Using Non-Traditional Writing Task Strategy to Improve Cognitive Concept Mastery in Learning Science and Identify Self- Regulated Learning Ability

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Abstract: The purpose of this study was to determine the effectiveness of writing task non-traditional strategies in improving students ' Concept mastery and to identify students' self-regulated learning profiles. The research method used was a quasi-experimental design with the research design Non-Equivalent Control Group Design. The population in this study were all students of class VIII at a junior high school in Bandung. The sample in this study consisted of 64 students of class VIII at a junior high school in Bandung who were selected using a purposive sampling technique. The instruments used in this study were mastery of student concept tests and self-regulated learning questionnaires. The result of analysis using the percentage of gain normalized showed that the strategy of writing task non-traditional was more effective in improving the mastery of student concepts. The result of descriptive analysis to obtain the self-regulated learning profile of students showed that in the experimental class and control class were mostly in the moderate category. The relationship between mastery of student concepts and self-regulated learning profiles based on the results of the correlation test analysis classified as low criteria.

Keywords: non-traditional writing tasks, concept mastery, self-regulated learning.

Abstrak: *Tujuan dari penelitian ini adalah untuk mengetahui efektivitas strategi writing task non-tradisional dalam meningkatkan penguasaan konsep dan untuk mengidentifikasi profil self-regulated learning peserta didik. Metode penelitian yang digunakan adalah quasi experimental design dengan desain penelitian Non-Equivalent Control Group Design. Populasi dalam penelitian ini adalah seluruh peserta didik kelas VIII di salah satu SMP di Kota Bandung. Sampel pada penelitian ini terdiri dari 64 peserta didik kelas VIII di salah satu SMP di Kota Bandung yang dipilih dengan menggubakan teknik purposive sampling. Instrumen yang digunakan dalam penelitian ini adalah tes kemampuan penguasaan konsep dan kuesioner self-regulated learning. Hasil analisis menggunakan persentase gain dinormalisasi menunjukkan bahwa penerapan strategi writing task non-tradisional dapat meningkatkan kemampuan penguasaan konsep. Hasil analisis deskriptif untuk mengetahui profil self-regulated learning menunjukkan bahwa profil self-regulated learning peserta didik kelas eksperimen dan kontrol sebagian besar berada pada kategori sedang. Adapun hubungan antara kemampuan penguasaan konsep dan profil self-regulated learning berdasarkan hasil analisis uji korelasi tergolong dalam kriteria rendah.*

Kata kunci: *writing task non-tradisional, penguasaan konsep, self regulated learning.*

▪ **INTRODUCTION**

Science learning is directed at finding out and doing so that it can help students to gain an understanding and ability to master deeper concepts about the natural surroundings (Nugraha, 2018), besides that Sintiawati et al., (2021) also revealed that Concept mastery and principles in science learning is important in developing skills and cognitive aspects for students. Concept mastery is very important in the learning process because with this students are able to develop their abilities in each lesson.

The ability to understand concepts is the ability of students in the form of mastery of subject matter where students not only memorize or remember a concept being studied but students are able to restate the concept in another form that can be easily understood. The ability to understand this concept is the most important part in learning science because mastering basic material concepts or prerequisites can make it easier for students to solve and understand problems in science learning material (Martiasari, 2021). Currently, the 2013 curriculum emphasizes students to be actively involved in the learning process in the hope of producing productive, creative, innovative, and affective people through integrated attitudes, knowledge, and skills (Astuti, 2017). Nugraha (2018) also revealed that the learning process has so far been too oriented towards mastery of theory and memorization in all fields of study which has hampered students' learning abilities.

Facts in the field are that there is still learning that is fixated on conventional learning where the teacher becomes the center of learning and students become passive in receiving knowledge from what is conveyed by the teacher so that students' abilities are weak and students' creativity and skills are low. Nugraha (2018) also revealed that the learning process has so far been too oriented towards mastery of theory and memorization in all fields of study which has hampered students' learning abilities. Siahaan, KWA, et al. (2021) also revealed that the learning that has been carried out so far is generally still a teacher centered approach. Learning that is only teacher-centered can cause these students to be less interested in participating in the learning process that takes place where the teacher only actively explains the material and provides information and then works on and explains several examples of questions in the book (Martiasari, 2021). It is this kind of learning process that causes many students to still lack Concept mastery, especially in science learning.

