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Comparative Study between Drill Skill and Concept Attainment Model towards Physics Learning Achievement

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ABSTRACT

Alternative learning model that can be used in teaching physics to overcome the problems of lack of student learning achievement is a model of skill training (drill skills, and the concept attainment model. Drill skill model is a teaching technique in which students carry out training activities on what they have learned, so that the material already taught more embedded in the minds of students, and students will have the dexterity or higher, while the concept attainment is a model of achievement of learning model that is designed to help students to be more easily learn a concept. The purpose of this study was to compare the results between student who was teached with drill skill model and concept attainment model. The quasi-experimental type was used. Sampling was done randomly in order to obtain two classes one for the first experimental group with drill skill, and the second one for the second experimental group with concept attainment model. These results suggest that the science-physics learning achievement of students with drill skill model is better than using a concept attainment model.

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1. INTRODUCTION

Physics is a subject that provides knowledge about the universe. Physics is also be a matter wich the aims to train thinking ability and analytical skills of students [1]-[2]. Physics is also be an important subject as the basic for mastery of science and technology [3]-[4]. Due to the importance of physics, this subject always learned in secondary schools in Indonesia either junior high school or senior high school as well as the university.

In junior high school, Physics material is included in natural science subjects. According to *Depdiknas* [5], the aim of science teaching is to prepare students to be good citizens based on *Pancasila* and the 1945 Constitution, by focusing on the development of individuals who can understand the problems that are in the environment, whether they are in a social environment that addresses human interaction and the natural environment.

As stated by Sezgin et al., [6] the vision of physical education in junior high school is to prepare learners who understand science and technology, through skills development, scientific attitude, critical thinking skills, mastery of the essential concepts of science and technology.

Although it has an important function, the result of students learning in physics is still at the minimum value. Accoording to Abdelraheem and Asan [7] nowadays, the process of learning physics conducted in the school tend to get stuck in a routine. This means that when teacher was teached, they just gave some formulas and example of problems, and students just do some exercise without exploration of the

concepts. Moreover, the learning is still dominated by conventional lecture method which tends to be restricting student ability to remember some object. These condition leads the involvement of students in conducting scientific work is lack, and will promotes student to more difficult to understand the concept presented by the teacher.

Therefore, teachers are encouraged choose appropriate learning models wich tailoring the subject matter to be taught, as well as enabling more active involvement of students in learning. Mekonnen [8] was stated that when a learning process was designed, teachers should consider learning model that can be fun for students. According to Arends [9], some factors that can be considered in selecting a learning model are: the subject matter, students' level of cognitive development, learning environment, and supporting facilities are available. Similarly, in teaching physics, learning models also requires to be applied. In physics learning, there is an assortment of materials with different characteristics, so it can not simply use a learning model for all materials. Thus, two or more learning models can be used in order to maximize student engagement so the learning process can be carried out to maximum.

Alternative learning model that can be used in teaching physics to overcome the problems of lack of student learning achievement is a model of skill training (drill skills), and the concept attainment model. Drill skill model is a teaching technique in which students carry out training activities on what they have learned, so the subject matter already taught more understood by students, and they will have the dexterity or higher skills [10],[11], while the concept attainment is a model of achievement of learning model that is designed to help students to be more easily learn a concept [12]. As stated by Mayer [13] was stated that oncept attainment model focused on providing learners with a number of concepts and focuses on how to develop the concept. Thus, both models are essentially complementary to each other.

Several studies on the use of concept attainment model of the learning achievement of physics reported by Mayer [13] which states that by using concept attainment model, student can figure out the concept and can distinguish between relevant or irrelevant information, and this condition leading the attaining of concept. In Physics learning, Setianingrum and Anggaryani [14] reported that the use of concept attainment models can improve results of student learning on effort and energy concept amounted to 78.75% with a positive response by 85.72%. Kumar and Mathur [15] also states that this model is very effective and can improve student learning achievement in physics. Drill skill model has also been reported as a very effective learning model in improving the mastery of science, creativity and skills of students.

Although it has been shown to be effective in improving learning achievement of physics, but the combination of drill skill models and concept attainment models in physics learning achievement, especially against light materials in 8^{th} Class of students at The 9^{th} State Junior High School of Ambon, has never been done. So, this research was conducted with the aim was to compare achievement between two groups taught with Drill skill models and concept attainment model of student in the 9^{th} state Junior High School of Ambon.

