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THE EFFECT OF DISCOVERY LEARNING METHODS AND THE ABILITY TO THINK CREATIVELY ON THE LEARNING OUTCOMES OF STUDENTS IN GRADE V SDN GUNUNG KELING WEST ACEH DISTRICT

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ABSTRACT: *This study aimed to find out: (1) the effect of discovery learning methods on student learning outcomes, (2) the effect of creative thinking abilities on student learning outcomes, and (3) how big the effect the discovery learning methods and creative thinking abilities on students' mathematics learning outcomes in class V of SDN Gunung Keling. This research used a quantitative approach, with a kind of quasi-experimental research. The population in this study was all grade V students of SDN Gunung Keling and the sampling technique in this study was total sampling, as many as two classes. The experimental class was treated with the discovery learning method and the control class was treated with the expository learning method. The instrument used consisted of mathematics learning achievement tests. Data analysis was performed using two-way ANAVA. The findings of this study found that the mean learning outcomes with the discovery learning method were 82.00 while the mean learning outcomes with the expository learning method was 70.85. So it can be concluded that the students' mathematics learning outcomes taught with discovery learning methods were higher than students who are taught with Expository learning methods, mathematics learning outcomes of students who had high creative thinking abilities were higher than students who had low creative thinking abilities.*

KEYWORDS: Discovery, Creative Thinking Ability, and Mathematics Learning Outcomes

INTRODUCTION

Student learning outcomes and creative thinking skills in mathematics in elementary school are still low. Factors that caused the low learning outcomes and students' creative thinking abilities in mathematics namely students are still passive in the learning process and the teacher has not actively involved students in the learning process. In addition, one of the factors causing the low student learning outcomes in mathematics is the teaching methods given by the teacher are less relevant to the characteristics of students.

The ability to think creatively needs to be owned and developed by every student because this ability is useful for generating many ideas in solving students' problems. The ability to think creatively has three indicators namely, fluency, flexibility, and novelty. Fluency indicators namely students can solve problems with various interpretations, methods of solving or answering problems. Flexibility, namely students solve problems using other methods. Novelty means students examine several methods of completion, and then make other methods that are different (Siswono, 2008: 44).

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Based on the results of preliminary observations made in class V of SDN Gunung Keling, it appears that the teachers have tried to apply several learning methods including the lecture method, assignments, discussions, questions, and answers. In addition, there are no learning media used by teachers in learning. As a result, when students are given questions with different problem models, students feel confused and unable to solve the problem.

This makes the students' mathematical creative thinking abilities and student learning outcomes in mathematics subject were still below the Minimum Completion Criteria namely 65. Based on the values and exposure above, the factors that caused the low student learning outcomes were the approach or method of learning that had not been able to develop students' creative thinking skills in learning mathematics. Therefore, there needs to be an improvement in the process or variations in mathematics learning to help students develop creative thinking skills and improve learning outcomes in mathematics. Learning method which is considered appropriate to help students develop creative thinking skills and mathematics learning outcomes is discovery learning method.

According to Suryosubroto (2009: 178) that "Discovery method is a component of educational practice that includes teaching methods that advance active learning, process-oriented, self-directed, self-seeking, and reactive". Learning is done by discovering themselves, investigating themselves, will last long in students' memories.
The method that is currently widely used in advanced schools is the discovery method. Learning by using this discovery method is one way that can make students more active and can develop students' creative thinking skills and solve problems related to the surface area of the building space. By finding their own way, the results obtained by students will last long in the memory.

Based on the description above, the researcher concluded that the discovery learning method was an appropriate method to be applied to mathematics learning. Discovery method was able to provide learning conditions that could develop students' thinking abilities and creativity so that student learning outcomes were improved. This was an alternative to improve the quality of mathematics learning.

LITERATURE REVIEW

Discovery Learning Method

According to sund (in Roestiyah, 2008: 20) "Discovery is a mental where students are able to assimilate a concept or principle. Mental processes are: Observing, digesting, understanding, classifying, making guesses, explaining, measuring, making conclusions and so on. Discovery method is one way of teaching that involves students in the process of mental activities through the exchange of opinions, discussions, seminars, reading and trying by themselves so that they can learn on their own.

