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Effect of Cooperative Learning Model and Assessment Technique towards the Physics Learning Result by Controlling Student's Basic Knowledge (Experiments in Junior High School 1 and 2 Tondano)

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Abstract
The purpose of this study to determine the effect of instructional models, assessment techniques, and the effect of its interaction on learning outcomes of physics, by controlling the basic knowledge of students. The method used is an experimental method with a 2 x 2 factorial design. Models of learning and assessment techniques as a treatment variable, the results of studying physics as the response variable, and the student's prior knowledge as covariate variables. Samples were VIId graders and VIIh SMP I Tondano and VIIf graders and VIIg SMP II Tondano determined by cluster random sampling with the number of respondents 120 students. ANKOVA analysis techniques to examine the effect of using the main factor (main effect) and the influence of the interaction (interaction effect).

The results concluded that cooperative learning model TPS and project appraisal techniques more effective in improving learning outcomes physics compared with conventional learning models with a written assessment techniques. Suggested in the study of physics should make cooperative learning model to embody TPS project appraisal techniques as a learning strategy which prioritized in science teaching physics in schools.

Keywords: cooperative learning, assessment techniques, the results of learning physics, student's prior knowledge

1. Introduction

Learning physics education secondary school (SMP), often get notes / title as the learning that has value learning outcomes are low compared to the value of the results of the other study subjects, and the subjects are the least preferred by students in general, considered to be the eyes lessons daunting and tedious, as the subjects that are difficult to understand or be understood, and a variety of other predicates.
Speaking about the study results, it can not be separated from the process of learning that occurs in self-learners. The learning process is less according to the student characteristics and the characteristics of the subject matter will result in less than the maximum learning outcomes that can even result in understanding the wrong concepts (misconception). Related to the process and learning outcomes, Slameto (2003: 1-2) suggests that the overall process of education in schools, learning is the most basic activity, which means that the success or failure of many educational achievement depends on how the learning process experienced by students as learners.
The link between learning processes and learning models are very closely related, because the use of appropriate learning model will produce appropriate learning process as well. In addition to the use of appropriate learning models, things that can not be avoided is how the process of learning experienced by learners supported by appropriate assessment techniques as well, because even though the learning process is right but if not supported by appropriate valuation techniques may result in the entire process learning will not produce maximum learning outcomes of students whose maximum anyway. Hayat (2008: 1-6) argued that the assessment should be an integral part of the learning process (a part of instruction) and must be understood as an activity to streamline the learning process. Therefore models of learning and assessment techniques regarded as the components are very important in improving student learning outcomes.

In connection with the learning model, then there are a variety of learning models that have been known to even have many used as learning model (direct instruction), the model-based learning problems (basic instruction), and cooperative learning model (cooperative learning). Likewise, the assessment technique known as portfolio assessment techniques, performance appraisal techniques, project appraisal techniques (assessment project), written assessment techniques (paper and pencil test), and so forth.

Specifically for cooperative learning model (cooperative learning) that have been known to have a variety of types such as STAD (Student Teams-Achievement Divisions), the type of TAI (Team Assisted Individualization),

JIGSAW, CIRC (Cooperative Integrated Reading And Composition), TGT (Team-Game -Tournament), Group Investigation, including the type of TPS (Think-Pair Share). Especially cooperative learning model TPS, Nur (2008: 11) argues that the Think-Pair-Share is a cooperative learning structure that is very useful, the point is when the teacher presenting a lesson in class, students are asked to think (think) own question teacher, then the pair (pairs) with partner discussions to reach consensus on the answer, and finally the teacher asks students to share (share) answers that they agree to all students in the class. Furthermore, from internet sources stated that the "Think-Pair-Share is a strategy designed to provide students with" food for thought "on a given topics enabling them to formulate individual ideas and share these ideas with another student. (Http://olc.spsd.sk.ca/DE/PD/instr/strats/ think / index. Html).

