



## The Effect of Project-Based Learning with Realistic Mathematics Approach on Students Self-regulated learning

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**Abstract:** This study aims to find out how the effect of the project-based learning model with a realistic mathematics education approach on students' self-regulated learning independence. This research was a quasi-experimental study with a non-equivalent control group design. The population of this study was all fifth-grade students of the public elementary school in the Sumedang Utara district, Sumedang Regency. The sample in this study was the fifth-grade students from two public elementary schools in the Sumedang Utara district, Sumedang Regency. Fifth-grade students from one public elementary school were designated as the experimental group, whereas fifth-grade students from another public elementary school were designated as the control group. The instruments in this study were a self-regulated learning scale using a Likert scale, observation guidelines, student daily journals, and field notes. The results of this study indicate that with a significance level of  $\alpha = 0.05$  (5%) the project-based learning model with the Realistic Mathematics Education approach can improve students self-regulated learning

**Keywords:** Project-Based Learning, Realistic Mathematics Education, Self-Regulated Learning.

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### INTRODUCTION

Today we often encounter deviant behavior by students in the classroom. Examples of deviant behavior that are often done by students are cheating or doing homework that is done by parents. Cheating is usually done by students to avoid failing test scores or assignments. The behavior of cheating and doing homework that is done by parents is a behavior that must be eliminated in students. This cheating behavior is related to self-regulated learning. This is in line with the opinion of Lestari, et al. (2015) which states that student self-regulated learning can be seen from their behavior if students are good at self-regulated learning, then the student can complete their assignments well and on time without copying assignments from other friends, on the contrary, if they have low of self-regulated learning then can't collect assignments on time. According to Masrun (in Nurhikmah, 2015) self-regulated is an attitude that allows someone to act freely, do something on their impulse and for their own

needs without help from others or think and act original/creative, full of initiative, able to influence the environment, have a sense of confidence, and get satisfaction from his efforts. From this opinion it can be concluded that students who are accustomed to being self-regulated will not experience difficulties in learning, because students can organize and direct themselves without dependence on other people and these students will show their readiness to learn, such as being able to complete their assignments, and confident in expressing his own opinions. Meanwhile, students who are not accustomed to self-regulated learning tend to be passive and not confident in learning and they will show their unpreparedness in learning. According to Suherman (2018) to solve the problems of character education, a learning strategy is needed in building the students' character, since it has to be positioned as an effort to develop a strong character. Thus, every education unit has to have its character-building programs integrated with all intra-curricular and extracurricular activities. From



this opinion, what teachers can do to instill students' self-regulated learning attitudes is to integrate the character values of self-regulated into the learning process through the approaches, strategies, methods, or media used by the teacher. One of the subjects that must instill student self-regulated learning through the learning process in mathematics. Suwangsih (2010) says that mathematics can be described as a deductive science, structured science, mathematics is a symbol, and mathematics is the queen and servant of knowledge.

Mathematics is a subject that discusses the science of logic regarding forms, arrangements, quantities, and concepts related to numbers. Even though mathematics is not a subject that directly teaches attitudes to students, some strategies can be used to instill student self-regulated learning, that is Project Based Learning with Realistic Mathematics Approach. According to Zakaria and Syamaun (2017), the Realistic approach is based on the idea of Freudenthal which says that mathematics is a human activity, learning mathematics is seen as a process. From this opinion, the reality of student life is something meaningful, it can be in the form of media or parables of the problems given and are always found by students in life. In learning to use the RME strategy, students can build their understanding using the media that students used. Meanwhile, according to Ellis (in Maliawan, 2015) says that project-based learning is an innovative learning model that emphasizes contextual learning through complex activities such as giving students the freedom to explore planning learning activities that will ultimately produce a product of the learning process. Based on the results of research and statistical analysis conducted by Veralita et al. (2018), it is concluded that the increase in self-regulated learning of junior high school by using the Realistic Mathematics Education approach is better than those using ordinary learning.