The discovery method according to Suryosubroto (2009: 178) is interpreted as a teaching procedure that is concerned with teaching, individual, manipulation of objects and others, before reaching the generalization. Meanwhile according to Sund (in Suryosubroto, 2009: 179) that: "Discovery is a mental process where students assimilate a concept or something principle. The mental process is, for example, observing, classifying, making guesses, explaining, measuring, and making conclusions, and so on". In addition, Hanafiah (2010: 77) says:

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> "Discovery method is a series of learning activities that optimally involve all students' abilities to search and investigate a systematic, critical, and logical way so that students can find their own knowledge, attitudes, and skills as a form of behavior change".

Thus, it can be concluded that the discovery method is a teaching and learning process in which the teacher allows students to find information that is traditionally usually just told or given. Situations where the teacher teaches the students by not telling but providing opportunities so that they find the solution by themselves are called discovery methods.

The Nature of Mathematics Learning Outcomes

Sudjana (2010: 22) states that learning outcomes are abilities possessed by students after receiving their learning experiences. Howard Kingsley in Sudjana (2010: 22) divides learning outcomes into three types namely (a) skills and habits, (b) knowledge and understanding, (c) attitudes and ideals. Each type of learning outcomes can be filled with materials that have been specified in the curriculum.

According to Purwanto (2009: 34), learning outcomes are changes in student behavior due to learning. The change was pursued in the process of teaching and learning to achieve educational goals. Meanwhile, according to Wingkel in Purwanto (2009: 39), learning outcomes are a process in individuals who interact with the environment to get a change in their behavior.

Based on the opinion above, those mathematics learning outcomes are the final process of student learning after understanding and mastering knowledge or science of mathematics. These abilities include cognitive, affective, and psychomotor aspects. Learning outcomes can be seen through evaluation activities that aim to obtain evidence of data that shows the level of student ability to achieve learning objectives. The learning outcomes examined in this study were cognitive learning outcomes in mathematics which include three levels, namely knowledge (C1), understanding (C2), application (C3), analysis (C4), and evaluation (C5). The instrument used to measure student learning outcomes on cognitive aspects was a test. The application of discovery method in the material surface area of the building area, especially the surface of beams and cubes was to find and process the learning material independently, which was found by the students themselves.

The Nature of Creative Thinking Ability

The emergence of creativity in each individual is not a thing that is inherited. Davis, et al. (2011: 221) states that there is a unique combination of intelligence and creative intelligence that has been carried by certain individuals since birth, but that creativity can be increased and can also be lost if it is not trained. Meanwhile, according to Hasanah and Surya (2017: 287), if someone has high creativity, then he has the ability to think creatively.

Creative thinking makes it possible to formulate a new idea that further enhances something that already exists and creates a completely new way. Creative thinking is considered as a dynamic mental process, including convergent thinking (one solution) and divergent thinking (many solutions) (Nadjafikhah and Yaftian, 2013: 348). Another opinion states that creative thinking skills are considered as the basis of learning that can be done by working with mathematics and being a problem solver (Sanders, 2016: 22). The understanding of mathematical creative thinking

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according to Hasanah and Surya (2017: 288) is a person's ability to solve mathematical problems by finding different and varied solutions by looking at the quality of the solution. So it can be concluded that mathematical creative thinking is directed thinking to create a new thing by developing all the possibilities that are relevant in the field of mathematics.

Creative thinking has actually become our daily habit in solving all existing problems. Creative thinking is also very much needed to construct a school subject matter, especially mathematics. The teacher will pay more attention to the characteristics of students in developing the emergence of creative thinking. According to Munandar (in Wike Sulistiarmi, 2016: 11) that there are 10 characteristics of a person having an attitude of creative thinking ability, namely as follows:

1. High curiosity.
2. Like to ask relevant questions.
3. Variation of ideas in dealing with problems.
4. Freedom of opinion.
5. Aesthetic taste is high.
6. Mastering one area of life.
7. Look at the problem from various angles.
8. Have a sense of humor.
9. Imaginative.
10. Original ideas.