In addition to the application of cooperative learning models, things that need to be studied scientifically through this research is the use of assessment techniques. One regarded appraisal techniques have characteristics that match the characteristics of the physical sciences are project assessment technique (assessment project), because this valuation technique has seen the procedure is in accordance with the process of understanding the concepts of physics in which the concepts of physics are built from the symptoms or the observed phenomena. Therefore the project appraisal techniques that learners are deliberately assigned to carry out a project. Bastari and Witjaksono (2008: v-1) defines that the project is a task that must be completed in a period / time. In the form of a research task since of the collection, organization, evaluation, presentation of data, to reporting. This is in line with what is termed by Budiningsih (2005: 57) as a process that humans construct knowledge through interaction with objects and the environment, for example by seeing, touching, feeling, knowledge and understanding of the object and the environment will increase.

Besides asssessment technique project, evaluation techniques are also frequently used by teachers is a written assessment techniques (paper and pencil test). The same thing also expressed by the Jihad and Haris (2008: 68) that the written test is a test in which the students provide a written answer. Furthermore Surapranata (2004: 8) also states that a written assessment test as a class-based assessment tools and their use in the presentation of writing. National Education Standards Agency (2006: 2) more fully, suggested that as a form of assessment techniques, a written test that can be designed in the form of descriptions, multiple choice, short answer, stuffing, matching, true-false or to be done by students within a certain time limit.

In addition to models of learning and assessment techniques as described above, it should also be taken into account is the beginning of knowledge possessed by learners (students) are engaged in a learning process. Why it is so important, because the student's initial knowledge or existing knowledge construction on students is crucial in constructed or understanding the formation of a new concept. Any students who follow the learning process is not like a clean white paper without any records, or in other words every student who follows a process of learning has had early knowledges in its memory. Moreover, students who have followed a process of learning in the previous stages or levels of education, to ensure every student has the knowledge or concepts for specific skills, although under different conditions between each student is dependent on previous learning process. Besides the knowledge gained from the learning process through classroom, the participant have interacted with their environment everyday knowledge that can also form in a person.

Theories related to student's prior knowledge is the theory proposed by Reigeluth (1983: 88) termed the beginning of knowledge as an entry level competency in the entire lower level of known or controlled prior to initiating a series of student learning in the initial capability. Dick and Carey (1987: 80) termed as entry behaviors prior knowledge is knowledge or skill possessed by every student before receiving a new lesson. Asmani (2012: 150) also suggests that the initial knowledge is knowledge that has been owned by the student. The theory also explains the initial knowledge is a theory proposed by Ausubel is quoted Dahar (1998: 137) which describes meaningful learning is a process of linking new information on relevant concepts contained in the person's cognitive structure. The most important factor influencing learning is what students already know. Therefore, for every student who has had prior knowledge pertaining to new learning materials that will help the process of understanding or the creation of new knowledge for students. Similarly, if the initial concepts contained in the student's self-concept is a concept that is wrong or mistaken (misconceptions) then this will be a barrier for the formation of new concepts or knowledge. It can be concluded that the initial knowledge and the process is affecting student learning outcomes.

Based on the description set forth above, then the main objective this research was to determine the effect of cooperative learning and learning outcomes assessment techniques of physics to control the initial knowledge, and the influence of both (interaction) on learning outcomes of physics in junior high school students.

II. Research Methodology

The method used in this study is an experimental method with a 2 x 2 factorial design. With the following design:

Table 1. Experimental Design

		Learning Model	
		Cooperative Type SMT A_1	Conventional (expository) A_2
techniques Assessment	Project B_1	$[X,Y]_{11k}$ k=1, 2, …., n11	$[X,Y]_{12k}$ k=1, 2, …., n12
	Written B_2	$[X,Y]_{21k}$ k=1, 2, …., n21	$[X,Y]_{22k}$ k=1, 2, …., n22

Description: X = Knowledge Beginning Students
Y = Physics Learning Outcomes
k = Number of respondents per cell
Y (outcome variables studied physics) is the response variable, and X (initial knowledge of students) as covariates or covariates.
The population in this study were all students of class VII SMPN 1 Tondano 8th grade and the number of SMP 2 Tondano with number 6 class. Both of these schools are in the city is the city Tondano Minahasa in North Sulawesi.The research sample was determined by using a multistage random sampling technique. The research instrument is an instrument of knowledge developed early and instrument physics learning outcomes in the form of multiple choice with 4 options. Instrument prior knowledge of the 36 items, and instrument physics learning outcomes totaling 58 items. Empirical validation is the process through the instruments in the field trials. For instruments prior knowledge involving 39 students and learning outcomes for physics instruments involving 43 students. Based on the calculation results obtained validity: of total 36 items that tested 30 items acquired by status with reliability coefficient of 0.929. To instrument physics learning outcomes, based on the calculation of the results obtained: the number of 56 tested items obtained 38 valid items with the status of the reliability coefficient of 0.928. Analysis using ANKOVA with SPSS version 17.00.