There are several studies that have been carried out by researchers in an effort to improve mastery of the concept. One of them was carried out by Martiasari (2018), this study showed that the inquiry learning model with the cooperative learning method can greatly help optimize the understanding of science learning concepts for students in junior high school. In addition, Nugraha (2018) also revealed that using the Resource Based Learning (RBL) learning model can improve students' ability to master science concepts in class VII. Astuti (2017) also revealed that there is an influence between self-concept and learning interest in increasing Concept mastery. Based on the research above, there have been many efforts made by researchers in increasing students' Concept mastery in science learning apart from the models and methods provided students also need to master themselves so that students have an interest in learning so that they can adapt themselves to the model or the method given in an effort to improve Concept mastery in science learning.

One of the successes of students in achieving learning achievement is determined by the students themselves which are obtained through the assessment process during learning. These aspects can be in the form of self-regulation, Concept mastery, or other things that can help in the learning process. Thus, to achieve successful learning achievement it is very important for students to know the profile of self-regulated learning so that they can regulate themselves in the learning process. Self regulated is described as a process of taking control and evaluating learning and own behavior (Huang, et al., 2020). learning is a process that can help students in the learning process

so that students can improve their learning skills and achieve the success they want. Meanwhile, according to Zumbrunn et al. (2011) Self Regulated Learning is a strategy for self-regulation in managing their thoughts, behaviors and emotions in order to successfully gain learning experiences.

In this study, efforts to increase Concept mastery were carried out by carrying out writing activities. Writing activities are carried out because the ability to write is very important for everyone to have. Norris & Phillips (2003) also stated that a student's scientific thinking ability will not develop if there is no writing activity in it. In addition, according to Galbraith (in Chen et al., 2013) writing can be seen as a tool that can build knowledge. By writing, students' understanding that has not been organized will be more coordinated as a whole. According to Avci et al (2013) in Aktepe (2020) states that writing assignments are categorized into two groups, namely traditional and non-traditional. Traditional writing tasks tell knowledge that usually requires students to write individually within a limited time frame for evaluative purposes with the teacher as the only audience (Prain & Hand, 1996). Meanwhile, the main contents of Non-traditional used to make writing activities into learning science.writing Non-traditional refers to the use of writing in science as a way of learning through a number of diverse writing assignments, which is in line with the knowledge transformation model (Sinaga & Feranie, 2017b).

Atasoy (2013) also suggests that when students write to explore their own ideas, share ideas with peers and teacher-led discussions, it is an important activity to support students' social and cognitive development. The non-traditional writing task strategy is a strategy that can be used to develop students' ideas about a concept in all learning activities or at the end of learning. In non-traditional writing tasks, this writing task can be done by writing a journal. Implementation of non-traditional writing task in learning requires students to work independently, including students are required to put their understanding of the material into writing and look for other references that can develop their writing.

In addition, the implementation of non-traditional writing task through journal writing also requires students to reflect. Students also need to ask themselves about things they don't understand and find solutions to overcome them. Therefore, students must be able to manage themselves well, in this case students need to have high self-regulated learning so they can carry out their tasks properly.

▪ **METHOD**

Participants

In this study the subjects for the research trial were all Grade VIII students in the 2022/2023 school year at one of Bandung's junior high schools. Meanwhile, the sample in this study were 64 students in class VIII at one of the junior high schools in the city of Bandung who were selected using a purposive sampling technique.

Research Design and procedures

The research method used in this research is the Quasi-Experimental Design or commonly called quasi-experimental. In this study the research design used was the Non-Equivalent Pretest–Posttest Control Group Design, in this design the experimental group and the control group were selected without random assignment. Both took the

pretest and posttest. However, only the experimental group received the treatment (Creswell, 2009). The experimental class is a class that is given treatment in the form of non-traditional writing task in learning while the control class is a class that does not receive treatment or learning without using non-traditional writing task strategies.

Instruments

Profiles self-regulated learning students self-regulated learning and conceptual mastery test instruments. The concept mastery test is in the form of multiple choice questions, which are given to students before (pretest) and after (posttest) learning with the same questions in both the experimental and control classes. The concept mastery test consists of 20 multiple choice questions arranged based on the cognitive process dimensions of the revised bloom taxonomy. Aspects of cognitive abilities in this study are the ability to remember (C1), understand (C2), apply (C3), and analyze (C4). Questionnaire self-regulated learning used in this study consisted of 32 statements which were divided into 5 aspects, namely metacognitive self-regulation, time management and study the environmental management, effort regulation, peers learning, and help seeking. This statement was adapted from self-regulated learning (2014). The answer choices available on the questionnaire refer to the Likert scale which consists of four choices of attitude statements.

