Analyzing The Student Experiment Psychomotor Abilities

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Abstract. Analyzing the student experiment psychomotor abilities on SMA Negeri 7 Wajo. This study is a pre-experiment which aims to describe psychomotor abilities in practicum activities. The study subjects were 27 students at X IPA 2 Grade, SMA Negeri 7 Wajo. This research was conducted in 2018/2019 academic year. The study data were gathered by non-test observation sheet. The study results showed that the highest experiment psychomotor abilities indicator is using experiment instruments and materials skill at 86.53 %. The following ability is analyzing and designing experiment at 85.41 %. The lowest ability is interpreting and presenting experiment result at 82.7 %.

Keywords: Practical Activities, Psychomotor Abilities, Observation Sheets

1 Introduction

Science is study of facts, concept, principal and law of nature. These must be discovered systematically. Physics as one of science branches is essentially consist of two aspects. Those are learning product and process. Since physics learning must be rolled in those aspect, learning process must be balanced [1].

Students are expected to actively participate in learning process. Moreover, student must have a scientific attitude and apply scientific methods. These are the reason for applying practicum in learning as methods to make student have experienced in term of solving scientific problem by scientific method.

Practicum is a learning method that help student to understand more concept by direct interaction between student, instrument, and science material [2]. It also improves student intellectual skills by observation and gathering information. Those skills are experimental problem solving, knowledge application, experimental designing, data interpreting, and scientific attitude.

Curriculum should contain the following aspects: (1) religious, (2) attitudes (affective), (3) knowledge (cognitive), and (4) skills (psychomotor). Assessment in experiment does not only cover cognitive aspects but affective and psychomotor aspects. However, one important aspect of assessment in experiment is the psychomotor aspect.

Assessment of psychomotor learning outcomes includes: the ability to use tools and materials, the ability to analyze and plan work procedures, interpret and present experimental results. Psychomotor learning outcomes appear in the form of skills and individual acting abilities [3, 4]. Based on the results of school observations, skills (psychomotor) were less concern as learning outcomes. This is inferred by the implementation of the experiment which

is only done once a semester. The successful development of the cognitive domain is considered sufficient as the completeness of student learning outcomes so that it ignores the psychomotor domain as feedback on the success of students mastering the material provided. Therefore, learning that emphasizes practicum activities can be a learning solution that actively involves students in improving psychomotor learning outcomes in physics learning [5, 6].

2 Method

This study was a Pre-experimental research with One Shut Case Study design. 27 Student were taken as sample from all students of X-Grade in science majority in SMA Negeri 7 Wajo. Sample were taken by random sampling system.

The variables in this study are physics experiment and psychomotor abilities. Experiment is an activity that gives students an opportunity to solve a problem by conducting a series of experiments using laboratory equipment and materials that have been provided. Whereas psychomotor ability is the ability possessed by students when conducting practicum which is assessed by rubric with indicators as follows: ability to use tools and materials, ability to analyze and plan work procedures, interpret and present experimental results.

The study data are gathered by direct observation with indicators assessment rubric. This observation was directed by observation sheet. The study used descriptive analysis with observation sheet analysis techniques. Observation sheet was used to describe student psychomotor abilities in experiment process.

The observation results consisted of experiment psychomotor abilities. Those abilities were given scored by the rubric and those scores were converted into percentage based on Sahertian's experiment psychomotor ability categories based on Table 1.

Table 1. Sahertian's experiment psychomotor ability categories [7].

Score Range	Category
81 – 100%	Very Good
61 – 80%	Good
41 – 60%	Average
21 – 40%	Poor
0 – 20%	Very Poor

3 Results and Discussion

The results of observations of students' psychomotor ability when practicum activities take place can be seen in the following Table 2. Based on Table 2, the highest indicator was using tools and materials ability which is in 86.53%. This is due to student direct interaction to the tools and materials. Students can find out the function of tools and materials provided by themselves. After knowing its function, students can use tools and experimental materials properly and correctly.

In the indicator of using tools and materials ability, the activities observed are students using tools and materials properly and correctly, as well as observing and conducting experiments.

Table 2. Students' Psychomotor Abilities Observation Result.

No.	Psychomotor Abilities	Meeting (%)			Average (%)	Category
		1	2	3		
1	using tools and materials	80,50	86,33	92,75	86,53	Very Good
2	analyzing and plan work procedures	70,33	89,17	96,72	85,41	Very Good
3	interpreting and presenting experimental results.	74,33	83,45	89,93	82,57	Good
	Average				**84,84**	**Very Good**

Based on the study results that show in Table 3 for groups IV and V score is in the very good category. But in groups I, II, and III is in the good category.

Table 3. Recapitulation of using tools and material ability in the 1st Meeting.

No.	Group	Score	Percentage (%)	Category
1	I	6,33	79,13	Good
2	II	6,40	80,00	Good
3	III	6,20	77,50	Good
4	IV	6,60	82,50	Very Good
5	V	6,67	83,38	Very Good
	Average		**80,50**	**Good**

Table 4 show that all of group score has been rosen about 5 percent. All of students' category are in very good for the using tools and materials ability. At the third meeting according to Table 5, group I obtained a fixed score. While other groups experienced an increase in the excellent category. This is because students at the first meeting are still in the stage of learning and understanding the function of the tools and materials to be used. But at the second and third meeting students have understood the function of these tools and materials properly.

Analyzing and planning work procedures is an activity to gather accurate information by observing and experimenting. Analyzing and planning work procedures on this indicator include arranging tools and materials in accordance with LKPD, using simple springs / pendants properly, and measuring time using a stopwatch. In this indicator students are trained to construct their knowledge into skills in terms of assembling tools and materials, and using a spring / swing on the pendulum, measuring time with a stopwatch.