III. Results and Discussion

Table 2. Summary of Data Description Learning Outcomes Physics

			Learning Model		Total
			Cooperative Type SMT (A1)	conventional (A2)	
techniques Assessment	Project (B1)	*n*	30	30	60
		Mean	27,5	20,9	25,30
		Min	17	16	16
		Max	34	26	34
	Written (B2)	*n*	30	30	60
		Mean	24,3	26,3	25,15
		Min	16	16	16
		Max	33	33	33
Total		*n*	60	60	
		Mean	25,9	24,4	
		Min	16	16	
		Max	34	33	

Description:
A1: classroom of students with learning model SMT type
A2: classroom of students with conventional learning models
B1: class students given project appraisal techniques
B2: a class of students with a written assessment techniques
Y: physics achievement scores
n: number of samples
Min: minimum score
Max: The maximum score

B. Testing the hypothesis

1. Hypothesis Testing Key Factors (Main Effect)

Hypothesis main factor (main effect) to be tested are as follows:

a. Learning outcomes of students who taught physics at the cooperative learning model TPS higher compared with the results of the study of physics students taught with conventional learning models, after controlling for student's prior knowledge.

Statistical hypotheses: Ho: μA1 <μA2 and H1: μA1> μA2

The results in the table below:

Table 3. F Test About Effect Factor Model Physics Learning Against Learning Outcomes, Foreknowledge After Controlling Students.

Source	*Type III Sum of Squares*	*df*	*Mean Square*	F_o	$F_{table(0,05)}$
Corrected Model	1532,577(a)	2	766,289	86,830	
Intercept	1041,754	1	1041,754	118,043	
X	1454,169	1	1454,169	164,775	
A	67,088	1	67,088	7,602	3,92
Error	1032,548	117	8,825		
Total	78317,000	120			
Corrected Total	2565,125	119			

Because the value of Fo = 7.602> Ftab (0,05) = 3.92, mean Ho is rejected and accept H1. Thus concluded that the students 'learning outcomes physics class taught by cooperative learning model TPS (μA1 = 25.9) with a higher class of students taught with conventional learning models (μA2 = 24.4) after controlling for student's prior knowledge.

b. Physics learning outcomes between students who assessed the project appraisal techniques is higher than the results of the study of physics students assessed with a written assessment techniques, after controlling for student's prior knowledge.

Statistical hypotheses: Ho: μB1 <μB2 and H1: μB1> μB2

The results in the table below:

Table 4. F test About Influence Factors Engineering Physics Learning Outcomes Assessment, After Controlling Early Knowledge Students

Source	Type III Sum of Squares	df	Mean Square	F	$F_{table\ (0,05)}$
Corrected Model	1506,061(a)	2	753,031	83,191	
Intercept	904,848	1	904,848	99,963	
X	1501,653	1	1501,653	165,895	
B	40,572	1	40,572	4,482	3,92
Error	1059,064	117	9,052		
Total	78317,000	120			
Corrected Total	2565,125	119			

Because the value of Fo = 4.482> of Ftab = 3.92, mean Ho is rejected and accept H1. It can be concluded that the results of the classroom students learn physics is assessed with project appraisal techniques (μB1 = 25.3) is higher than grade students assessed with a written assessment techniques (μB2 = 25.15) after controlling for student's prior knowledge.

2. Hypothesis Testing Interaction (Interaction Effect)

Influence the interaction between learning models with engineering physics assessment of learning outcomes after controlling for student's prior knowledge.

