

ANALYSIS OF STUDENT'S BASIC ABILITY IN SOLVING PHYSICS PROBLEMS AT STATE SENIOR HIGH SCHOOL 7 BANDA ACEH

Suci Rahmi Ananda

Ms, Universitas Pendidikan Indonesia, Indonesia, sucidjkm@student.upi.edu

Abstract

The study titled "Analysis of student's basic ability in solving physics problems at state Senior High School 7 Banda Aceh", discusses the problem of how the student's basic ability in solving physics problems at state Senior High School 7 Banda Aceh. The purpose of this study was to analyze the student's basic ability in solving physics problems at state Senior High School 7 Banda Aceh. The population of this study is the students class X of state Senior High School 7 Banda Aceh, amounting to 159 students. The number of population is defined sample of 33%, it is 52 students. The sample determination was done randomly. The approach of this study is descriptive approach. The instrument to collect the data used is a test. The test is given in essay form. Data were analyzed using qualitative analysis technique. The result showed that students class X Senior High School State 7 Banda Aceh who have very good ability in solving the physics problems in the material "Straight Motion Changes Irregularly" as many as 23 students with percentage 44, 23%, which is good ability as many as 4 students with percentage 7, 69%, moderate ability as many as 24 students with percentage 46, 15%, less than 1 student with percentage 1, 92% and no students with bad ability. Thus, it can be concluded that the basic ability of students in solving the physics problems in the material straight motion changes irregularly in class X High School 7 Banda Aceh is in the good category. Suggested for the next study that are relate to the student's basic ability in solving physics problems both at the level of Junior High School /Madrasah Tsanawiyah and Senior High School /Madrasah Aliyah can be continued by other researchers. So, it can be exposed to the constraints experienced by students in solving physics problems. This will make it easier for students to solve systematic physics problems.

Keywords: analysis, basic ability, problem.

1. INTRODUCTION

Education is one of the most important factors in human life as the process of forming human character that can develop their potential. Achievement of an education can be seen in the learning ability obtained. Ability is a skill a person has to complete a job. Poerwadarminta (2005: 742) says that ability is our ability, skill, and strength to try with ourselves. Can be interpreted that Traffic is the potential that is in each individual with the effort made by that person. Ability also means as a state capable of doing something based on education, knowledge, experience and training in an effort to improve something.

Slamet Wiyono (2005: 37) said that the basic human capabilities that Allah SWT has given since the mother's womb until a certain moment (the end of life), which is still hidden in him, waiting to be realized into something tangible benefits in human life in the world this and in the hereafter. Basic competence is an important component in students as a basic capital to prepare themselves to face and understand the subject matter in school.

Mulyasa (2003: 121) said that basic skills include the following abilities:

1. Understanding the words, that is namely the ability to understand ideas expressed with words.
2. Numbers that is the ability to reason and manipulate mathematically.
3. Space that is the ability to visualize objects in the form of space.
4. Reasoning, that is the ability to solve problems.
5. The speed of perception that is the ability to find equations and disquiets among objects.

Based on that opinion, it can be concluded that each individual not only has the ability to understand words, but also has the ability to understand numbers, space, reasoning, and the speed of perception.

Syaiful Bahri (2000: 272) discloses that the category of student's level of ability in teaching and learning process is classified as follows:

90 - 100 Very good ability level

75 - 89 Good ability level

55 - 74 Medium ability level

40 - 54 Less ability level

00 - 39 Bad ability level

Based on the basic ability categories of students above, it can be concluded that the level of ability of students in physics learning there are high, medium and low.

Physics is one part of the Natural Science that studies all kinds of material that exist in this nature. Students assume that physics is a difficult subject and feared as Evendi's opinion ((1999: 3) "that in general the eye science lessons are the subjects most feared by most students, especially physics, in addition to requiring mathematical skills also require higher reasoning to the concepts of physics itself ".

