

Proportional Reasoning Ability of Students on Physics Learning

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Abstract:- Proportional reasoning as a qualitative structure that allows complex physical systems comprehension which contain many factors. On physics learning, student's proportional reasoning ability is expected to be trained and developed because physics learning has part related to reasoning. The purposes of this research are: (1) gaining information of student's proportional reasoning ability in physics learning; (2) gaining information of student's obstacles in developing the proportional reasoning ability. The used research's method is ex-post facto with research subject is students in XI IPA 1 SMA Negeri 1 Gelesong. This research uses statistical descriptive analysis to describe student's proportional reasoning. From the research result, it can be said that (1) the proportional reasoning ability of students is still low in physics learning. (2) there are some obstacles in developing the proportional reasoning in physics learning which are the less effort given by their teacher to use the proportional reasoning as a device to solve physics problem, students do not use proportional reasoning method because they are not sure whether their answer will be accepted by the teacher.

Keywords:- Proportional reasoning, physics learning.

I. INTRODUCTION

Teaching and learning process is a process containing a series of teacher and students action based on the reciprocal relationship which happens in educative situation to reach certain purpose. The interaction or reciprocal relationship between teacher and students is the main requirement for the ongoing learning process. Interaction in teaching and learning process has a wide direction, not only a relationship between teacher and students but also an educative [1].

Learning is defined as a process of behavior change in individual due to the existence of interaction between individuals and individual with his environment [2, 1, 3, 4]

The learning process of science is not only based on the behavior learning theory. Curriculum emphasizes on the skill forming gets a knowledge whose characteristic is difficult to be observed. The emphasis can only be realized through the application of cognitive learning theory. Cognitive learning theory in education psychology can be classified in constructivism theory [5].

Learning according to Gagne [6] is a set of process which is internal for each individual as a transformation result of stimulation caused by external event around the individual's environment (condition). In order to make the external event becomes more meaningful, it is better to organize it in

sequence of learning event (method or treatment). Besides that, as an effort to set the external condition it needs various stimulations that can be accepted by the five senses, which is known as learning media and source.

Learning according to Gagne should be able to cause a learning and cognitive process event [7]. One of the life skills that need to be developed through the educational process is thinking skill. One's ability is success in his life is determined by his thinking skill, especially for solving life problems that he faces.

Reasoning is a process of reaching logic conclusion according to facts and relevant sources. The ability of reasoning makes students be able to solve the problem in their life, inside or outside the school. Any time we use reasoning to validate our thoughts. While the activities included in reasoning activities are: making logic conclusion; using explanation by using model, fact, characteristics, and relationship; estimating answer and solution process; using pattern and relationship; to analyze situation, making analogy and generalization; organizing and testing; following inference rule; checking arguments validity; organizing valid arguments; organizing prove directly, indirectly, and using induction. Reasoning is a thinking activity that has specific characteristic to find the truth. What is meant by specific characteristic is logical thinking pattern and analytical thinking process.

Proportional reasoning as a qualitative structure that allows complex physical systems comprehension which contain many factors. As an example of the complex physical systems comprehension is a comprehension related to proportion and ratio concept. The comprehension about proportional situations consists of the ability in comparing two ratios like identifying equivalent ratio. Proportional reasoning is a quite important thing in understanding physics concept in high school. On physics learning, it needs the existence of proportional reasoning. Some physics concept need to use proportional reasoning to understand them. Successful in understanding physics concept in high school such as density, concentration, force, acceleration, velocity, efficiency power, pressure require the ability in proportional reasoning. [8, 9, 10, 11, 12].

Reminding the importance of proportional reasoning in physics learning, so it needs planned effort to know the proportional reasoning ability of high school students on physics learning and know the student's obstacle in developing the proportional reasoning that they have.

II. METHOD

This research is an ex post facto research and aims to gain information of student's proportional reasoning ability and obstacle in developing the proportional reasoning in physics learning.