Statistical hypotheses: Ho: Interaction A x B = 0 and H1: Interaction A x B ≠ 0

The results in the table below:

Table 5. Analysis of the results of A * B Interaction Effects on Learning Outcomes Physics, Students after Controlling Knowledge Early

Source	Type III Sum of Squares	df	Mean Square	F	Ftable
Corrected Model	1790,459(a)	4	447,615	66,449	
Intercept	977,953	1	977,953	145,178	
X	1390,767	1	1390,767	206,461	
A	67,031	1	67,031	9,951	
B	36,958	1	36,958	5,486	
A * B	217,712	1	217,712	32,320	2,68
Error	774,666	115	6,736		
Total	78317,000	120			
Corrected Total	2565,125	119			

Result analysis: Fcount = 32.320> F (0,05) = 2.68 which means that Ho is rejected and accept H1. Thus concluded that there is an interaction effect between the model of learning with the learning outcomes assessment techniques of physics, after controlling for student's prior knowledge.

3. Hypothesis Testing Advanced Simple (Simple Effect)

1. Learning outcomes in physics class with cooperative learning model TPS is assessed with techniques of project appraisal is higher than the results of studying physics in the classroom with cooperative learning model TPS is assessed by a written valuation techniques, after controlling for student's prior knowledge.
   Statistical hypotheses: Ho: μA1B1 <μA2B1 and H1: μA1B1> μA2B1
   The results in the table below:

   Table 6. Mean Parameter Estimates Between Y Factor A for all Levels each factor B, after controlling for student's prior knowledge.

Parameter	*B*	*Std. Error*	*t*	t_{table}
Intercept	11,688	1,111	10,516	
X	0,912	0,063	14,369	
[B=1]	-1,565	0,685	-2,284	
[B=2]	0(a)	.	.	
*[A=1] * [B=1]*	4,198	0,672	6,249	1,671
*[A=1] * [B=2]*	-1,208	0,671	-1,800	-1,671
*[A=2] * [B=1]*	0(a)	.	.	.
*[A=2] * [B=2]*	0(a)	.	.	.

   Results obtained by analysis of the value of t0 = 6.249> t table (0.05, 58) = 1.671, which means H0 is rejected and H1 accepted. Thus concluded that the results of the classroom students learn physics taught with cooperative learning model TPS with project appraisal techniques (μA1B1 = 27.5) is higher than the results of the classroom students learn physics taught with conventional learning model with project appraisal techniques (μA2B1 = 24.3) after controlling for student's prior knowledge.

2. Learning outcomes in physics classes taught by cooperative learning model TPS with a written valuation technique is lower than the results of studying physics in classes taught by conventional learning models with a written assessment techniques, after controlling for student's prior knowledge.
   Statistical hypotheses: Ho: μA1B2 ≥ μA2B2 and H1: μA1B2 <μA2B2
   The results in the table below:

Table 7. Parameter Estimates Between All Levels Mean Y Factor B for each factor A, After Controlling X

Parameter	*B*	*Std. Error*	*t*	t_{tabel}
Intercept	11,688	1,111	10,516	
X	0,912	0,063	14,369	
[A=1]	-1,208	0,671	-1,800	
[A=2]	0(a)	.	.	.
*[A=1] * [B=1]*	3,840	0,674	5,701	1,671
*[A=1] * [B=2]*	0(a)	.	.	.
*[A=2] * [B=1]*	-1,565	0,685	-2,284	-1,671
*[A=2] * [B=2]*	0(a)	.	.	.

Results obtained by analysis of the value of t0 = -1.800 <t table (0.05, 58) = -1.671, which means H0 is rejected and H1 accepted. It can be concluded on the learning outcomes physics classes taught by cooperative learning model TPS with a written assessment techniques (μA1B2 = 24.3) is lower than the results of studying physics in classes taught by conventional learning models with a written assessment techniques (μA2B2 = 26 , 3) after controlling for student's prior knowledge.

