THE STUDENTS' CONCEPTUAL UNDERSTANDINGS ON GLOBAL WARMING THROUGH READ-ANSWER-DISSCUSS-EXPLAIN-AND CREATE (RADEC) LEARNING MODEL IMPLEMENTATION

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Abstract: This research aims to identify the students' conceptual understandings on Global Warming through RADEC learning model implementation. This study used Quasi-experimental design with Matching Only Pretest-Posttest Control Group design. This research involved 60 students of Junior High School grade VII in South Cirebon Regency. Those students were devided into two classes, each classes concisted of 30 students. Experimental class learnt using RADEC Learning Model and Control Class learnt using Jigsaw Cooperative Learning (CLTJ) model. The instrument used was in the form of Concept Mastery Test given before and after the learning process. Processed data showed the average of learning value of the pretest experiment class value (55.42) and pretest control class value (54.17) were not different significantly ($p = 0.378$). While posttest experimental class value (81.67) and posttest control class value (62.92) were different significantly ($p = 0.00$). The increase in the mastery of concepts through the implementation of the RADEC learning model obtained N-Gain (0.57) is higher than using the *CLTJ* model obtained by N-Gain (0.18). Based on these findings, it can be concluded that the RADEC learning model can improve mastery of concepts more than the *CLTJ* model.

Keywords: Students' conceptual understanding, RADEC learning model, global warming, junior high school

1. Introduction

In the 21th century, there were skills needed by the students commonly known as 4C including Communication, Critical thinking and problem solving, Collaboration, and Creative thinking (Sopandi, 2017). Those skills need to be provided to the students of Junior High School through the implementation of 2013 Currriculum. The 2013 Currriculum constitutes a curriculum that emphasizes the balance of soft skills and hard skills including aspects of competency, skills, and knowledge (Fadlillah, 2014). To achieve the curriculum objectives, an appropriate and innovative learning model or approach is needed. Thus, students have the knowledge and skills of the 2013 Curriculum. Without an inovation in learning proccess in class, it is difficult to provided the skills as skills in the 21th century to the students. Thus, the changes in learning process is extremely important in order to the best quality of learning procces is achieved as the demands of the age. Besides, this change is important with the immende role of education in influencing the fate of indonesian people in the future. Nelson Mandela stated that "Education is the most powerful weapon you can use to change the world" (Sopandi, et al, 2017).

If we viewed from the low rank of Indonesia's Human Development Index (HDI) among 173 countries, it even declined from 1996 in the rank of 102 to be ranked 109 in 2000. In the fields of reading, mathematics and science compared to students from other countries joined the OECD is always in the lower group or the average score is below the average. (Schleicher, 2012). The data shows that it needs the improvement in the learning process, especially in the Mathemathics and Natural Science field in particular.

Today, in 21st century, students' literacy ability is closely related to the demands of reading skills which lead to the ability to understand information analytically, critically, and reflectively. Starting from the difficulties of the teachers in the field to implement innovative learning that has been known so far, a learning model that has been developed is adjusted to the conditions and situations in Indonesia. The model in question is the RADEC model. However, the quality of this model in helping students achieve learning goals (one of them is understanding the concept) still needs to be tested. In this case, understanding is not only means remembering (memorizing only), otherwise it means expressing it in the form of their own words that it is easy to understanded the material meaning studied without changing the real meaning in it. After we are able to understand, so we can master the concept. The mastery of concept in this case is a level where a person is not only know the concept of the theme related to the Global Warming material, but also deeply understand it well proved by their ability in solving various problems both related to the concept or theme or its implementation in the new situation (Karim, 2007).

In this article, a report on the results of testing the quality of the RADEC learning model is presented in helping students to understand the field of Natural Science lessons, especially the material of Global Warming. The material of Global Warming is a material that exists in the field of science which has emerged as a stand-alone concept in the 2013 curriculum, where in the previous curriculum, the material of global warming was in the discussion of the Earth and Solar System.

2. Research Methods

This study used the Quasi Experimental method with Matching Only Pretest-Posttest Control Group Design that gave treatment in the form of the application of the RADEC Learning Model to the Experimental Class and the application of the Jigsaw Cooperative Learning (JCL) to the Control Class (Sugiyono, 2010). Before being given treatment, both classes students were given a pretest questions to measure the mastery ability of students' concepts. Meanwhile, the posttest question was given after the treatment to see the effect of treatment on students' ability to master the concept. The test technique was used to determine the increase in mastery of students' concepts by using pretest and posttest. The questionnaire technique was used to obtain student responses toward the application of the RADEC learning model in the classroom.