Data Analysis

Technique used is the calculation of the n-gain value formulated by Hake (1998) to determine the increase in students' cognitive abilities, the Mann Whitney U and effect size to determine the effectiveness of non-traditional writing task, and descriptive analysis to obtain self-regulated learning profile. Linear correlation is used to determine the relationship between concept mastery and self-regulated learning. The correlation test aims to find whether or not there is a relationship and how close the relationship is (Arikunto, 2013). The correlation test is carried out by calculating the correlation coefficient and the results are interpreted with Arikunto's criteria (2013).

▪ **RESULT AND DISSCUSSION**

This research was carried out offline and face to face in schools. Researchers enter class to carry out learning, researchers use Google form as a means of testing ability to master concepts and to collect answers to writing assignments, besides that researchers also use WhatsApp as a means to collect answers for students who experience problems when collecting answers on Google Form. Meanwhile, for the questionnaire the researcher used answer sheets that had been prepared and worked on while in class. Learning activities are carried out for two meetings and at each meeting, students are given writing assignments that must be done individually.

Self Regulated Learning Profile

The profile of self-regulated learning ability of students described in the following description: 50% to 74% are included in the moderate category, and scores of 32 to 63 with a percentage of 25% to 49% are included in the low category.

Based on the results of processing the questionnaire data, the total score and percentage score of each student was obtained. Then the percentage score will be interpreted according to the categories that have been mentioned. The following is the

average percentage of the self-regulated learning of students in the control class and experimental class:
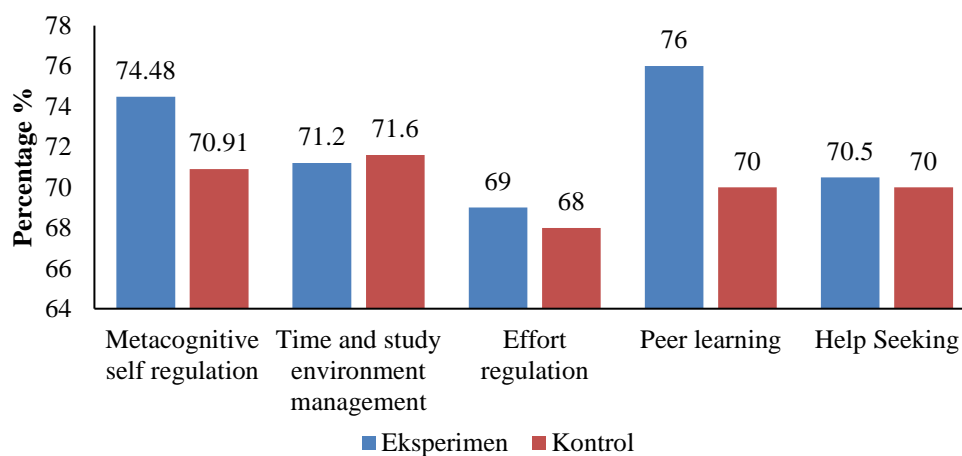
Figure 1. The average percentage of self-regulated learning scores

Based on Figure 3, it is found that in the aspects of metacognitive self-regulation, time and study environment management, effort regulation and help seeking both the experimental class and the control class are in the medium category, while for the peer learning the experimental class is in the high category and the control class is in medium category.

In addition, it can be seen from the aspect of time management and study the environmental management, the experimental class has a lower percentage than the control class. Whereas in the metacognitive self-regulation aspect, effort regulation, peer learning, and help seeking, the experimental class has a higher percentage than the control class. One reason is the difference in the adaptation process between the control and experimental classes. Thus, the control class has a slightly higher percentage than the experimental class. In the recapitulation of the number of students for each category of self-regulated learning in the experimental class, it was found that of the 33 students in the experimental class, 27.27% of students had self-regulated learning in the high category, 72.73% of students were in the medium category, and there were no students in the high category. low. Meanwhile, for the control class, it was found that out of 31 students, 19.35% had self-regulated learning in the high category, 80.64% of students in the medium category, and no students in the low category. These results indicate that there are more students who have moderate levels of self-regulated learning than low levels. It can be said that most of the students, both in the experimental class and in the control class, are quite good at managing themselves during the learning process, but they are still not optimal.

