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RESEARCH ARTICLE

THE INFLUENCE OF THE ASSESSMENT MODEL AND METHOD TOWARD THE SCIENCE LEARNING ACHIEVEMENT BY CONTROLLING THE STUDENTS' PREVIOUS KNOWLEDGE OF MATHEMATICS.

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Abstract

This research aims to study the influence of the assessment model and method toward the science learning achievement by controlling the students' previous knowledge of mathematics. This study was conducted at SMP East Seram district with the population of 295 students. This study applied a quasi-experimental method with 2 X 2 factorial design using the ANCOVA model.

The findings after controlling the students' previous knowledge of mathematics show that the science learning achievement of the group of students assessed by the analytic assessment method (the analytic rubrics) with the peer assessment model is higher than the science learning achievement of the group of students assessed by the analytic assessment method with the self-assessment model. The science learning achievement of the group of students assessed by the holistic assessment method (the holistic rubrics) with the peer assessment model is higher than the science learning achievement of the group of students assessed by the holistic assessment method with the self-assessment model. Overall, the result found in this study is the science learning achievement of the group of students assessed by the analytic assessment method is higher than the science learning achievement of the group of students assessed by the holistic assessment method for all assessment models.

Introduction:-

Education is one of the vehicles for family, government and society building that must be done in integrated method to improve and change the behaviour to improve the quality of Indonesia human resources for the better. The low qulity of education at every level and educational unit starting from primary, secondary to university levels is one of the educational problems faced by the Indonesian today, especially the achievement of science subjects. The quality of education is determined by the ability of educational units in managing the learning process, especially in the assessment process.

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Assessment is the most important part of learning process. The assessment of students' science learning accievement is not only about the cognitive aspect but also about the aplication, and is the effective aspect of the attitude and internalization of values that need to be studied and implanted through science subjects. Therefore, in order to improve the quality of education, in the process of assessment the teacher can assess by modifying an assessment model through assessment method. The assessment models selected are peer assessment and self-assessment model while the assessment method selected are analytic assessment method (analytic rubrics) and holistic assessment method (holistic rubrics). Mertler (2010: 1-2) defines an analytic rubric requires the teacher to define a list of importent components to be assessed. A holistic rubric requires the teacher to score the over all learning process as a whole, without judging the component parts separately. Mertler's research (2010: 4) obtained assuming results that the analytic rubrics used in the assessment process of learning accievement is better than the holistic rubrics used in the assessment process of learning accievement. These research results are similar to Mustamin's research results (2012: 29).

In the learning process must have an assessment, a teacher makes an assessment at the classroom level with peer assessment and self-assessment. A classroom self-assessment is an assessment conducted by a teacher or student concerned for the benefit of managing learning activities in the classroom. According to Tola (2008: vi-4), the opportunity of a student and teacher to be able to reflect and assess themselves is the basis for encouraging themselves: (1) to be responsible for learning and teaching, (2) to promote critical thinking, and (3) to help students become actively involved in their education process. Peer assessment requires perticipation of fellow learning groups to assess each other. Bostock (2010: 1) defines peer assessment is an assessment of students by other students, both formative reviews to provide feedback and summative grading to improve the quality of learning and empower students to be able to judge.

In general, this study was conducted with the aim to study the effect of assessment model factor and assessment method factor to the science learning achievement by controlling the previous knowledge of students' mathematics.

Method:-

The method applied in this study is a quasi-experimental method with 2 X 2 factorial design and the factors consist of: (1) an assessment model factor classified into peer assessment and self-assessment, and (2) an assessment method factor classified into analytic rubrics and holistic rubrics. To obtain the experimental data developed instruments: (1) the assessment of science learning obtained through tests conducted with a multiple-choice form and essay referring to the cognitive dimensions of Bloom, and (2) the measurement of students' previous mathematical abilities by referring to the students' abilities of the last national examination achievement of mathematics subjects. Before the students' science learning achievement used in this study, the test first was conducted to know the reliability level of the items. From the instrument test result, it obtained that the coefficient of item reliability is 0,80, while all other analysis requirement tests in this study have been fulfilled.

Results:-

The research results describe any differences between the science learning achievement of the group of students assessed by the analytic rubrics and the science learning achievement of the group of students assessed by the holistic rubrics with the peer assessment model and the self-assessment model by controlling the students' previous knowledge of mathematics. The statistical analysis of F-test is shown in table 1.