However, there is a difference between previous research and this research that is the indicators of self-regulated learning. In this research, indicators of student self-regulated learning are taken according to Djamarah (2011), that is aware of learning objectives, awareness of learning responsibilities, continuity of learning, active learning, and learning efficiency. This indicator is used as an indicator of changes in student self-regulated learning before and after treatment. The hypothesis proposed in this study is that learning mathematics using project-based learning with realistic mathematics approach affects student self-regulated learning, conventional learning affects the self-regulated learning of elementary school students, and mathematics learning with project-based learning with realistic mathematics approach is more influential than conventional learning on student self-regulated learning. In this project-based learning with realistic mathematics approach students will build their understanding and self-regulation by using the media used then students pour back their understanding into a product that they make independently. With this strategy, it is hoped that the student self-regulated learning of students will increase. The subject matter discussed solving problems related to the volume of cubes and blocks.

#### **METHOD**

The design research of this study used a quasi-experimental design and the type of design is the nonequivalent control group design. Sugiyono (2012) Non-equivalent Control Group Design is almost the same as the pretest-posttest control group design in the experimental group, but what distinguishes it is that in this study neither the control group nor the experimental group was chosen randomly.

This research was conducted through three procedures in its implementation, namely the preparation, implementation, and data processing. Sampling in this study, researchers used the nonprobability sampling



technique with purposive sampling type. The samples in this study were students in grade V SDN Gunasari as the experimental group and class V SDN Tenjonegara as the control group.

**RESULTS AND DISCUSSION**

Hypothesis one is that learning mathematics using the RME approach affects students' self-regulated learning. To prove whether or not

there was an increase in student self-regulated learning in the experimental group, the independent T-test was carried out on average without going through the homogeneity test because one of the data was not normally distributed. The independent test uses the Wilcoxon Signed Rank Test found on SPSS 16.0 for windows.

**Table 1.** the results of the independent test the mean value of pretest and posttest students self-regulated learning of the experiment group

	Posttest - Pretest
Z	2.667 <sup>a</sup>
Asymp. Sig. (2-tailed)	.000
a. Based on negative ranks.	
b. Wilcoxon Signed Ranks Test	

Based on Table 1, it can be seen that the P-value (Sig. 2-tailed) is 0,000. In this case, the hypothesis to be tested is one-way, so that the P-value (Sig. 1-tailed) must be searched by dividing the value of 0.000 in half, so the P-value (Sig. 1-tailed) is 0,000. P-value (Sig. 1-tailed) 0.000 <0.05 which causes H<sub>0</sub> to be rejected and H<sub>1</sub> to be accepted. This means that learning using project-based learning with a realistic mathematics approach affects students' self-regulated learning.

Hypothesis two is that conventional learning affects the student's self-regulated learning in elementary school. To prove whether or not there was an increase in the student self-regulated learning in the control group, the independent T-test was carried out on average without going through the homogeneity test because one of the data was not normally distributed. The independent test uses the Wilcoxon Signed Rank Test found on SPSS 16.0 for windows.

**Table 2.** The results of the independent test in the mean value of the pretest and posttest students self-regulated learning of the control group.

	Posttest - Pretest
Z	2.903
Asymp. Sig. (2-tailed)	.000
a. Based on negative ranks.	
b. Wilcoxon Signed Ranks Test	

Based on Table 2, it can be seen that the P-value (Sig. 2-tailed) is 0,000. In this case, the hypothesis to be tested is one-way, so that the P-value (Sig. 1-tailed) must be searched by dividing the value of 0.000 in half, so the P-value (Sig. 1-tailed) is 0,000. The P-value (Sig. 1-tailed) is 0.000 <0.05, which causes H<sub>0</sub> to be rejected and H<sub>1</sub> to be accepted. This means that conventional learning affects students' self-regulated learning.

Hypothesis three is that mathematics learning with the project-based learning with realistic mathematics approach is more influential than conventional learning on student self-regulated learning. Based on the results of hypotheses 1 and 2, it was found that project-based learning with a realistic mathematics approach and conventional learning were both able to increase students' self-regulated learning. Based on the results of the pretest normality test of the two



groups, it turns out that both of them have the same initial self-regulated learning as the

results of the Mann-Whitney U-test as follows.

**Table 3.** The Results of the Mann-Whitney U-test of Pretest Value the Students self-regulated Learning Pretest of Experiment Group and Control Group

	Pretest
Mann-Whitney U	445.000
Wilcoxon W	941.000
Z	-.895
Asymp. Sig. (2-tailed)	.371

a. Grouping Variable

Based on the table above, it can be seen that the p-value (2-tailed) is 0.371. The value of 0.371 fulfills the requirements for P-value  $\geq$  0.05 so that  $H_0$  is accepted and causes  $H_1$  to be rejected. This may imply that there is no difference in students' self-regulated learning in mathematics between the experimental group and the control group or the data

comes from the two groups with the same initial independence in learning mathematics.