Studying physics, we must have the basic ability of physics to understand the subject matter of physics. The basic ability of physics is the main capital to solve the problems on the material physics. Physics is an interesting lesson to learn because we study the natural phenomena that occur in everyday life. But in fact, many students are less like physics.

Pasaribu I. L and Simajuntak (1982: 92) argue that student's ability in physics can not be separated from three, namely:

1. Talent (basic ability that is brought from birth).
2. Achievement (results achieved after attending a certain education / training).
3. Special abilities (special abilities of psychological functions) such as intelligence or skill to perform a job and memory that is a special but abstract ability.

Based on these opinions can be concluded that the basic ability of each student is closely related to the talent they have. Student's ability can be seen after attending education/ training on the material of physics. Then, the student's ability will be seen when they solve the physics problems.

In solving physics problems is needed the basic skills of physics. Basic skills in physics include:

1. The ability of students to know the variables in physics precisely. For example: students can distinguish between time (t) variabel and temperature (T) variable.
2. The ability of students in understanding the unit. Students understand the units in both SI and CGS, and understand each unit of each variable. For example the time unit is second and the unit temperature is Kelvin.
3. The ability of students to understand the physics formulas. Students can flip through formulas smoothly.

4. Student's ability to perform mathematical operations. Students have to understand the basic concepts of mathematics to be easy in solving problems that require mathematical calculations. Wahab (2003: 102) said that if student's understanding of basic mathematics as a tool for understanding basic concepts of the natural science is very weak, it would make difficult for students to perform calculations relating to physical, chemical and biological quantities.

Based on the observations that researchers done at state Senior High School 7 Banda Aceh, most students have difficulty in solving physics problems. These difficulties include: students still have weaknesses in using symbols, understanding formulas, using formulas and using units.

This study examines the basic ability of students in solving physics problems at state Senior High School 7 Banda Aceh. This problem is interesting to be studied because the difficulties experienced by students is fundamental in learning more physics lessons to improve student's ability in solving physics problems.

Research related to the problem has been investigated by Munawar Hadi who examines the Basic Physical Ability Judging from the Process of Solving Problems on Ohm's Law Material. This research was conducted on the students of SMA Negeri 2 Indra Jaya Kabupaten Pidie. The result of Munawar Hadi's research shows that students' basic physics ability in solving physics problems in the form of essay on Ohm's Law is still low. This can be seen from several aspects, namely: aspects of translating sentences into the symbols, aspects of understanding the formula to answer the problem, using the formula aspect to answer the problems and aspects of using the right units. In his writings, Munawar Hadi suggested to students should often practice in solving essay problems to better understand the problem and solve it mathematically.

2. RESEARCH METHODS

In this study, researcher used a descriptive-quantitative method. The descriptive method is used to obtain the description of the basic physics skill level of state Senior High School 7 Banda Aceh students in solving the problems. Implementation of this method can follow the steps of work such as research instruments, collect data, analyze data, and get a conclusion.

The Problems in this research is how the basic ability of students in solving physics problems at state Senior High School 7 Banda Aceh. This study aims to determine the basic ability of students in solving physics problems at state Senior High School 7 Banda Aceh.

This research is expected to be useful in practical terms, both for writers, for students, and for teachers.

- 1) For writers; to add insight and experience in doing research.
- 2) For students; can know their ability and potential in solving physics problems.
- 3) For teachers; can be used as input materials in the learning process, so as to improve student's ability in understanding the material and solve the problems.

The hypothesis of this study is the student's ability at state Senior High School 7 Banda Aceh is still low in solving physics problems well. The scope of this research is focused only to find out how big the basic ability of students in solving physics problems in Senior High School 7 Banda Aceh. Sampling was done by random sampling technique. According to Subana, Prasetyo, et al (2000: 25), random sampling technique allows researchers to take samples objectively because each unit that belongs to a population has the same opportunity to be selected as a sample member. The random used in this technique is in ordinal form based on the tenfold absent number.