Table 1:-F-test Statistics of *AB, A*B* toward The Students' Science Learning Achievemen

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	F_{table} $\alpha = 0,05$	
X	827,427	1	827,427	10,353	0,002	2,70	3,98
A	1333,314	2	366,657	**12,207**	0,006		
B	1321,186	1	321,186	**10,633**	0,002		
A * B	7,078	2	823,539	**9,117**	0,087		

The data source is processed by SPSS Version 16.0:-

Based on the results of hypothesis testing analysis in table 1, it shows on line [A] value $F_{hit} = 12,207 > F_{tab} = 2,70$ at 0,05 validity means any differences of the students' science learning achievement between the group of students with peer assessment model and the group of students with self-assessment model after controlling the students'

previous knowledge of mathematics. This result is reinforced by the result of descriptive analysis which the mean value of peer assessment model (μA_1 = 82,68) is higher than the mean value of self-assessment model (μA_2 =81,65). Thus, it concludes that the science learning achievement of the group of students with peer assessment model is higher than the science learning achievement of the group of students with self-assessment model.

On line [B] in table 1 above, value $F_{hit} = 10,633 > F_{tab} = 2,70$ at 0,05 validity means any differences of the students' science learning achievement between the group of students assessed by the analytic rubrics and the group of students assessed by the holistic rubrics after controlling the students' previous knowledge of mathematics. This result is reinforced by the result of descriptive analysis which the mean value of the analytic rubrics (μB_1 = 81,82) is higher than the mean value of the holistic rubrics (μB_2 = 80,54). Thus, it concludes that the science learning achievement of the group of students assessed by the analytic rubrics is higher than the science learning achievement of the group of students assessed by the holistic rubrics.

The interaction effects the assessment method and the assessment models of the science learning achievement after controlling the students' previous knowledge of mathematics. It is shown from F-test statitical analysis result, in table 1 on line A*B value $F_{hit} = 9,117$ is higher than value $F_{tab} = 2,70$ at 0,05 validity.

To find out more about the difference in mean value on which group is higher, it can be tested by T-test. The result of T-test is shown below:

Table 2:-T-test Statistics of The Difference of Y Average Parameter by A and B Factor after Controlling X

Model	Unstandardized Coefficients		t	Sig.		ttabel	
	B	Std. Error			α = 0,05		α = 0,01
(Constant)	64,221	6,786	9,464	0,000	1,684		1,303
X	0,160	0,099	1,626	0,107			
[A1][A2]	1,150	1,319	2,872	0,007			
[B1] [B2]	4,004	1,879	2,131	0,116			

The data source is processed by SPSS Version 16.0:-

Based on the results of analysis in table 2 on line ([A1][A2]), it shows value $t_0 = 2,370 > t_{tabel} = 1,697$ means the science learning achievement of the group of students with peer assessment model (A1) is higher than the science

learning achievement of the group of students with self-assessment model after controlling the students' previous knowledge of mathematics.

The average value of the group of students assessed by the analytic rubrics is higher than the average value of the group of students assessed by the holistic rubrics after controlling the students' previous knowledge of mathematics. T-test analysis result in table 2 on line [B] is value $t_{hit} = 2,131 < t_{tabel} = 1,697$.

To find out about the difference of value on which group is higher, it can be tested by T-test and the result is:

Table 3:-T-test Statistics of Y Average Parameter between All Level of B Factor for Each Level of A Factor after Controlling X

Model	Unstandardized Coefficients		t		Sig			ttabel	
	B	Stand Error					α = 0,05		α = 0,01
(Constant)	58,750	6,359		6,359		0,000	1,697		1,310
X	0,160	1,626		1,626		0,007			
B1 [A1*A2]	0,159	2,476		2,476		0,050			
B2 [A1*A2]	0,045	4,406		4,406		0,007			

The data source is processed by SPSS Version 16.0:-

Spesifically on the analytic rubrics, the students' science learning achievement of the group with peer assessment model is higher than the students' science learning achievement of the group with self-assessment model after

controlling the students' previous knowledge of mathematics. T-test statistical value in table 3 on line [$B_1(A_1*A_2)$] is value t_{hit} = 2,476 > t_{tab} = 1,697. Spesifically on the holistic rubrics, the students' science learning achievement of the group with peer assessment model is higher than the students' science learning achievement of the group with self-assessment model after controlling the students' previous knowledge of mathematics. T-test statistical value in table 3 on line [$B_2(A_1*A_2)$] is value t_{hit} = 4,406 > t_{tab} = 1,697.