Based on data in the Table 6, Student analyzing and planning ability were in good category but for the first group only in average category. The students' percentage average was in 70.33 point.

Table 4. Recapitulation of using tools and material ability in the 2nd Meeting.

No.	Group	Score	Percentage (%)	Category
1	I	7,00	87,50	Very Good
2	II	6,80	85,00	Very Good
3	III	6,60	82,50	Very Good
4	IV	6,80	85,00	Very Good
5	V	7,33	91,63	Very Good
	Average		**86,33**	**Very Good**

Table 5. Recapitulation of using tools and material ability in the 3rd Meeting.

No.	Group	Score	Percentage (%)	Category
1	I	7,00	87,50	Very Good
2	II	7,40	92,50	Very Good
3	III	7,60	95,00	Very Good
4	IV	7,60	95,00	Very Good
5	V	7,50	93,75	Very Good
	Average		**92,75**	**Very Good**

Table 6. Recapitulation of analyzing and planning experiment ability in the 1st meeting.

No.	Group	Score	Percentage (%)	Category
1	I	7,17	59,75	Average
2	II	9,40	78,33	Good
3	III	8,20	68,33	Good
4	IV	8,60	71,67	Good
5	V	8,83	73,58	Good
	Average		**70,33**	**Good**

Based on data in the Table 7, Student analizing and planning abalitiy rose to very good categori. The table also show the rising percentage point at 18,84 point.

Table 7. Recapitulation of analyzing and planning experiment ability in the 2nd meeting.

No.	Group	Score	Percentage (%)	Category
1	I	10,50	87,50	Very Good
2	II	11,20	93,33	Very Good
3	III	10,00	83,33	Very Good
4	IV	10,80	90,00	Very Good
5	V	11,00	91,67	Very Good
	Average		**89,17**	**Very Good**

At the third meeting according to Table 8, each group experienced an increase into very good category. This was because at the first meeting, students are still confused in terms of assembling tools and materials in accordance with LKPD. In addition, students do not yet know how to use a spring / swing on the pendulum and measure the time using a stopwatch. At the second meeting, students have increased in terms of assembling tools and materials and can use springs / swings on the pendulum properly and appropriately. But there are still students who are still mistaken in the stopwatch reading. From the research data, the average percentage of indicators analyzing and planning work procedures was 85.41% with a very good category.

Table 8. Recapitulation of analyzing and planning experiment ability in the 3rd meeting.

No.	Group	Score	Percentage (%)	Category
1	I	11,00	91,67	Very Good
2	II	11,80	98,33	Very Good
3	III	11,60	96,67	Very Good
4	IV	11,80	98,33	Very Good
5	V	11,83	98,58	Very Good
	Average		**96,58**	**Very Good**

The ability to interpret and present the results of experiments on this indicator includes presenting observations in the tables that have been provided, interpreting the results of experiments into graphs and making conclusions on experiments conducted. In this indicator students are expected to be able to know how to present the experimental data into a table and interpret the graph completely and appropriately.

Based on Table 9, the ability average of students' interpreting and presenting experiment ability was in good category with 74,33%. Group V was in the highest percentage ini Very Good Category, and the rest Group were ini good category. Based on Table 10, the ability average of students' interpreting and presenting experiment ability rose by 9,12 % and was in very good category. There was only III Group which was in good category and the rest group was in Very Good Category.

Table 9. Recapitulation of interpreting and presenting experiment ability in the 1st meeting.

No.	Group	Score	Percentage (%)	Category
1	I	7,83	65,25	Good
2	II	8,40	70,00	Good
3	III	9,20	76,67	Good
4	IV	9,00	75,00	Good
5	V	10,17	84,75	Very Good
	Average		**74,33**	**Good**

Table 10. Recapitulation of interpreting and presenting experiment ability in the 2nd meeting.

No.	Group	Score	Percentage (%)	Category
1	I	10,00	83,33	Very Good
2	II	10,00	83,33	Very Good
3	III	9,40	78,33	Good
4	IV	10,00	83,33	Very Good
5	V	10,67	88,92	Very Good
	Average		**83,45**	**Very Good**

At the third meeting according to Table 11, the percentage of groups I and V decreased and the other groups experienced an increase. This is because students are not careful in presenting observational data in the tables that have been provided. So there are groups that have decreased or increased scores. In addition, most students only imitate the classmates' charts. In making conclusions, students are able but there are still inappropriate conclusions. So that obtained an average percentage of indicators communicating the experimental results of 82.57% with excellent category. Based on the overall data analysis of the results of the study showed the psychomotor ability of students of class X IPA 2 SMA Negeri 7 Wajo was in the very good category with a percentage of 84.84%.

Table 11. Recapitulation of interpreting and presenting experiment ability in the 3rd meeting.

No.	Group	Score	Percentage (%)	Category
1	I	9,83	81,92	Very Good
2	II	11,20	93,33	Very Good
3	III	11,00	91,67	Very Good
4	IV	11,60	96,67	Very Good
5	V	10,33	86,08	Very Good
	Average		**89,93**	**Very Good**

4 Conclusion

The highest indicator on the psychomotor ability of students of Wajo 7 Public High School is an indicator of the ability to use tools and materials with a percentage of 86.53% which is included in the excellent category. The next indicator is the indicator of analyzing and planning work procedures that are in very good category with a percentage of 85.41%. Indicators interpreting and presenting the results of experiments are indicators that are still lacking in students with a percentage of 82.57% in the very good category.

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