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The Effect of Learning Cycle 5e Learning Model on Students' Motivation and Learning Outcome

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Abstract

This research aims to determine the influence of the 5E Learning Cycle Learning Model on the Motivation and Learning Outcomes of Class The research population was all grade three consisting of 3 classes with a total of 84 students. The research instrument is a motivation questionnaire and a learning outcomes test in the form of multiple-choice questions. Data was obtained through learning motivation questionnaires and learning outcomes tests. Data analysis techniques are descriptive statistics and inferential statistics with the help of the SPSS 20 application through the One Way Anova test with an error rate of 5% (α = 0.05). The results of the research show that there is an influence of the 5E Learning cycle learning model on learning motivation and learning outcomes of class.

Introduction

Education is an important factor in nation development so various efforts are made to improve the quality of education. Efforts to improve the quality of education cannot be separated from the quality of learning activities in the classroom. This is one part of the educational process which aims to bring about a new, better situation.

To develop students' active and creative thinking, learning is needed that can foster students' active participation and a creative atmosphere in the classroom (Yasin & Baresi, 2024; Jamilah, 2024). Therefore, in learning there is a need to change the perspective of the learning process, which was initially teacher-centered *(teacher center)* to learner-centered learning *(student center).*

Bambalamotu 1 Public High School is one of the senior high schools established in North Mamuju district and has quite a large number of classes and students. Bambalamotu 1 Public High School has set the Minimum Completeness Criteria (KKM), namely 75. Based on the results of interviews with chemistry subject teachers on October 6 2016, information was obtained that many students' learning outcomes were still below the minimum completeness criteria (KKM). The learning outcomes data on acid base material for 2014/2015 is with an average value of 62.84.

The learning outcomes of students who have not reached the KKM are caused by several factors (Kusmiati et al. 2020). Acid-base material is an important concept in chemistry because this material is related to everyday life, such as citric acid which is found in oranges, vinegar acid, lactic acid in milk, and soap which has slippery properties and a bitter taste which are the characteristics of bases, therefore, strong motivation is needed to study acid-base material so that chemical materials related to acids-bases can be more easily understood by students (Yana, 2023). One way to study acid-base material is by doing practical work. So that the material can be well recorded in students' memories, there needs to be a learning model that makes students

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actively involved in the learning process. Then the solution is sought through an experiment or experiment in the laboratory carried out by students (Fitri, 2022).

To answer the problems above, learning models are used that can change *the teacher center* into *a student center*, including the learning model used, namely the 5E *learning cycle learning model* (Faishal & Saputro, 2021; Ong et al., 2021). The 5E *learning cycle* learning model is a learning model design with a series of activity phases that are organized and structured so that students can master the competencies that must be achieved in learning by playing an active role.

Methods

type of research is quasi-experimental or (quasi-experimental). This research was carried out in the even semester of the 2016/2017 academic year at SMA Negeri 1 Bambalamotu, North Mamuju Regency, Class XI Science.

The type of research used is *non-equivalent post-test control group design*. This research used 2 classes, namely the experimental class and the control class. Before the learning took place, both classes were given a pretest and posttest. The research design can be seen in Table 3.1.

Table 1. Research Design *Nonequivalent Post-Test Control Group Design*

Group	Pretest	Treatment	Posttest
Experiment	O_1	X	O_2
Control	O_3	Y	O_4

Source: Sugiyono, 2015.

Information:

X : Treatment by applying the *5E learning cycle learning model*

Y : Treatment by applying conventional learning models

O1 : Initial test (pretest) of the experimental class before being given treatment

O2 : Final test (*posttest*) of the experimental class after being given treatment

O3 : Initial test (*pretest*) control class

O4 : Final test (*posttest*) control class

Sampling was carried out using class random techniques and the classes selected are classes XI IPA1 and XI IPA 3. The research instrument is a motivation questionnaire and a learning outcomes test in the form of multiple-choice questions. Data was obtained through learning motivation questionnaires and learning outcomes tests. Data analysis techniques are descriptive statistics and inferential statistics with the help of *the SPSS* 20 application through the *One Way Anova test* with an error rate of 5% ($\alpha = 0.05$).