3. Learning outcomes in physics class with cooperative learning model TPS is assessed with techniques of project appraisal is higher than the results of studying physics in the classroom with cooperative learning model TPS is assessed by a written valuation techniques, after controlling for student's prior knowledge.
   Statistical hypotheses: Ho: μA1B1 <μA1B2 and H1: μA1B1> μA1B2
   Based on the research results as in Table 8 above, the results of the analysis [A = 1] * [B = 1] obtained the value t0 = 5.701> t table (0.05, 58) = 1.671, which means H0 is rejected and H1 accepted. It can be concluded that the class of students who were taught with cooperative learning model TPS, physics on student's learning outcomes were assessed with a technical assessment of the project (μA1B1 = 27.5) is higher than the results of the study of physics students assessed with a written assessment techniques (μA1B2 = 24.3), after controlling for student's prior knowledge.
4. Physics learning outcomes in the classroom learning model is assessed with conventional techniques of project appraisal is lower than the results in the physics classroom learning with conventional learning models are assessed by a written valuation techniques, after controlling for student's prior knowledge.
   Statistical hypotheses: Ho: μA2B1 ≥ μA2B2 and H1: μA2B1 <μA2B2
   Based on the research results as in Table 8 above, the results of the analysis [A = 2] * [B = 1] obtained the value t0 = -2.284 <t table (0.05, 58) = -1.671, which means H_0 is rejected and H_1 accepted. thus it can be concluded that the students in the class taught by conventional learning model, students are assessed with project appraisal techniques (μA2B1 = 20.9) is lower than the physics student learning outcomes being assessed with a written assessment techniques (μA2B2 = 26.3) , after controlling for student's prior knowledge.

C. Discussion of Research Finding

Results of this study demonstrate that the learning of physics that has material characteristics highly associated with symptoms or natural phenomena, then the TPS cooperative learning model is superior to the conventional learning models. This is because cooperative learning model TPS with stages think, pair and share will enrich student's understanding of the concepts of physics. Beside that also by listening to the ideas or the opinions of other students will also enrich and complete understanding of the concepts that will be formed and that has been formed in students.

Physics learning outcomes between students who assessed the project appraisal techniques with students being assessed with a written assessment techniques, after controlling for student's prior knowledge demonstrated the superiority of project appraisal techniques. Judging from the theoretical side, the project appraisal techniques has phases that point is the observation, collection of information or data from what is observed, analyzed data, and concluded. These stages in the procedure is very relevant to understand the concepts of physics, so it will greatly assist the process of discovery or The constructed knowledge and understanding of physics concepts. This result is in line with what is proposed by the National Education Standards Agency (2007: 377) that learning science (including physics learning) should be taken of scientific inquiry (scientific inquiry) to develop the ability to think, work and behave and communicate science as an important aspect life skills. It is contained in the stages of project appraisal techniques, so it is encouraging the formation of knowledge and understanding of learners while engaged in the learning process of physics.

In addition to the relevant concepts in a discovery procedure, project appraisal techniques will also be able to help learners apply their knowledge in the form of the concepts of physics in solving problems or the problems of physics. The process of the invention and application of physics concepts can be reached through observation of symptoms or phenomena that occur in everyday life. Because the concepts of physics that exist in the student's environment with project valuation techniques are very helpful in understanding the formation of The constructed or physics concepts.

The results also showed that there are significant interactions between the model of learning with the learning outcomes assessment techniques of physics, after controlling for student's prior knowledge. These results prove that the model of learning and assessment techniques have interaction effect on learning outcomes of physics. It gives the sense that in choosing a learning model that will be applied in the study of physics is necessary to consider the valuation techniques will be applied.

The results also suggest that the learning outcomes for the physics class to get the project appraisal techniques, the result for a class of students studying physics is taught with cooperative learning model TPS higher learning outcomes for grade physics students taught with conventional learning model. Relevance of the steps in the project appraisal techniques which fit the syntax or the steps of cooperative learning model TPS, then all the capabilities of students to be pursued or conditioned in such a way that students begin to build knowledge through problem given to him. This will certainly have an impact on efforts to complement each other, help each other in an effort to understand the physics concepts that will greatly assist the process of the formation of The constructed or knowledge to every student. The whole stage-stage in cooperative learning model TPS will be strengthened through the procedures adopted in the project appraisal techniques, because the project appraisal techniques, students return to the stages observed, analyzed the data and concluded that understanding or knowledge that has been established through the model strengthening of cooperative learning is increasingly gaining knowledge on the formation of the student.