While Munandar (in La Moma, 2015: 29) also explains the characteristics of creative thinking abilities that can be seen from the following skills:

1. Fluency:
   1) Express many ideas relevant to a problem.
   2) Having a variety of ideas for doing various things.
   3) Work faster and more.
2. Flexible thinking:
   1) Have many ways of working on a problem.
   2) Solve problems from various points of view.
   3) Different presentation of a concept.
3. Original (authenticity):
   1) Express a relatively new idea.
   2) Make unusual combinations.
4. Breakdown (elaboration):
   1) Extending other people's ideas.
   2) Improve the arrangement (detailing) to improve the quality of ideas.
5. Characteristics of evaluating skills:
   1) Can find the justification of a problem solving (justification).
   2) Have reasons that can be accounted for.

RESEARCH METHOD

This research was conducted in grade V of SDN Gunung Keling in Meureubo District, West Aceh Regency. The population of this study was grade V students at SDN Gunung Keling. The sample classes used were 2 classes totaling 38 students, class V-A as many as 18 students as discovery class and class V-B as many as 20 students as an expository class. The research method used was

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Quasi Eksperimental Method. The research design is presented with a 2 x 2 factorial design with 2-way analysis of variance (ANAVA) techniques. Data collection techniques in this study used two types of instruments, namely tests and questionnaires. Tests are used to find out students' learning outcomes and questionnaires are used to measure students' creative thinking abilities. The data analysis technique used is descriptive and inferential statistical techniques. Inferential statistical techniques are used to test research hypotheses, where the inferential technique used is the Two Path Variance Analysis technique (2x2 factorial design) with a significant level of 0.05 (Sudjana, 2011). Before two-way Anava is carried out, the analysis requirements test is first performed, namely the normality test using the lilifors test, while the homogeneity requirements are using the F Test and the Barlett Test. To test the research hypothesis, researchers used a data analysis technique with two-way Analysis of Variance (ANAVA) at the significance level $\alpha = 0.05$ and univariate General Linear Model (GLM) test with SPSS 20 for windows.

RESEARCH FINDING

Student Learning Outcomes Data with Discovery Learning Method

After learning was done, the math posttest questions were given to students in both Discovery and expository classes. Posttest questions were 10 questions. Posttest was given for two hours of learning. This was to see whether there was an improvement or improvement after students were taught with Discovery and Expository. Mathematics learning outcomes data provided with the discovery learning method, the mean score was 82.00. Variance (S2) was 70.58 and standard deviation (S) was 8.40. The lowest student mathematics learning outcomes through discovery learning methods was 70, while the highest score was 100. For more details, this was explained in the following table:

Table 1. List of Frequencies Distribution of Student Mathematics Learning Outcomes with Discovery Learning Method

Discovery Learning Method Class		
Score	**F**	**F relative (%)**
70 - 75	5	28
76 - 81	4	22
82 - 87	4	22
88 - 93	4	22
94 - 99	0	0
100	1	6
Total	**18**	**100**
Mean	**82**	

Student Learning Outcomes Data with Expository Learning Method

Data on mathematics learning outcomes provided with expository learning methods, the mean score was 70.85. Variance (S^2) was 126.55 and standard deviation (S) was 11.25. The lowest score of student mathematics learning outcomes through expository learning methods was 50, while the highest score was 85. For more details, this was explained in the following table:

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Table 2. List of Frequencies Distribution of Student Mathematics Learning Outcomes with Expository Learning Methods

Expository Learning Method Class		
Score	**F**	**F relative (%)**
50-56	4	20
57-63	1	5
64-70	4	20
71-77	5	25
78-84	5	25
85-91	1	5
Total	**20**	**100**
Mean	**70,85**	

Student Learning Outcomes with Discovery Learning Method with High Creative Thinking Ability