Results and Discussion

Results of analysis of student motivation data on the main material of acids and bases. presented in Table 2.

Table 2. Statistical Analysis Results Description t i f Student Motivation Data

Statistics	Experimental Group	Control Group
Mean	61.85	59.92
Median	63.00	58.00

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Lowest Value	50.67	48.67
The highest score	74.67	66.67
Standard Deviation	6.29	4.74

Table 2 shows that the experimental group has an average motivation value amounting to 61.85. There are students who have motivation with the lowest score, namely 50.67 and motivation with the highest score, namely 74.67. Meanwhile, the control group had an average motivation score of 59.92. Meanwhile, students who had the lowest motivation score were 48.67 and the motivation score with the highest was 66.67. Meanwhile, the standard deviation value for the experimental group is higher than the control group, this shows that the experimental group data is more diverse compared to the control group. Apart from that data shows nominal motivation for the experimental group was higher compared to the control group.

The results of the descriptive analysis of learning motivation can be presented in Table 3.

Table 3. Results of Descriptive Statistical Analysis of Learning Motivation Data for Each Indicator

No	**Aspect**	**Average value**	
		Control Experiment	
1	Perseverance in Facing Tasks	90	86
2	Tenacious in Facing Difficulties	85	82
3	Showing Interest	75	75
4	Happy to work independently	86	82
5	Enjoy looking for and solving problems	88	81
6	Can Defend His Opinion	80	76

Table 3 shows that the indicator of perseverance motivation for the experimental group obtained a value of 90, for the control group 86, this indicator was tenacious in facing difficulties for the experimental group 85, for the control group 82, for the indicator showing interest for the experimental and control groups the value obtained was 75, enjoyed working independently in the experimental group 86 and the control group 82, enjoyed finding and solving problems in the experimental group 88 and the control group 81, and could defend their opinions in the experimental group 80 and the control group 76. Based on these data it can be concluded that motivation learning that each indicator is in the high category.

The results of the descriptive analysis are presented in Table 4.

Table 4. Statistical Analysis Results Description of Learning Outcome Data Cognitive Domain

Statistics	**Experimental Group**	**Control Group**
Mean	80.14	76.00
Median	80.00	77.00
Lowest Value	73.00	67.00
The highest score	87.00	83.00
Standard Deviation	5.03	5.43

Table 4 shows that the experimental group has an average cognitive learning outcome value of 8 0.1 4. The lowest value was 73.00 and the highest value was 87.00. Meanwhile, for the control group, the average score for cognitive learning outcomes was 7.6.00. The lowest score was 67.00 and the highest score was 83.00. Meanwhile, the standard deviation for the control

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group was higher than the experimental group. This means that the control group data is more diverse than the experimental group. Apart from that, the data shows that the cognitive learning outcomes of experimental group students are nominally higher than those of control group students.

The results of the descriptive analysis of the completeness of learning outcomes in the cognitive domain are presented in Table 5.

Table 5. Data Analysis Results for Completeness of Cognitive Learning Outcomes

Class	Number of Students	Not finished	(%)	Complete	(%)
Experiment	27	4	14.81	23	85.18
Control	27	9	33.33	18	66.66

Based on Table 5, it can be seen that of the 27 students in the experimental group, the percentage of completeness was 85.18, and those who did not complete it were 14.81. This shows that there were 23 students who completed and 4 students did not complete, while for the control group the percentage of completeness was obtained at 66.66 and for those who did not complete, the score was 33.33. This shows that there were 18 students who completed and 9 students who did not complete. Students who complete are caused by several factors, including the students' ability to understand and work on questions quite well. Students who have not achieved completeness tend to be passive in participating in the learning process activities and the level of students' ability is lacking to understand the questions and problems well in the learning outcomes tests.

Data analysis results the cognitive domain learning outcomes for each indicator are presented in Table 6.