This research was held in SMA Negeri 1 Galesong with the research subject is students of XI IPA 1 who are chosen then into 10 male students and 10 female students. This research consists of one variable which is the physics proportional reasoning ability, operationally defined as proportional reasoning skill that is part of formal reasoning skill measured by proportional reasoning test and stated by score. The result data is analyzed statistical descriptively and data presentation is presented in the form of graphic.

III. DISCUSSION

Analysis result of proportional reasoning ability gives a description of student's ability which is, the maximum score gained by students is 9 and the lowest score gained by students is 4 from the total score of 15. The average score of students is 7,1 with the deviation standard of 1,25.

If the proportional reasoning score in physics learning of students in XI IPA 1 SMA Negeri 1 Galesong Utara is categorized in the scale of five, which is score 0-20 is in very low category, 21-40 is in low category, 41-60 is in medium category, 61-80 is in high category and 81-100 is in very high category, then it can be made into the frequency distribution table as following:

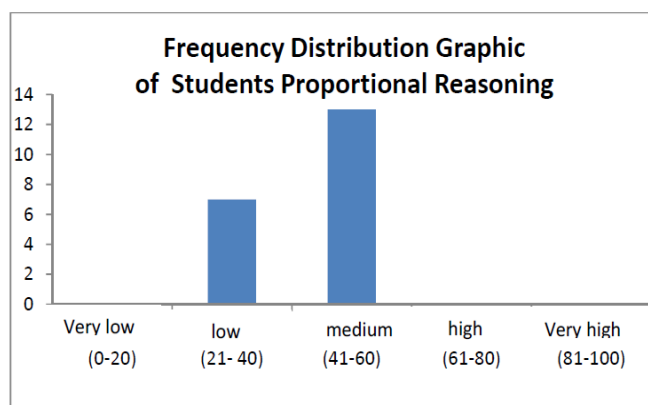


Fig 1:- Frequency Distribution Graphic of Students Proportional Reasoning

The graphic above shows that the proportional reasoning ability of students on physics learning is in low and medium category. From the graphic it is showed that out of 20 students who participate in proportional reasoning test, 13 students are in medium category and another 7 students are in low category, while for the very low, high, and very high category there is no one in.

It shows that the student's ability is still low in proportional reasoning on physics learning. It is in accordance to the reasoning level which is on level 6 in the science scale

stated by PISA, which the reasoning itself is above the ability of knowing and applying.

This research also reveals that students prefer using algorithm to proportional reasoning in solving physics problem, and generally their answers are not correct because the question requires the usage of proportional reasoning.

From the interview result with students, there are four things that become students' obstacles in using proportional reasoning on physics learning which are firstly they do not care enough about the proportional reasoning that can be used to solve physics problem, students claim that there is no effort from teacher to relate the ratio and physics although they have studied about ratio as a mathematics topic but not as a tool to solve problem.

Second, some students believe that there is a certain way to solve physics problem where they are expected to adapt. They state that the individual approachment or alternative to solve physics assignment is not accepted by teacher because there are specific ways to solve physics problem.

The students' third reason to not using proportional reasoning is related to their fright and guilty feeling about using proportional reasoning. They claim that they do not use this method because they are not sure if their answer will be accepted. This indicates to scoring system that is only oriented on result not on the thinking or reasoning skill. The last reason for students not using proportional reasoning is that they are not accustomed in using proportional reasoning concept in physics learning.

This discovery is in accordance with the statement of Akatugba & Wallace, 1999, who noted that teacher do not care enough about the proportional reasoning that can be used to solve problem, the faith that there is specific way to solve problem where they are expected to adapt, students are not sure whether their answer will be accepted or not if they use any method other than what is taught by teacher and the patchiness of using science learning proportional reasoning.

IV. CONCLUSION

According to data analysis and discussion that have been stated above, so it can be concluded as following:

1. The proportional reasoning ability of students is still low on physics learning.

There are some obstacles in developing proportional reasoning on physics learning which are less effort from teacher to use proportional reasoning as a device to solve physics problem, students do not use proportional reasoning method because they are not sure whether their answer will be accepted by teacher.

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