Based on the data obtained from the study, it was known that the mathematics learning outcomes of students who had high creative thinking abilities obtained a maximum score of 100 and the minimum score was 74, the mean score was 84.8, the variance (S^2) was 69.51, and the standard deviation (S) was 8.33. For more details, this was explained in the following table:

Table 3. List of Frequencies Distribution of Student Mathematics Learning Outcomes with Discovery Learning Method with High Creative Thinking Ability

Discovery Learning Method Class with High Creative Thinking Ability		
Score	**F**	**F relative (%)**
74 - 79	2	20
80 - 85	4	40
86 - 91	1	10
92 - 97	2	20
97 -102	1	10
Total	**10**	**100**
Mean	**84,8**	

Student Learning Outcomes with Discovery Learning Method and Low Creative Thinking Ability

Based on the data obtained from the research, it was known that the mathematics learning outcomes of students who had high creative thinking abilities obtained a maximum score of 84 and the minimum score was 70, the mean value was 78.5, the variance (S^2) was 56.85, and the standard deviation (S) was 7.54. For more details, this was explained in the following table:

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Table 4. List of Frequencies Distribution of Student Mathematics Learning Outcomes with Discovery Learning Method and Low Creative Thinking Ability

Discovery Learning Method Class with Low Creative Thinking Ability		
Scor	**F**	**F relative (%)**
70 -74	4	50
75 - 79	0	0
80 - 84	2	24
85 - 89	1	13
90 - 94	1	13
Total	**8**	**100**
Mean	**78,5**	

Student Learning Outcomes with Expository Learning Methods and High Creative Thinking Ability

Based on the data obtained from the research, it was known that mathematics learning outcomes of students who had high creative thinking skills obtained a maximum score of 85 and a minimum score was 70, a mean score was 78.63, variance (S^2) was 24.45, and standard deviation (S) was 4.94. more details, this was explained in the following table:

Table 5. List of Frequencies Distribution of Student Mathematics Learning Outcomes with Expository Learning Methods and High Creative Thinking Ability

Expository Learning Method Class with High Creative Thinking Ability		
Score	**F**	**F relative (%)**
70 - 73	1	9
74 - 77	4	36
78 - 81	2	19
82 - 85	4	36
Total	**11**	**100**
Mean	**78,63**	

Student Learning Outcomes with Expository Learning Methods and Low Creative Thinking Abilities

Based on the data obtained from the research, it was known that the mathematics learning outcomes of students who had high creative thinking ability obtained a maximum score of 72 and the minimum score was 50, the mean value was 61.33, the variance (S^2) was 84.75, and the standard deviation (S) was 9,20. For more details, this was explained in the following table:

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Table 6. List of Frequencies Distribution of Student Mathematics Learning Outcomes with Expository Learning Methods and Low Creative Thinking Ability

Expository Learning Method Class with Low Creative Thinking Ability		
Score	**F**	**F relative (%)**
50 - 54	2	22
55 - 59	2	22
60 - 64	1	11
65 - 69	0	0
70 - 74	4	45
Total	**9**	**100**
Mean	**61,33**	

Hypothesis Testing

After the data had been collected and the statistics analyzed, the hypothesis test was then performed. This hypothesis test used the two-way Anava Test, which was calculated using SPSS 16 for windows. From the learning achievement test data obtained, the mean of each group was calculated and then arranged as a two-way ANAVA table. In summary, the data was presented in table 7.

Table 7. Factorial Design 2x2 Mean

Creative Thinking Ability	Learning Outcome Mean		Total Mean
	Discovery	Expository	
High	84,8	78,63	81,71
Low	78,5	61,33	69,91
Total Mean	81,65	71,98	

To see the difference in the ability to think creatively and student learning outcomes towards learning given, the Two Way Anova Test by selecting the General Linear Model (GLM) Univariate on SPSS 16 was used. This test also aimed to see how the influence of creative thinking abilities on student learning outcomes, whether students with high creative thinking skills had high learning outcomes or vice versa, and whether the interaction of learning methods and creative thinking abilities affected student learning outcomes.