3. Results and Discussion

a. Mastery of Student Concepts

The student mastery concept score was obtained from the results of the pretest given before the teaching and learning activities with the aim to know the students' initial abilities. While the post-test score was used to measure the mastery of student concepts after the RADEC learning model was applied. Test questions of mastering students' concepts for pre-test and post-test consist of 8 essays questions with different indicators on each issues. Data results of mastery of concepts were shown in the form of scores as in the tabel below:

TABLE 1. Concept Mastery (%)

Class	N	Indicator 1			Indicator 2			Indicator 3		
		Pre	post	n-gain	Pre	Post	n-gain	Pre	Post	n-gain
Experimental	30	290	300	-4,7	280	300	-10	130	270	-280
Control	30	300	290	4.5	230	270	-26,7	100	130	-150

Class	N	Indicator 4			Indicator 5			Indicator 6		
		Pre	Post	n-gain	Pre	Post	n-gain	Pre	post	n-gain
Experimental	30	170	260	-100	170	230	-66,7	0	50	62,5
Control	30	100	160	-300	120	180	-150	20	30	16,7

Class	N	Indicator 7			Indicator 8			Average		
		Pre	Post	n-gain	Pre	Post	n-gain	Pre	Post	n-gain
Experimental	30	60	250	950	230	300	-46,7	55,42	81,67	0.57
Control	30	140	160	-33,3	290	290	0	54,17	62,92	0.18

TABLE 2. Normality and Homogeneity Test

Class	N	X N-Gain	Standard Deviation	Normality test		Homogeneity test		Mann-Whitney Test	
				Pre	Post	pre	Post	Pre	Post
Experimental	30	0,57	1,30	0,000	0,008	0,56	0,18	0,378	0,000
Control	30	0,18	1,48	0,009	0,079				

Class	N	X N-Gain	Standard Deviation	Normality N-Gain test	Homogeneity N-Gain test	Independent Samples test N-Gain
Experimental	30	0,57	0,30	0,54	0,017	0,001
Control	30	0,18	0,49	0,2		

Where the students were given questions about the pretest to measure the mastery ability of students' concepts. Meanwhile, the posttest question were given after the treatment to see the effect of treatment on students' ability to master the concept. The test technique was used to determine the

mastery ability of students concept by using the pretest and posttest. The questionnaire technique was used to get student responses to the application of the RADEC learning model in the classroom.

Based on the results obtained during the pre-test, the biggest score was in question number 1, number 2 and number 8, this was because the question number 1, number 2 and number 8 were not strange for them to answer because the questions constitutes problems that had become an issue in the worlds and also the possibility was that the students had learnt the material before. While the results of the student concept mastery test showed that after learning activities with the RADEC model, there was an increase in scores.

The increasing the mastery score of students' concepts was influenced by several factors including learning by using the RADEC model capable of inviting students to develop the concept by reading the reading material at home which allows students to discover concepts for themselves thus they did not only get material from the teacher others like books (Yaumi, et al, 2017). Scientific phenomena on scientific issues and investigations carried out to prove a concept related to scientific issues exist in the material of global warming which aims to train students to read a lot, especially science reading or Natural Science (Toharudin, et al, 2011). There was another factor; students were enthusiastic in participating in learning as indicated by students' positive responses toward learning.

The magnitude of the increase in mastery score of students' concept is seen as acquisition of N-Gain between experimental class results N-Gain 0.57 in medium category and the control class results N- 0.18 in low category.

b. Students Response

Student response is students' opinions towards the application of RADEC learning model. The results of student responses indicated that RADEC learning on the material of Global Warming applied by researchers has been effective and has received positive responses from students. The results of the student response percentage of 92.9% showed a very good category. Student responses did not show 100% toward RADEC learning. This is because the RADEC learning model had never been applied before by their teacher so that it had not been optimal and consistent in implementing the RADEC model.

4. Conclusion

The implementation of the RADEC learning model can improve students' knowledge and understanding of the material of global warming, with a N-gain score of 0.57 (moderate) while without using the RADEC learning model 0.189 (low), while in the u test the results are 0,000 where value of the Sig.(2-tailed) 0.00 is smaller than 0.05 so it can be stated that there is a difference between the classes that use the RADEC learning model and the class that not use the RADEC learning model.

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