It was found that the control class and the experimental class had the self-regulated learning ability in the medium category but experienced an increase in the ability to master different concepts, where the experimental class experienced a higher increase in Concept mastery compared to the control class. One of the factors that led to an increase in mastery of higher concepts in the experimental class was due to differences in the treatment given by the researchers to the two classes. In the

experimental class, the researcher applied a non-traditional writing task in learning, while in the control class the researcher did not apply a non-traditional writing task. In addition, writing activities also help students to increase their understanding of the material being studied and they can also help their classmates who do not take part in the lesson through the writing they make, they are also asked to reflect on their understanding during learning and then the teacher will respond to these reflections. From these activities the teacher will find out what they do not understand and communication will also be established between the teacher and students, the teacher can also help students overcome their difficulties in learning.

Improving Students' Concept Mastery

Improved students' Concept mastery can be seen from the results of the pretest and posttest that have been obtained, which are then calculated using the average normalized gain. The average n-gain value that has been obtained is then interpreted based on Hake's criteria (1998). The increase in students' cognitive abilities is presented in table 1 below:

Table 1. Improving the concept mastery

Experimental group				Control group			
<Pretest>	<Posttest>	<g>	Category	<Pretest>	<Posttest>	<g>	Category
52.57	79.40	0.565	Moderate	47.097	67.097	0.378	Moderate

Jika digambarkan dalam bentuk grafik, maka peningkatan kognitif peserta didik adalah sebagai berikut :
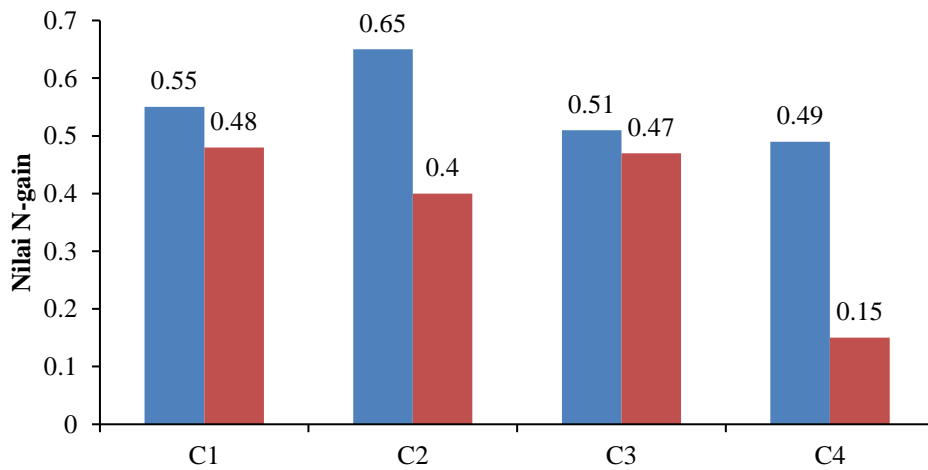
Figure 2. Improvements in students' cognitive ability improvement. Experimental and control group presented by blue and red colors respectively

Based on table 1 and figure 2, it was found that both classes experienced changes in their ability to master concepts. The magnitude of the increase in concept mastery can be seen from the n-gain values of both classes, which are 0.565 for the experimental class in the medium category and 0.378 for the control class in the medium category. In addition, when viewed through the cognitive dimensions the experimental class has a

higher n-gain value than the control class. It can be said that the experimental class students have a fairly good understanding ability. Based on these results, it is known that the experimental class experienced a higher increase in Concept mastery compared to the control class. Thus, it can be said that the application of non-traditional writing task in learning can further enhance students' mastery of students' concepts.

The Effectiveness of Non-Traditional Writing Task

To find out the effect of treatment on students' ability to master concepts, a difference test and effect size.data normality test for the posttest ability to master the concept using the IBM SPSS 25 application, it was found that the data was not normally distributed. Because there are data that are not normally distributed, hypothesis testing is carried out using non-parametric, namely the Mann Whitney U. The hypothesis in this study is as follows:

Ho: There is no significant difference in the increase in students' Concept mastery between classes that implement non-traditional writing task and classes that do not apply non-traditional writing task strategies.