Table 6. Results of Data Analysis on Cognitive Domain Learning Outcomes for Each Indicator

No	Indicator	Average value	
		Experiment	Control
1	Explaining the meaning of acids and bases with examples according to Arrhenius, Bronsted Lowry and Lewis	78.66	76.10
2	Determine acid base pairs conjugation according to Bronsted-Lowry and Lewis acids and bases	75.82	75.00
3	Identify the properties of acid-base solutions with various indicators.	76.00	70.82
4	Estimating the pH of an acid-base solution based on the results of observing the color change trajectories of various indicators	63.00	60.00
5	Explain the meaning of pH, the strength of acids and bases, conclude the results of pH measurements from acid-base solutions of the same concentration.	67.99	66.66
6	Relates acid-base strength to the degree of ionization and the acid (Ka) or base (Kb) constant	68.32	63.99

Based on Table 6 completeness The learning outcomes in the cognitive domain for each indicator show that the scores obtained for the experimental group were higher compared to the control group students. Based on this data, there are 3 indicators that have not been

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completed, this is because in these indicators the level of questions refers more to the ability to apply and analyze. The completeness set is 75.

The results of the descriptive analysis of learning outcomes on the main acid-base material are presented in Table 7.

Table 7. Results of Descriptive Statistical Analysis of Learning Outcome Data Affective Domain

Statistics	Experimental Group	Control Group
Mean	79.49	76.94
Median	78.75	76.25
Lowest Value	71.25	70.00
The highest score	88.75	87.50
Standard Deviation	3.84	4.06

Table 7 shows that the average affective learning outcome of experimental group students is 79.49, while the lowest score is 71.25 and the highest score is 88.75. Furthermore, for the control group the average value of the students' affective learning outcomes was 7.6.94, while the lowest value was 70.00 and the highest value was 87.50. Meanwhile, the standard deviation for the experimental group is 3.84 and the control group is 4.06. These data show that for the control group the data is more diverse compared to the experimental group. Apart from that, the data shows that the learning outcomes are in the affective domain for the experimental group was nominally higher compared to the control group.

The results of the descriptive analysis of learning outcomes in the affective domain for each indicator are presented in table 8.

Table 8. Results of Data Analysis of Affective Domain Learning Outcomes for Each Indicator

No	Indicator	Control Experiment		
		Criterion Value	Mark	Criteria
1	Curiosity	75.69 OK	80.09	Good
2	Honest	76.62 OK	73.00	Good
3	Discipline	78.93 OK	76.15	Good
4	Brave	83.79 OK	78.47	Good
5	Cooperate	83.79 OK	81.25	Good

Based on Table 8, it shows that the learning results in the affective domain of the experimental group for the curiosity indicator obtained a value of 75.69, for the honest indicator the value was 76.62, for the discipline indicator the value was 78.93, for the brave indicator the value was 83.79 and for The cooperation indicator obtained a value of 83.79. Meanwhile, for the control group, the curiosity indicator obtained a value of 80.09, the honesty indicator obtained a value of 73.00, the discipline indicator obtained a value of 76.15, the courage indicator obtained a value of 78.47, and for the cooperation indicator, a value was obtained. amounting to 81.25. From the data, each indicator has a good category. The data for each indicator shows that the learning outcomes for the experimental group are nominally higher than those for the control class.

The results of the descriptive analysis of learning outcomes on the main material of acids and bases are presented in Table 9.

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Table 9 Statistical Analysis Results Description of Domain Learning Outcome Data Psychomotor

Statistics	Experimental Group	Control Group
Mean	77.96	75.16
Median	77.50	75.00
Lowest Value	72.50	67.50
The highest score	87.50	86.25
Standard Deviation	3.70	4.13

Table 9 showed that the psychomotor learning results for the experimental group obtained an average value of 77.96, and had the lowest value of 72.50, and the highest value was obtained at 87.50. Meanwhile, for the control group, the average score was 75.16, while the lowest score was 67.50 and the highest was 86.25. Meanwhile, the standard deviation for the control group is higher than the experimental group. This means that the control group data is more diverse compared to the experimental group. Apart from that, it shows that the psychomotor learning outcomes for the experimental group are nominally higher than those for the control group.

Results of descriptive analysis of data Learning outcomes are presented in Table 10.

