results of Post-test Score

Category	Score	Frequency	
		F	%
Very good	81 - 100	12	42.86
Well	71 - 80	15	53.57
Pretty good	61 - 70	1	3.57
Not enough	≤60	0	0

Source: (Primary Data, 2022)

Based on table 2, it can be seen that the post-test scores for static fluid materials are in the very good category of 42.86%, good as much as 53.57%, quite good as much as 3.57%, and not good as much as 0%.

Based on these data, it can be seen that the very good and good categories have the highest frequency compared to other categories. The good category has a frequency of 15 students with a percentage of 53.57% and the very good category has a frequency of 12 with a percentage of 42.86%.

Table 3. Results of Pretest and Posttest Data

	The highest score	Lowest Value	Average	Standard Deviation
Pretest	85	40	68.75	12.59
Posttest	100	70	83.21	7.96

Source: (Primary Data, 2022)

Based on table 3, it can be seen that the use of LKPD affects learning outcomes, it can be seen in the results of the pretest and post-test scores. In the pretest, the lowest score was 40 and the highest value was 85, while in the post-test there was an increase in the value with the highest score of 100 and the lowest score of 70. Based on the results of the research that has been carried out, the graph of the average pretest and post-test values is shown as shown in Figure 1 below.

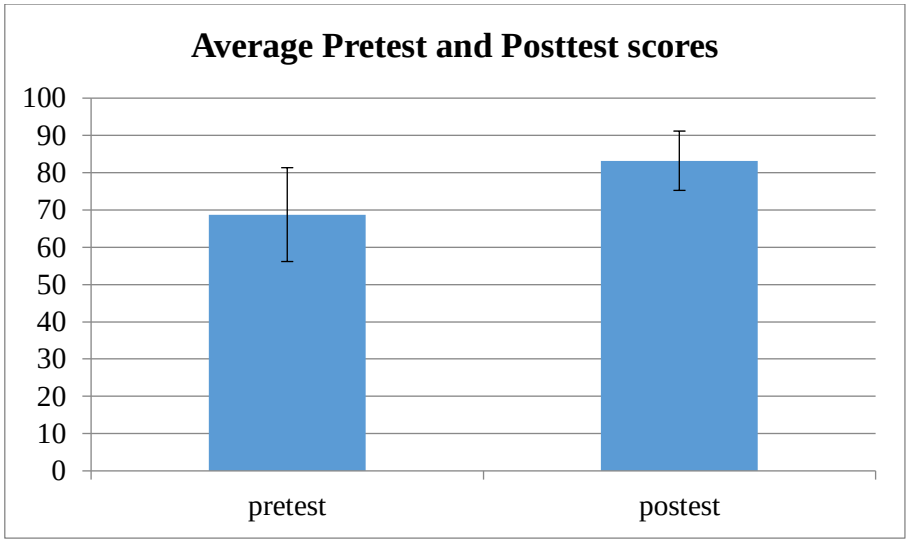

Figure 1. Average Pretest and Posttest scores

From the graph above, it can be seen that the results of the pretest with 28 students had an average of 68.75 and a standard deviation of 12.59, while the results of the post-test with 28 students had an average of 83.21 and a standard deviation of 7.96.

Based on the graph, it can be concluded that the post-test scores have a higher average than the pretest results. In practice, students prefer to learn by using animation such as phet simulation. This is shown by students who are more interested in learning so the Static Fluid LKPD based on a virtual lab is quite effective in being applied in the learning process.

In the research of Fitriani, et al., (2017) it was found that LKPD affected students' creative thinking. The class given the LKPD had a higher average value for creativity than the class without the LKPD. In addition, based on the statistical test the LKPD also affects science process skills as evidenced by the average post-test value of students' science process skills in the class given the LKPD is higher than the post-test score in the class without the LKPD (Kurniawati, et al., 2021)

Based on the results of the research that has been done, it is relevant to previous studies. Based on research with LKPD trials, students become more active in learning. In the application of this LKPD, students have high activity, such as students who actively ask questions or provide input to their friends who are making presentations. In addition, in the learning process students also have a high curiosity about phenomena in virtual lab-based static fluid experiments such as the cause of an object that keeps moving when it is immersed in oil, while water and honey cannot move. Students have a higher interest when conducting experiments using a virtual lab because in the virtual lab there are animations that can help students better understand the material.

Based on the results of the analysis that has been carried out, it has been proven that the virtual lab-based LKPD has a positive effect on the activities and learning outcomes of MAN 1 Jember students. This is

evidenced by the post-test value which is higher than the pretest value. In addition, with LKPD students become more active and have a higher interest than without using LKPD.

CONCLUSIONS AND SUGGESTIONS

A. Conclusion

Based on observations about student activities in learning, students have a higher interest when using virtual labs. Based on the results of the LKPD trial, students had good results with an average posttest score of 83.21, while the average pretest score was 68.75. Based on the results of the study, it can be concluded that the use of Static Fluid LKPD has a positive influence on student learning outcomes at MAN 1 Jember.

B. Suggestion

Static Fluids LKPD based on a virtual lab with three meetings requires careful preparation, therefore it needs better planning and preparation to run effectively. This Static Fluid worksheet can be developed for other materials and used as a guide in learning.

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