The non-parametric statistical test for the gain value used was the Mann-Whitney U-test. This U-test was carried out using SPSS 16.0 for windows and the results were obtained as in Table 4 below.

**Table 4.** The Results of the Mann-Whitney U-test of Posttest Value the Student self-regulated Learning of Experiment and Control Group

	Posttest
Mann-Whitney U	318.000
Wilcoxon W	879.000
Z	-2.607
Asymp. Sig. (2-tailed)	.009

a. Grouping Variable: Group

Based on the table above, it can be seen that the P-value (Sig. 2-tailed) is 0.009. In this case, the hypothesis to be tested is one-way, so that the P-value (Sig. 1-tailed) must be searched by dividing the value of 0.009 in half, so the P-value (Sig. 1-tailed) is obtained of .0045. The p-value (Sig. 1-tailed) is 0.0045 < 0.05, which causes  $H_0$  to be rejected and  $H_1$  to be accepted. This means that there is an increased difference between the experimental group and the control group. To find out which increase in student self-regulated learning is better, it can be seen from the difference in the posttest scores of the average student self-regulated learning for the experimental group which is 85.99, while for the control group is 81.69. So, with this, it can be stated that project-based learning with a realistic mathematics

approach is more influential than conventional learning on student self-regulated learning.

The increase in the student self-regulated learning of the experimental group students could be caused because according to the responses given by students, the teaching-learning process that occurs was fun. After all, students were allowed to build their understanding using the media and make projects.

When students were able to understand the subject matter, students would be having regulated learning. This situation was in line with Mujiman's opinion (in Aini, 2012) that student self-regulated learning is a trait and the ability of students to carry out active learning activities, which are driven by a



motive to master the competencies they already have.

The treatment given in the control group in this study was conventional learning. The learning was teacher-centered with teaching and learning activities that were dominant in lectures and assignments. When going to teach material by lecturing, the teacher must be able to make students interested in continuing to pay attention to the explanation, so that students could understand the material explained so that they have student self-regulated learning. As expressed by Fatimah (in Fidayanti, 2011) self-regulated learning is an individual attitude that is obtained cumulatively during development, and individuals will continue to learn to be independent in dealing with various situations in the environment so that individuals are ultimately able to think and act on their own. It is better if learning by applying project-based learning with a realistic mathematics approach in improving the student self-regulated learning attitudes of elementary school students in problems solving related to simple cubes and blocks compared to conventional learning, it can be because the project-based learning with realistic mathematics approach has components that are more able to challenge students to learn with seriously, wherein the process students are required to find their knowledge.

In the problem-solving step, students are invited to be able to connect real-world life with problem-solving subject matter related to simple cubes and blocks so that students have an initial scheme regarding the material that students will learn and become one way to cultivate student interest. At the reasoning step, students build their knowledge by discussing as a valuable form of their experience when learning to solve problems related to simple cubes and blocks and this experience will be a means of conducting students to be able to continue at the next, that is the communication. At the communication step, students apply the knowledge they get and exchange opinions

with their friends so that students are challenged to be able to solve problems in the student worksheet. The fourth step is self-confidence, where the results or knowledge that students have obtained in the previous step are discussed with classmates to correct each other, complementing existing knowledge, or sharing knowledge with friends, so that student knowledge is built through himself and his friends. The last step is the presentation where students use the knowledge, they already have to solve new problems that are different from previous problems and connect mathematical material to students' real-world life. So that students are increasingly aware that problem-solving simple cubes and blocks are related to the real world and the students will feel the usefulness of this subject matter.

### CONCLUSION

Based on the results of the research and discussion presented, it can be concluded that learning used project-based learning with a realistic mathematics approach can increase student self-regulated learning. project-based learning with a realistic mathematics approach gives freedom to students to construct their understanding and then pour their understanding back into a project. The basis of a strong understanding ability, it will make students have a student self-regulated attitude in learning. Project-based learning with a realistic mathematics approach can provide an idea that mathematics is applicable and beneficial to student life.

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