The results also show that for a class of students are assessed with a written assessment techniques, learning outcomes of students who taught physics at the cooperative learning model TPS is lower than the results of the study of physics students taught with conventional learning models. As theoretical assessment revealed that the technique is able to accommodate a variety of written information submitted by the teacher so that may be disclosed again by the students through a written assessment because the characteristics of the type of written assessment technique is the aspect of freedom and flexibility in expressing his understanding of students. Besides that, the conventional implementation of teacher learning model can provide more leverage subject matter, although in terms of understanding the concept is not as good as the models of cooperative learning, but through a written assessment techniques, students can inform their knowledge back because of the flexibility aspect and the amount of information received by students during the learning process to follow.

The results also show that the class of students taught with cooperative learning model TPS, physics learning outcomes are assessed in the classroom with engineering projects assessment is higher than the results of the classroom students learn physics is assessed by a written valuation techniques, after controlling for student's prior knowledge. Blend TPS cooperative learning model to project appraisal techniques proved to have a very powerful impact on learning outcomes of students in learning physics. This is because cooperative learning model with the stages of TPS students think (think), discussions (pair) and a split / listen to people / other students (share) will enrich the student's understanding of physics concepts especially combined with project appraisal technique its phases is essentially an observation, collection of information or data from what is observed, analyzed data, and concluded. These stages in the procedure is very relevant to understand the concepts of physics, so it helps the process of discovery or The constructed knowledge and understanding of physics concepts. Aside from the formation of The constructed or understanding, the concepts of physics, engineering project appraisal also is in accordance with the purpose of establishing the attitude and skills for learners in carrying out tasks in the form of the project, students are trained to practice scientific attitudes and skills formation in students. Therefore the effect on learning outcomes physics where the learning outcomes are integral to knowledge (cognitive), attitudes (affective) and skills (psychomotor) student assessment techniques can be developed through the project.

The results also show that the class of students taught with conventional learning models, learning outcomes are assessed physics class engineering project appraisal is lower than the results of the classroom students learn physics were assessed with a written assessment techniques. This can be understood as the process of learning with conventional learning models, where teachers are more dominant role in the teaching and learning activities, so that students get more information from the teacher than the information obtained learning materials students through learning activities that are self-contained. In addition, a written assessment technique also theoretically have an advantage in terms students can recall, compile, or integrate the knowledge they have learned into a series of sentences or statements are well-organized, because a written valuation technique is not only used to measure the ability of learners in fabricate things, but also in terms of ability to resolve a matter, analyzing

problems, and express opinions.
Therefore the conventional learning model in which the teachers were more likely to be the provision of learning material information, if followed by a written valuation techniques where students can easily remember, analyze, and quantify, the impact of the acquisition will provide a physics learning outcomes more leverage than the technique assessment of the project due to the formation or The constructed knowledge can be helped with the stages or steps that take place in the process of implementing a written assessment techniques.

IV. Conclusion

1. Learning outcomes in the classroom physics students taught with cooperative learning model TPS higher learning outcomes in the classroom physics students taught with conventional learning models, after controlling for student's prior knowledge,
2. Physics learning outcomes are assessed in grade students with techniques of project appraisal is higher than the results of the classroom students learn physics is assessed by a written valuation techniques, after controlling for student's prior knowledge,
3. There is an interaction effect between learning models with engineering physics assessment of learning outcomes, after controlling for student's prior knowledge,
4. For the class of students who assessed the project appraisal techniques, the results of the classroom students learn physics taught with cooperative learning model TPS higher than the results of the classroom students learn physics taught with conventional learning models, after controlling for student's prior knowledge,
5. For the class of engineering students are assessed with a written assessment, learning outcomes in the classroom physics students taught with conventional learning models of higher learning outcomes in the classroom physics students taught with cooperative learning model polling station, after controlling for student's prior knowledge,
6. For the class of students taught by cooperative learning model TPS, the results of the classroom students learn physics is assessed with techniques of project appraisal is higher than the results of the classroom students learn physics is assessed by a written valuation techniques, after controlling for student's prior knowledge, and
7. For the class of students taught by conventional learning models, the results of the classroom students learn physics is assessed by a written valuation technique is higher than the results of the classroom

students learn physics were assessed with technical assessment of the project, after controlling for student's prior knowledge.

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