Table 10. Results of Data Analysis of Learning Outcomes in the Psychomotor Domain for Each Indicator

No	Indicator	Control Experiment			
		Mark	Category	Mark	Category
1	Preparation for carrying out learning	81.78	Good	78.24	Good
2	Participation in groups	80.09	Good	77.31	Good
3	Observation of practical results	75.00	Good	74.53	Good
4	Mastery of practical steps	73.84	Good	69.90	Enough
5	Reporting practical results	75.65	Good	75.23	Good

Table 10 shows that the learning results in the psychomotor domain of the experimental group for the indicator of preparation for carrying out learning obtained a value of 81.78, for the indicator of participation in the group a value of 80.09 was obtained, the indicator for observing practicum results obtained a value of 75.00, the indicator for mastery of practical steps obtained a value of 73.84 and for the indicator for reporting practicum results, a value of 75.65 was obtained. Of the 5 indicators, all are in the good category. This is because during learning, students pay attention, actively ask questions and are able to work together with their group friends. Meanwhile, for the control group, the value for the preparation indicator for carrying out learning was obtained at 78.24, for the participation indicator in the group, the value was 77.31, for the observation indicator the value was 74.53, for the indicator for reporting practicum results, the value was 75.23. These 4 indicators are in the good category. The indicator for mastery of practical steps was obtained with a score of 69.90 and the indicator for mastery of practical steps was in the sufficient category, this was because students were not active in asking questions during the learning process. The data for each indicator shows that the learning outcomes for the experimental group are nominally higher than those for the control class.

The results of the analysis of normality tests, homogeneity tests and hypothesis tests are presented in table 11.

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Table 11. Results of Normality, Homogeneity and Hypothesis Testing

Dependent variable	Normality test		Homogeneity Test		Hypothesis testing	
	Sig	Information	Sig	Information	Sig	Information
Cognitive domain	0.343	Normal	0.422	Homogeneous	0.004	Influential
Affective Domain	0.219	Normal	0.892	Homogeneous	0.022	Influential
Psychomotor Domain	0.303	Normal	0.535	Homogeneous	0.012	Influential
Motivation	0.778	Normal	0.155	Homogeneous	0.014	Influential

Source: Appendix 9 page 189

The results of the normality and homogeneity test analysis show that the significance is greater than $\alpha = 0.05$, this means that the data is normally distributed and homogeneous. And the results of the t-test analysis show that the significance is smaller than $\alpha = 0.05$, this means that H_0 is rejected and H_1 is accepted, so it can be said that there is an influence of using the *5E learning cycle* learning model on motivation and learning outcomes.

5E learning cycle learning model is a *student* -centered learning model where new information is linked to the knowledge that students already have with a learning orientation in the form of investigation and discovery that leads to problem solving. In this way, the learning process becomes more meaningful because it prioritizes real experiences that are often encountered in students' daily lives and prevents students from conventional learning methods that tend to memorize. In the *5E learning cycle learning model there is an engagement* stage, used to focus attention and stimulate thinking abilities as well as arouse students' interest and motivation towards the concept to be taught, this can be seen from the students' enthusiasm in answering questions given during the learning process. Next, at the *exploration stage,* students carry out demonstration, discussion and practicum activities, which are used to open up students' knowledge and develop students' curiosity. In this phase, students' curiosity arises to find the relationship between the concepts they are studying and other concepts they have or have not studied. So that students are more motivated to find answers to their curiosity. Next, in the *explanation stage,* students carry out discussions and explain the results of the discussions with their group friends. In this phase, it can be seen that there is cooperation between students, and interacting well with fellow group members and other group members, this will provide motivation to be more active in discussions to solve problems. In the *elaboration stage,* at this stage, students express their opinions regarding the concepts they developed during group discussions. In the *evaluation* stage, students work on questions from the previous phase.