H1: There is a significant difference in the increase in students' Concept mastery between classes that apply non-traditional writing task and classes that do not apply non-traditional writing task strategies.

The results of data processing with the Mann Whitney U using the SPSS 25 application obtained the value of Sig. (-tailed) of 0.000 (Sig. <0.05) so that H0is rejected and H12 accepted. So it can be concluded that there is a significant difference in increasing the ability to master concepts between classes that apply non-traditional writing task and classes that do not apply non-traditional writing task. To measure the effectiveness of the non-traditional writing task, it can be obtained using the effect size. The Cohen's d effect size value that has been obtained is then interpreted based on Cohen's criteria (1998). Based on the effect size, the average value for the control class is 67.09, the experimental class is 79.39, the standard deviation is 11.371, and the Cohen d (effect size) value is 1.0814. This value is included in the high category. . This shows that the application of non-traditional writing task in learning has a fairly high impact on increasing students' Concept mastery.

By implementing a non-traditional writing task in the experimental class, requiring students in that class to work on writing assignments on the material being studied during learning, students are asked to look for other references to strengthen their writing. Non-traditional writing tasks provide opportunities for students to explain their opinions about natural phenomena and serve as a learning tool to reflect on previous knowledge and explain new concepts (Aktepe & Yildiz, 2020). So that with writing activities, students have the opportunity to review the material and improve their understanding of the subject matter.

In the experimental class students were given writing assignments, thus making students in the experimental class have to study harder than the control class. Because, when learning takes place, students must be able to collect as much information as possible from various sources to complete their writing assignments. Students must also always pay attention to the teacher when learning takes place, besides that students must also be able to remember and write down the learning given in the writing assignments

that have been given before. In writing assignments, students were also directed to write in as much detail as possible with the aim of providing information related to their learning for their friends who were not present that day in their own writing style which was not too stiff but still complete and easy to understand so that it would be easier for their friends to see the results of writing assignment work.
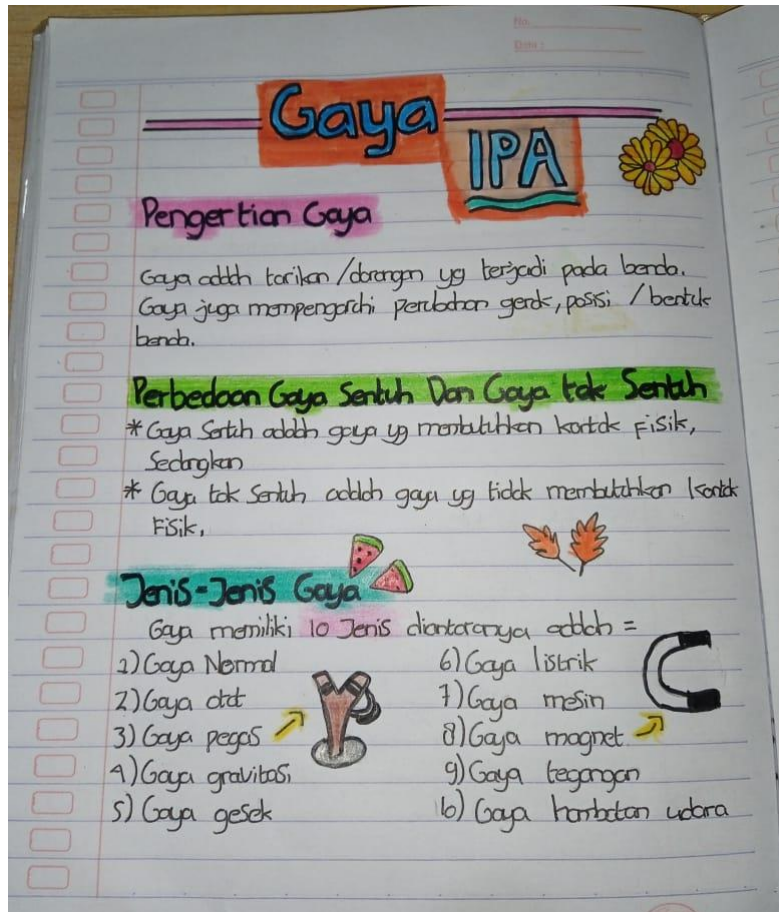

Figure 3. Screenshot of students writing

by implementing *non-traditional writing to task* in learning, it requires students to rewrite what they have learned during learning. So that students have the opportunity to review the material that has been studied, look for other relevant references, then put it into writing. Before writing, students need to first understand what they are going to write so that writing is one way to strengthen students' understanding. Writing causes students to be able to build explanations and understand information from various sources such as class discussions, textbooks, or laboratories (Sinaga & Feranie, 2017).