Implementation of the basic student's physics skills analysis in solving the problem on the Straight Motion Changes Irregularly. The first step is got permission from the supervisor, then obtained the license from the Dean of the Faculty of Teacher Training and Education Unsyiah and the permit from the Department of Education of Youth and Sports Banda Aceh. Before doing the research, the researcher asked permission to Senior High School 7 Banda Aceh. After obtaining a research permit, the researcher then consulted with Mrs. Rusmawati and Mrs. Nila Santi by observing at state Senior High School 7 Banda Aceh school and finally the research was established on November 27th, 2014 and November 29th, 2014.

3. RESEARCH INSTRUMENTS

The research instruments used in this research are the problems/ questions that can analyze the basic student's ability in solving the physics problems. Data collection techniques in this study using observation and test techniques.

- 1) Observations are conducted in an attempt to help gain an overview of the application of knowledge steps,

and to systematically observe the phenomena being subjected to observations prior to the application of teachers in the classroom. Anas sudijono (2008: 76) suggests "observation is how to collect ingredients or data that is done by holding a systematic observation and recording of the phenomena that are being targeted observations.

2) Test technique is simpler and more efficient. Judging from the time, the test can be done within a few hours. Furthermore, according to Arikunto (2009: 32) the sense of the test is "a series of questions or exercises or other tools used for skills, knowledge, intelligence, abilities or talents possessed by individuals or groups". The test held is for all students who are sampled with the same problem for each sample. The test is intended to see the ability of the students of class X. In solving physics problems about the expansion as a description of the basic skills of physics they have. The test is given in essay form.

Hasan and Iqbal (2008: 120) said that the data were analyzed using quantitative analysis techniques, because the analytical tools used statistical models and the results of the analysis are presented in numerical form and described in a description. Data analysis was performed using the following steps:

- 1) Using classification of written test results according to students' ability to solve physics problems.
- 2) Sorting the criteria for categorizing student's ability to solve the physics problem are very good criteria (90-100), good criteria (75-89) medium criteria (55-74), less criteria (40-54), and bad criteria (0-39) students who can answer the given questions.

According to Trianto (2009: 243) the percentage of student ability is calculated by using the formula:

$$P = f / n \times 100\%$$

Description:

P = percentage of student's ability

f = frequency

N = total of student

4. RESULTS AND DISCUSSION

The results of the overall test of the student's ability in solving the problem of Straight Motion Changes Irregularly can be seen in Table 1. below:

Table 1. Results of the test obtained by the student

Number	Student's Name	Aspect I	Aspect II	Aspect III	Aspect IV	Total
1	S ₁	20	15	15	20	70
2	S ₂	20	15	15	5	55
3	S ₃	20	15	15	20	70
4	S ₄	20	15	15	20	70
5	S ₅	20	15	15	20	70
6	S ₆	20	15	15	20	70
7	S ₇	20	15	15	20	70
8	S ₈	20	15	15	20	70
9	S ₉	20	15	15	20	70
10	S ₁₀	15	10	5	20	50
11	S ₁₁	20	15	15	20	70
12	S ₁₂	20	15	15	20	70
13	S ₁₃	20	15	15	20	70
14	S ₁₄	20	15	15	20	70
15	S ₁₅	20	15	15	20	70
16	S ₁₆	20	15	15	20	70
17	S ₁₇	20	10	10	15	55
18	S ₁₈	20	15	15	20	70
19	S ₁₉	20	15	15	20	70
20	S ₂₀	20	15	15	20	70
21	S ₂₁	20	15	15	20	70