Based on Table 11, the results of inferential analysis of learning motivation data obtained a significant value = 0.014 which is smaller than the value $\alpha = 0.05$, this means the application of the model *learning cycle 5E* has a significant effect on students' learning motivation. This is because the *5E learning cycle model* provides ample opportunities for students to search and discover for themselves what is needed to properly understand the material being studied and students are actively involved in the learning process. Apart from that, the change in motivation is clearly visible from each motivation indicator, namely an increase in students' interest in learning with a score of 75 for the experimental class and 75 for the control class in the high category, an increase in tenacity in facing difficult problems with a score of 85 for the experimental class and 82 for the control class. with a high category, diligent in facing tasks with a score of 90 in the experimental class and 86 in the control class in the high category, increasing student independence with a score of 86 in the experimental class, 82 in the high category of the control class, and solving various problems with a score of 88 classes

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experimental and 81 control classes in the high category , were able to defend their opinions with a score of 80 experimental classes and 76 control classes in the high category.

The stages in the *5E learning cycle learning model* invite students not only to listen to the teacher's explanation but also to play an active role in learning activities so that students can explore and enrich their understanding of the concepts being studied, the stages in the *5E learning cycle model*. In the *5E learning cycle learning model*, students not only hear the teacher's explanation but can play an active role in exploring, analyzing, evaluating their understanding of the concepts they are learning (Matitaputty & Sopacua, 2023; Ramdani etal., 2021).

The results of calculating the completeness of learning outcomes in the cognitive domain for the experimental class obtained a score of 85.18 in the complete category. Meanwhile, the incomplete score was 14.81, meaning that there were 4 students who did not achieve completeness, this was because the students did not understand the questions and problems contained in the learning outcomes test in the cognitive domain. Furthermore, for the completeness of each indicator, to explain the meaning of acid base, the value obtained was 78.66 and determining conjugate acid base pairs according to Bronsted-Lowry, the value obtained was 75.82, identifying the nature of acid base solutions with various indicators, the value obtained was 76.00, the three indicators were included in the category complete. Complete students can be seen from students who are active in learning activities. Meanwhile, for the incomplete category, the indicator estimates the pH of a solution based on the color change trajectory with a value of 63.00, explains the meaning of acid-base strength and concludes the results of measuring the pH of a solution with the same concentration, obtaining a value of 67.99, and connecting the strength of acids and bases. with a score of 68.32, this indicator was not completed due to the students' lack of numeracy skills in working on the questions, and the level of the questions refers more to the ability to use or apply the subject matter that has been studied in new situations in addition to the students' lack of ability to analyze the questions.

Next for learning outcomes in the affective domain and psychomotor domain. Based on analysis data, the experimental class has good scores for each aspect. These results are influenced by the *5E learning cycle learning model* applied in the experimental class. This can be seen from each stage, in the *engagement phase* students answer questions asked by the teacher to explore students' initial knowledge. This can be seen from the affective aspect of students' curiosity to find out answers, with a score of 80.09 in the good category. In the *exploration phase*, students discover the concepts they are learning by working together in small groups. This can also be seen from the affective aspect of cooperation, which has an average score of 83.79 in the good category. In practicum activities, students carefully carry out the practicum according to the instructions. This involvement of students makes learning more meaningful, thereby providing students with a deep understanding of concepts. In the *explanation phase*, students are involved in the learning process and become more active in asking questions, expressing opinions, Answer the question. This matter It can be seen from the average value of affective learning outcomes from the aspect of courage to answer questions with a score of 83.79 in the good category. In the *elaboration phase*, students apply the concepts obtained from *the explanation phase* by solving problems given by the teacher in the form of material deepening questions. In the *evaluation phase*, students work on quiz questions from previous phases as an evaluation. At this stage students are required to be honest when working on questions. The results obtained from the honest aspect were 76.62 in the good category. Apart from that, the learning outcomes of these students increased because most of them were able to participate in each activity well. This can be seen from the results

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of psychomotor learning from the preparation aspect in taking part in the lesson, getting a score of 87.78 in the good category. The results obtained in the good category are because when taking part in the practicum, students are calm so they pay more attention to the explanations given. Participation in group 80.09 experimental class was in the good category, these results show that students can work together with their group friends and other groups. Observation of practical results 73.84, this shows that students are able to describe the results of their observations well. Mastery of the practicum steps 73. 84 in the good category can be seen from students actively asking questions so that the practicum results obtained are better and the practicum steps are better mastered. And the reporting of practical results is 75.65 in the good category, this is because the results obtained are complete.