2. RESEARCH METHOD

Quasi experiment design was employed in this research. The population study was all 8^{th} grade students at 9^{th} State Junior High School of Ambon. Sample was carried out with random sampling technique in order to obtain two grades, namely $8_3{}^{th}$ grade and $8_4{}^{th}$ grade. As much as 30 students for each grade were taken as sample. These two grades were assumed as two group of experiment. One is as a first group or group 1, and the other one as a second group or group 2. The first group was taught with drill skill model, and the second one with concept attainment model. The study design can be described as follows (Table 1):

Table 1. Design of The Study

Group	Pre test	Treatment	Post test
Group 1	$T_{1.1}$	X_1	$T_{2.1}$
Group 2	$T_{1.2}$	X_2	$T_{2.2}$

Note:
$T_{1.1}$ = Pre Test for group 1
$T_{1.2}$ = Pre Test for group 2
$T_{2.1}$ = Post Test for group 1
$T_{2.2}$ = Post Test for group 2
X_1 = Drill skill model
X_2 = Concept attainment model

3. RESULTS AND DISCUSSION

The results shows that before learning process with two models was done, the student learning achievement data collected by pre test, is still low and fail categorized (80 % for group 1) and 66.67 % (for group 2) (Table 2). These results indicate that there is difference initial ability between two classes. Otherwise the results obtained after drill skil treatment and concepts achievement given to each class (Table 3) indicates that for the first experimental class (group 1 taught with drill skills model have average value of learning achievement about 76.7 % and enough categorized. For the second experomental class or group 2, the learning achievement value average about 46.7 % and fail categorized.

Table 2. The result of Pre Test

Mastery level	Group 1		Group 2		Qualification
	F	%	F	%	
90 - 100	-	-	4	13.33	Excellent
75 - 89	6	20.0	6	20.00	Good
55 - 74	-	-	-	-	Enough
< 54	24	80.0	20	66.67	Fail
Total	30	100	30	100	

Table 3. The Result of Post Test

Mastery level	Group 1		Group 2		Qualification
	F	%	F	%	
90 - 100	-	-	4	13.3	Excellent
75 - 89	7	23.3	6	20.0	Good
55 - 74	23	76.7	6	20.0	Enough
< 54	-	-	14	46.7	Fail
Total	30	100	30	100	

Based on Table 2 and Table 3, it can be seen that the initial ability of students was different. In the experimental group, before drill skill model was given, as much as 80 % of students were failed categorized, while after the drill skill model treatment was given, there is no student got fail category. For the second experimental class or group 2, the initial test result (pre test) showed that as much as 66.67 % in fail category, and after the given of concept attainment model, the learning result of student were still fail categorized (46.7 %). The results of t-test analysis (Table 4) showed significant difference between the two models of learning on student learning achievement.

Table 4. The Result of t-test Analysis

Level of significance	Degree of freedom	t_{table}
0.05%	4.05	
0.01%	2.638	1.67
0.1	3.416	

These results indicates that science-physics learning achievement of student by using drill skills model is better when compared with student whose taught with concept attainment model. This difference was caused by the ability of drill skill model to increase students to understanding the subject matter. Prince and Felder [16] and Delazer et al [17] stated that the active exercise can improve absorption, making learning more automated and allows students to transfer learning to new situations.

Brekke and Hogstad [18] that one approach in drill skill model is the application from theory to practice, and the feed back ability of student can be recognize and can be increase. This is in line with students experience during learning process wich was taught with this model. With this model, learning becomes more interesting, because the students are directed to exercise their individual abilities and skills as well, so it will automatically affect students' motivation to learn, and will give a positive influence on their learning achievement.

Another situation was found in science-physics learning achievement with concept attainment model. It do not show a significant influence on student learning achievement, when compared to the drill skill learning model. Basically the concept attainment model is also one of learning model that is emerging today to increase the level of student mastery. There are several advantages of this model as proposed by Arends [9] including usefull to help students to understand the concept and make the students more effective in getting the concept and how to understand the strategy of thinking.

However, it must be keep in mind that not all learning models or not all methods of learning always effective for all specific learning situations, or for a particular subject matter. With such a model may be effective for one material, but not necessarily suitable and effective for other material. In this study, it was found that drill skill model is superior in improving student learning achievement, especially for light concept.

Concept attainment model has not provided a good influence on student learning, because learning with this model there are some things may not have been performed by teachers as proposed by Arends [9] i.e: (1) teacher should have an supportive attitude of the hypothesis of students, (2) teacher should provide direction for students to provide arguments in testing hypotheses among them, and (3) teacher should establish the students to focus on specific examples.

On the other side, the concept attainment model requires samples to be delivered to students. This is means that the succsessfulness of student in learning requires the involvement of students directly in the experts' concept. Ilmi [19] was stated that the achievement of a concept (concept attainment) is a process to identify and define concepts through discovery of the most essential attribute in accordance with the concept. If these factors are not met, the achievement of the concept is not necessarily able to provide a positive influence on the learning itself. According to Setianingrum and Anggaryani [14] the concept attainment model must be combined with the development of attitudes and values because this can increase students understanding of the concept.

Another researcher was reported that the disadvantages of concept attainment model is it not always work with all age groups or topics, and the students may become too verbal and shout out answers [20]. Thus, the learning model of skill training or drill skill, be an appropriate model for teaching and improve learning achievement of science-physics especially for students of 8^{th} grade of student in the 9^{th} state junior high school of Ambon.

4. CONCLUSION

Based on the result and discussion, it can be concluded that there is differences in the initial ability of student before taught with two learning models. The result of student learning achievement show that drill skill model is better than the concept attainment model, and there is significance differences in the level of mastery among students taught using a drill skill model, and with the students whose taught by using the concept attainment model.

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