Discussions:-

The result of research hypothesis testing states any differences in the students' science learning achievement of the group assessed by (B) rubrics with (A) different assessment model after controlling the students' previous knowledge of mathematics. The result in the first hypothesis shows that the average of the science learning achievement of the group of students with peer assessment model is higher than the average of the science learning achievement of the group of students with self-assessment model on every assessment method after controlling the students' previous knowledge of mathematics. Sri Wahyuni's theory of peer assessment (2012: 76) supports the above result. She states that peer assessment is an assessment model conducted by asking the role of learners to provide an assessment to other learners by expressing the other's strengths and weaknesses in various matters relating to the learning process. Involving the students in the asssessment process can develop their abilities to work together, and them to be critical of the other students' performance, and recieve criticism and feedback from others on their own performance. Peer assessment can also educate the students about the criteria used in the judgements. Besides, peer assessment can also be used to determine the value of students' performance for both formative and summative purpose.

The superiority of peer assessment model when compared to self assessment model is as Bostock (2010: 4) says that peer assessment helps students to take responsibility by involving in the judgements, encourages students to be critical in researching the performance of other students, gives feedback for students, practises the transferable skills needed for students for life-long learning which the group do the assessment, decreases teacher's burden, improves students' motivation because students feel a sense of ownership of the assessment process, and developes students as autonomous learners because peer assessment encourages them to care more about their own learning. Brown, Rust and Gibbs as Bostock quotes (2010: 2) state judging the work of others makes students gain insight into their own performance and helps students develop the ability to make judgements.

The result in the second hypothesis shows that the science learning achievement of the group of students assessed by the analytic rubrics is higher than the science learning achievement of the group of students assessed by the holistic rubrics. It happens because the analytic rubric is an assessment method, which the teacher scores specifically student's individual parts of the product. Mustamin's research (2012: 26) presents the learning achievement in the group assessed by the analytic rubrics is higher than the learning achievement in the group assessed by the holistic rubrics. Similiar to this research, the theory explains the analytic rubric is an assessment method, which requires the teacher to define a list of importent components assessed. Mertler (2010: 2) says the analytic rubric is an assessment method, which the teacher scores individual parts of the product or performance first, and then sums the individual scores to obtain a total score. For further details, analytic rubrics usually prefer a value of a fairly focused type of response is required, for performance tasks in which there may be one or two acceptable responses and creativity is not an essential feature of the students' responses.

The result in the third hypothesis shows the interaction between the assessment models and the assessment method to the science learning achievement by controlling the students' previous knowledge of mathematics. The result of the research indicates the influence of interdependence correlation bettween the assessment models and the assessment method to the students' science learning achievement. The descriptive statistic reinforces this result of the research that shows the effect of interdependence correlation as shown visually in the following table

Table 4:-The Composition of The Science Learning Achievement of Every Research Group				
Rubrics	Assessment Models (A)			
(B)	Peer Assessment (A_2)	Self Assessment		Average
		(A_3)		
Analytic (B_1)	82,24	81,41		81,82
Holistic (B_2)	81,12	79,88		80,54

Sum	81,68	81,65		82,53

From the above table, it shows the difference between cell results after controlling the students' previous knowledge of mathematics determined by the assessment models and the assessment method. Therefore, the teacher in the assessment should focus not only on the assessment models but also on the rubrics such as holistic rubrics and analytic rubrics because the learning achievement not only is determined by the assessment models but also is affected by the rubrics so it is an interaction correlation between the assessment models and the assessment method. Based on the result of the hypothesis testing shown at the table and the above discussion, it concludes that the assessment models and the assessment method used determine the students' science learning achievement or generally the assessment models and the assessment method are interdependent.

The result of the fourth hypothesis testing shows the science learning achievement of the especial group of students assessed by the analytic and holistic rubrics with peer assessment is higher than the science learning achievement of the especial group of students assessed by the analytic and holistic rubrics with self-assessment after controlling the students' previous knowledge of mathematics. The descriptive analysis result reinforces this result of the research. It shows the avage score of the science learning achievement of the especial group of students assessed by the analytic and holistic rubrics with peer assessment is higher than the avage score of the science learning achievement of the especial group of students assessed by the analytic and holistic rubrics with self-assessment. Bostock's research result (2010: 4) assumes peer assessment combined with the proper assessment method can develop students' self-convidence and train them to think critically.

Mertler's theory (2010: 3) supports this result. It assumes the analytic rubric is an assessment method which every assessment must apply the scoring criteria. By applying the the scoring criteria, it makes students' work well examined. If it is combined with peer assessment, it motivates students to improve their achievement because peer assessment is the assessment involving students in full assessment. Involving students in full assessment may make them aware their weeknesses and want to learn from the strengths of their friends. From this research, it concludes the science learning achievement of the group of students with peer assessment model is higher than the science learning achievement of the group of students with a self-assessment model in all assessment methods.