Number	Student's Name	Aspect I	Aspect II	Aspect III	Aspect IV	Total
22	S ₂₂	20	15	15	20	70
23	S ₂₃	20	15	15	20	70
24	S ₂₄	20	15	15	20	70
25	S ₂₅	20	15	15	20	70
26	S ₂₆	25	25	15	25	90
27	S ₂₇	25	25	20	25	95
28	S ₂₈	25	25	15	25	90
29	S ₂₉	25	25	15	25	90
30	S ₃₀	25	25	15	25	90
31	S ₃₁	25	25	20	25	95
32	S ₃₂	25	25	20	25	95
33	S ₃₃	25	25	20	25	95
34	S ₃₄	25	25	20	25	95
35	S ₃₅	25	25	15	25	90
36	S ₃₆	25	25	20	25	95
37	S ₃₇	25	25	15	25	90
38	S ₃₈	25	25	20	25	95
39	S ₃₉	25	25	15	25	90
40	S ₄₀	25	20	15	25	85
41	S ₄₁	25	25	20	25	95
42	S ₄₂	25	25	20	25	95
43	S ₄₃	25	25	15	25	90
44	S ₄₄	25	25	15	25	90
45	S ₄₅	25	20	15	25	85
46	S ₄₆	25	20	15	20	80
47	S ₄₇	25	25	20	25	95
48	S ₄₈	25	25	15	25	90
49	S ₄₉	25	25	20	25	95
50	S ₅₀	25	25	20	25	95
51	S ₅₁	25	25	20	25	95
52	S ₅₂	25	20	15	20	80
TOTAL		1.170	1.020	830	1.145	4.165
AVERAGE		22,5	19,62	15,96	22,02	80,096

Source: State Senior High School 7 Banda Aceh (processed data)

Informations:

Aspect I: Translates the sentence into symbols.

Aspect II: Understanding the formula to be used to answer the question.

Aspect III: Using formulas to answer questions.

Aspect IV: Using the right units.

Based on Table 1. can be seen the student's ability in solving the problem on material the straight motion changed irregularly. The aspect of translating the sentence into symbols is a very student-controlled aspect compared to other aspects with a total of 1,170 and an average of 22.5. The aspect with the second highest number of points is the aspect of using the right unit with the total value of 1.145 and the average of 22.02. Then followed by aspects of understanding the formula that will be used to answer the problem with a total value of 1.020 and an average of 19.62. Then, aspects that are not mastered by students is the aspect of using the formula to answer the problem with the number of values 830 and the average of 15.96. Thus, the total value obtained is 4,165 with an average of 80,096.

Criteria of students' ability to solve problems can be seen in Table 2. below:

Table 2. Students' ability to solve GLBB material questions based on test scores.

Score	Amount of student	Persentase (%)	Criteria
90 - 100	23	44,23 %	Very Good
75 – 89	4	7,69 %	Good
55 – 74	24	46,15 %	Medium
40 – 54	1	1,92 %	Less
0 - 39	0	0 %	Bad

Based on Table 2. there are 23 students who are very good in solving the problem with the percentage of 44.23%, 4 students who are good with the percentage of 7.69%, 24 students with moderate ability with a percentage of 46.15%, a student with less ability with a percentage of 1.92%, and no poor-performing students. This situation shows that some of the students in grade X at state Senior High School 7 Banda Aceh are good.

5. CONCLUSION

Based on the results of research and discussion, it can be concluded that the basic ability of physics students in solving physics problems in the material Straight Motion Changes Irregularly at state Senior High School 7 Banda Aceh is good. This can be proved by the amount of value that students get on each aspect of the assessment. In the aspect of translating the sentence into the symbols overall students score an average of 22.5. The aspect of translating sentences into symbols is a very student-controlled aspect compared to other aspects. While the less-controlled aspects of students in solving the problem is the aspect of using the formula to answer the problem with an average score of 15.96 obtained by students.

6. SUGGESTIONS

Based on the results of research that researchers done, then researchers provide the suggestions that are expected to be useful input for the parties concerned.

- 1) Teachers can give more attention to the students who still have less ability by providing easy ways to solve physics problems in essay form so that problem solving will be more systematic.
- 2) Students who still have less ability in solving physics problems more diligent practice in completing essay questions to better understand the problem and solving systematically.
- 3) For further research is expected to be able to conduct further and in-depth study of student's learning motivation in solving physics problems in order to improve the quality of education, especially on learning physics.

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