Relationship Between Self-Regulated Learning and Concepts Mastery

Linear correlation test is used to find out whether students' Concept mastery has a relationship with students ' *self-regulated learning* . To find out the relationship, it is done by looking for correlation tests, linearity tests, and regression tests.

Table 2. Correlation analysis results

		Concept Mastery	Self-Regulated Learning
Concept mastery	Pearson Correlation	1	.082
	Sig. (2-tailed)		.651
	N	33	33
Self Regulated Learning	Pearson Correlation	.082	1
	Sig. (2-tailed)	.651	
	N	33	33

Based on table 6, the significance value is sig. (*2 tailed)* between mastery of the concept and the profile of *self-regulated learning* is 0.651 which is greater than the significance value in table (0.05). These results indicate that there is no significant correlation between concept mastery and *self-regulated learning profiles.* However, when viewed based on the calculated value *(Pearson Correlations)*, the correlation coefficient is 0.082 and this value is included in the low category. The positive correlation coefficient value indicates that the correlation between the ability to master the concept variable and the profile of *self-regulated learning* is positive. This shows that even though the correlation is very low, the relationship between the ability to master the concept and the profile of *self-regulated learning* is directly proportional.

Furthermore, a simple linear regression test was carried out, before carrying out the regression test, the linearity test was carried out first. Based on the results of the linearity test using ANOVA on the *deviation of linearity*, an F value of 0.515 was obtained with a significance of 0.897 for both values greater than 0.05. Furthermore, it can be concluded that there is a significant linear relationship between the variable mastery of the concept with *self-regulated learning*. Next, a simple linear regression test was carried out with X = Concept mastery and Y = Self-regulated learning profile.

Table 3. Regression test results

Coefficients[a]					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model	B	Std. Error	Beta		
(Constant)	66.408	28.509		2.329	.027
Self Regulated Learning	.140	.307	.082	.457	.651
a. Dependent Variable: Penguasaan Konsep					

Based on the results of the regression test, the regression equation is Y = 66.408 + 0.140X which means that for each additional 1% the value of the variable mastery of the concept, then the value of the self-variable regulated learning will increase by 0.140. the regression coefficient (X) is positive, so the direction of the influence of the concept mastery variable on the self-regulated learning variable (Y) is positive.

The low correlation between concept mastery ability and self-regulated learning indicates that some students have high concept mastery abilities but do not necessarily

have a high self-regulated learning. Fazal et al. (2018) states that one of the factors is due to the failure of students to achieve the desired learning outcomes. The failure of students to achieve the desired learning outcomes is influenced by internal and external factors. Internal factors are factors that come from the students themselves (emotional, intellectual, and mental). External factors are factors that come from outside such as the learning environment, family environment, school and community. Dhiya (2021) reveals that good Concept mastery can be achieved by his own efforts to organize learning as well as possible. For this reason, in addition to having high self-regulated learning, students also need to try their best to understand themselves during learning, so that the results obtained are also in accordance with the efforts that have been made.

- **CONCLUSION**

Based on research that has been conducted regarding the implementation of non-traditional writing task to improve Concept mastery in science learning, the results show that there is a significant difference in increasing cognitive abilities between classes that use non-traditional writing task and classes that do not use writing task-traditional. The increase in the cognitive abilities of the experimental class and the control class were in the moderate category, but the experimental class had a higher score than the control class. Therefore, non-traditional writing task effective in increasing students' Concept mastery in Newton's law and force material.

questionnaire data processing self-regulated learning, it was found that most of the students in both the experimental class and the control class had self-regulated learning that were in the medium category. In addition, there were also students with self-regulated learning in the high category, and no students with self-regulated learning in the low category were found. In addition, the relationship between the self-regulated learning and mastery of the concept is in very low criteria. That is, there is no significant correlation between self-regulated learning and Concept mastery. This can be caused by other factors that can affect learning outcomes.

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