The result of the fifth hypothesis testing especially peer assessment of the group of students assessed by the analytic and holistic rubrics is t_{hit} value is higher than t_{tab} value. The especial group of students assessed by the analytic and holistic rubrics with peer assessment have the differences of the science learning achievement between two groups after controlling the students' previous knowledge of mathematics. The descriptive analysis reinforces this result of the research shows the avage score of the students' science learning achievement with peer assessment specially the group of students assessed by the analytic rubrics is higher than the avage score of the students' science learning achievement with peer assessment specially the group of students assessed by the holistic rubrics. Thus, specifically on peer assessment, the avage of the science learning achievement of the group of students assessed by the analytic rubrics is higher than the avage of the science learning achievement of the group of students assessed by the holistic rubrics after controlling the students' previous knowledge of mathematics.

In the theory of study, the theory explaines analytic rubrics that Shirran (2008: 5-7) states analytic rubric is the assessment method having many advantages for the teacher and students. Some of the advantages are: (1) the teacher may give reasons and support the value given to the students if any students or parents submit complaint, (2) the students may be better to assess the quality of their performance, (3) easy to explain to parents and they may know what their child needs to raise the achievement, and (4) the theacher may reduce the hello effect when giving score.

The result of hypothesis testing analysis of the difference of the average deviation of learning result between the group assessed by analytic and the group assessed holistic rubrics with self-assessment is any differences of the science learning achievement between two group of students after controlling the students' previous knowledge of mathematics. The descriptive statistical analysis reinforces this result of the research shows the average of the students' science learning result with self-assessment of the especial group of students assessed by analytic rubrics is higher than the average of of students' science learning result with self-assessment of the especial group of students assessed by holistic rubrics. Thus, aspecially on peer assessment, the science learning result of the group of students assessed by analytic ribrics is higher than the science learning result of the group of students assessed by holistic rubrics after controlling the students' previous knowledge of mathematics.

In the theory of study, Mertler (2010: 4) explaines analytic rubric is a systematic and structured assessment method focusing on the aspects assessed, so it has many advantages for the teacher and students. Some of them are: (1) the teacher may give reasons and support the value given to the students if any students or parents submit complaint, (2) the students may be better to assess the quality of their performance, (3) easy to explain to parents and they may know what their child needs to raise the achievement, and (4) the theacher may reduce the hello effect when giving score to improve student learning motivation.

The use of analytic rubrics is one of the factors very important to improve the students' science learnning achievemnet on physics materials. The proper use of analytic rubrics can influence the students' science learnning achievemnet, aspecially on physics materials on science subjects for students of VII grade in junior high school. The sucsess in the learning process is highly dependent on the ability of the teacher to choose assessment model and method appropriate with the charactheristic of the material tested.

Conclusion:-

The conclusion of this study generally is the science learning achievement of the group of students with peer assessment model is higher than the science learning achievement of the group of students with self-assessment model by controlling the students' previous knowledge of mathematics in all assessment methods.

From this study, it presents to improve learning achievement is not only influenced by assessment model but also influenced by assessment method, so assessment model and method influence each other.

Generally, the science learning achievement of the group of students assessed by analytic rubrics for all assessment models is higher than the science learning achievement of the group of students assessed by holistic rubrics for all assessment models.

References:-

1. Bostock, Stephen. *Student Peer Assessment*. (http://www.ukcle.ac.uk/resources/assessment/group.html), (accessed
2. on October, 5 2010).
3. Mertler, Craig A. *Designing Scoring Rubrics for Your Classroom Practical*. (accessed on October, 18 2010).
4. Mustamin Idris. *"Pengaruh Penerapan Kriteria Penilaian, Model Pembelajaran dan Adversity Quotient TerhadapHasil Belajar Matematika Siswa SMP Kota Palu." (Sinopsis Disertasi).* Jakarta: PPs UNJ, 2012.
5. Sri Wahyuni. *Assessment Penilaian Bahasa.* Bandung: Refika Aditama, 2012.
6. Shiran, Alax. *Meng Evaluasi*. Nien Bakti Sumanto's Translation. Jakarta: Grasindo, 2008.
7. Tola, Burhanuddin. *Penilaian Diri.* Jakarta: Badan Penelitian Pengembangan Departemen Pendidikan Nasional, 2006.