Based on this description, it can be concluded that each phase in the *5E learning cycle learning model*. can support cognitive, affective and psychomotor abilities (Nisa et al., 2022). This is in line with the statement expressed by Nazriati & Fajaroh (2007) that the stages (phases) in the *Learning Cycle 5E learning model* provide opportunities for students to play an active role in exploring concepts by interacting with the physical and social environment.

For completeness of learning outcomes in the control class, a score of 66.66 was obtained and for incomplete results, the score obtained was 33.33. Based on these data, it can be seen that of the 27 students who achieved completeness, 18 students and 9 students did not reach the completeness score limit. This is because students tend to be passive in the learning process so that students do not properly understand the questions and problems in the cognitive domain learning outcomes tests. Furthermore, for each cognitive domain indicator, the first indicator is explaining the meaning of acid base, the value obtained is 76.10 and the indicator determines conjugate acid base pairs according to Bronsted-Lowry, the value obtained is 75.00, both indicators are in the complete category, then for the indicator identifying the nature of the acid base solution. and alkaline, the value obtained was 70.83, while for the indicator, it estimates pH based on the color change trajectory of various indicators, the value obtained is 60.00, the indicator explains the strength of the acid base and concludes the results of pH measurements from solutions of the same concentration, the value obtained is 66.66 and to connect the constants The value obtained for acids and bases is 63.99, this category is not complete. This is because students do not understand and their numeracy skills when working on questions are still lacking, and the level of questions refers more to the ability to use or apply the subject matter that has been studied in new situations in addition to the lack of students' ability to analyze questions. As for b, the completeness value used is in accordance with the limit value determined based on the policy used at SMA Negeri 1 Bambalamotu, namely with a completeness value of 75.

Next for learning outcomes in the affective domain and psychomotor domain. Based on analysis data, the control class is nominally lower than the experimental class. This is because some of the students still tend not to be active in participating in the learning process. The results obtained from each affective aspect for students' curiosity to find out the answers obtained a score of 75.69 in the good category. For cooperation, it has a score of 81.25 in the good category. For the courage aspect, a score of 76.15 was obtained in the good category. Furthermore, for the honesty aspect, a score of 73.00 was obtained in the good category. Apart from that, the learning outcomes of these students increased because most of them were able to participate in each activity well. This can be seen from the results of psychomotor learning from the preparation aspect in taking part in the lesson which obtained a score of 78.24 in the good category, the results obtained were in the good category, this is because when taking part in the practicum the students were calm so they paid more attention to the explanations given. Participation in groups was 77.31 in the good category, this result shows that students can

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work together with their group friends and other groups. Observation of practical results was 74.53, this shows that students are able to describe the results of their observations well. Mastery of the practical steps is 69.90 in the sufficient category, this is because students are not active in asking questions so that the practical results obtained are still lacking so that the practical steps have not been mastered. Furthermore, reporting the results of practicum 75.23 is in the good category, this is because the results obtained are complete.

Furthermore, the results of the descriptive analysis of learning outcomes have an average value of cognitive (80.14), affective (79.49), psychomotor (77.96) for the control class in the cognitive (76.00), affective (76.94), psychomotor domains. (75.16). Based on table 11, the results of the inferential analysis of learning outcomes data show that the significant value is cognitive = 0.004, affective = 0.022 and psychomotor = 0.012 because it is significant (α) < 0.05, this means the application of the model *learning cycle 5E*. has a significant effect on student learning outcomes.

Conclusion

Based on the results of the research and discussion, a conclusion can be drawn that: There is an influence of the *5E learning cycle learning model* on the motivation and learning outcomes of class XI students at SMAN 1 Bamabalamotu

Suggestion

Based on the conclusions above, things that can be recommended are as follows: (1) This research requires more time so for learning it is necessary to manage time well so that the learning process takes place in a more manageable and organized manner; (2) Teachers should consider learning models as an alternative in learning chemistry so that students can achieve optimal learning outcomes in accordance with learning objectives; (3) Teachers are expected to be able to use the *Learning Cycle 5E learning model* because it can increase motivation and learning outcomes.

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