Table 8. Factor Data Between Subjects

Between-Subjects Factors			
		Value Label	N
Learning methods	1	Discovery	18
	2	ekspositori	20
Creative Thinking Ability	1	High	21
	2	Low	17

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The statistical description of the output of ANOVA data on creative thinking abilities and learning outcomes was presented in table 8. This table showed that the total number of students with high creative thinking skills and low creative thinking skills in the Discovery and Expository classes. Overall students with high creative thinking skills were 21 students and low creative thinking skills were 17 students.

Furthermore, the normality of student learning outcomes data was tested. The results of the normality test were presented in table 9. The normality value with Kolmogorov smirnov was 0.094 with a significance of 0.420. Because the significance value (0.420) was greater than 0.05, the data were normally distributed. A Q-Q graph of the normal post-data distribution plot was shown in Figure 1.

Table 9. Normality Test Result on Student Learning Outcomes Posttest

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
postes	.115	38	.094*	.977	38	.420

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

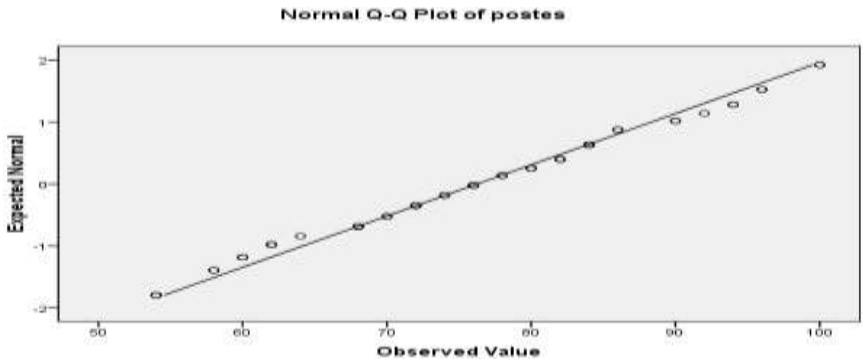

Figure 1. Post-Discovery and Expository Plot Q-Q Chart

Next, test the assumptions that must be met was the Homogeneity Test to see whether there were similarities invariance. Homogeneity Test results were shown in table 4.10. the test results showed the F value in table 4.10 of 0.810 with a significance of 0.373, because the value of sig. was 0.373> 0.05, so the two groups were homogeneous.

Table 10. Homogeneity Test between Groups

Test of Homogeneity of Variances			
Postest			
Levene Statistic	df1	df2	Sig.
.810	1	36	.373

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Next, the result of the two-way ANOVA test was shown in table 11.

Table 11. Two Anova Test Result

Tests of Between-Subjects Effects

Dependent Variable: postes

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2836.197[a]	3	945.399	16.517	.000
Intercept	215382.103	1	215382.103	3762.818	.000
metode	1274.654	1	1274.654	22.269	.000
kbk	1304.629	1	1304.629	22.792	.000
metode * kbk	283.515	1	283.515	4.953	.033
Error	1946.145	34	57.240		
Total	225031.000	38			
Corrected Total	4782.342	37			

a. R Squared = .593 (Adjusted R Squared = .557)

The data in table 11 was used to test the hypotheses proposed in this study. The following was a description of the results of the hypothesis test.

1. The first hypothesis

H_0 : $\mu A1 = \mu A2$: there is no effect of discovery learning method on student mathematics learning outcomes

H_a : $\mu A1 \neq \mu A2$: there is the influence of discovery learning methods on student mathematics learning outcomes

Based on the ANOVA results in table 11, the significance value of the learning method was obtained at 0,000, because of sig. 0,000 < 0,05 then the hypothesis test results rejected H_0 or accepted H_a in the alpha level 5 %. This showed that there was an influence of discovery learning methods on student mathematics learning outcomes. Because the mean student learning outcomes taught by discovery learning methods were higher than those taught with Expository learning, it could be concluded that discovery learning methods had a better influence on student learning outcomes than the Expository method.

2. The second hypothesis

H_0 : $\mu B1 = \mu B2$: there is no influence on the ability to think creatively on student mathematics learning outcomes

H_a : $\mu B1 \neq \mu B2$: there was an influence of the ability to think creatively on student mathematics learning outcomes

Based on ANOVA results in table 11, the significance value of the ability to think creatively was obtained at 0,000, because sig 0,000 < 0,05 then the hypothesis test results rejected H_0 or accepted H_a in the alpha level 5%. This showed that there was an influence of the ability to think creatively on student mathematics learning outcomes. Because the mean learning outcomes of students who had high creative thinking abilities were higher than those who had low creative thinking abilities, it could be concluded that high creative thinking abilities had a better influence on student learning outcomes than low creative thinking abilities.

3. Third hypothesis

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H_0 : A > B = 0 : there is no interaction between learning methods and the ability to think creatively towards student learning outcomes

H_a : A>< B ≠ 0 : there is an interaction between learning methods and the ability to think creatively towards student learning outcomes

Based on the ANOVA results in table 11 the significance value of the learning methods of students' creative thinking skills was obtained at 0.033, because sig was 0,033 < 0,05 then the hypothesis test results rejected H_0 or accepted H_a in the alpha level 5%. This showed that there was an interaction between learning methods and the ability to think creatively on student learning outcomes. The results of the interaction between learning methods with the ability to think creatively in influencing learning outcomes could be presented in graphical form in Figure 2.

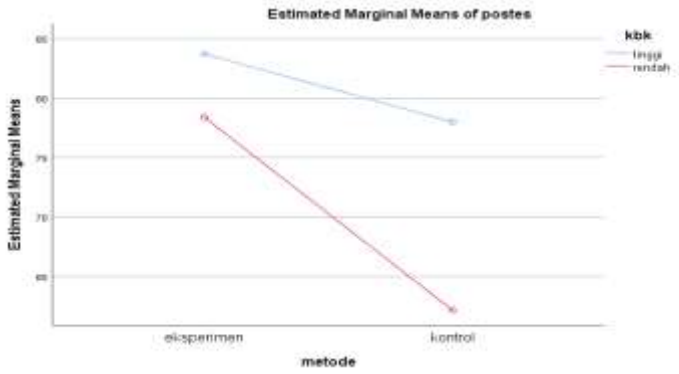

Figure 2. Interaction Graph of Discovery and Expository Learning Methods with Student Learning Outcomes

In Figure 2, the results of the interaction of learning methods with the ability to think creatively could not be seen directly with the intersection of the lines, but if the two lines were extended there would be intersection between the two lines, it could be seen that the score of student learning outcomes with high creative thinking ability discovery class was almost the same as the value of student learning outcomes with high creative thinking ability in the Expository class. In other words, both students who were taught with discovery and expository who had high creative thinking ability showed the same learning outcomes and not in students who had low creative thinking skills. The graph showed that the condition of the line would be widened for students the ability to think creatively low if taught with discovery and expository. This means that the score of learning outcomes in students of low creative thinking ability taught with discovery was different from the score of expository results. Students who were taught with discovery showed higher results than students who were taught by Expository.

CONCLUSION

Based on the findings of the study, several conclusions could be drawn as follows:

1. There was an effect of discovery learning methods on the learning outcomes of grade V students at SDN Gunung Keling. This could be seen from the learning outcomes of students who were taught with discovery learning methods better than student learning outcomes taught by expository.
2. There was an effect of the ability to think creatively on mathematics learning outcomes of grade V students at SDN Gunung Keling. This was evident from the learning outcomes of students

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who had high creative thinking abilities were better than the learning outcomes of students who had low creative thinking abilities.

3. There was an interaction between learning methods and the ability to think creatively on the mathematics learning outcomes of grade V students at SDN Gunung Keling. The interaction could be seen from the significant difference between the average learning outcomes taught by discovery learning methods with high creative thinking abilities and expository methods with low creative thinking abilities, discovery learning method with low creative thinking ability and expository method with low creative thinking ability as well as expository method with high creative thinking ability and expository method with low creative thinking ability.

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