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The effect of gobak sodor based outdoor learning on seventh grade students collaborative character in algebra

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THE EFFECT OF GOBAK SODOR BASED OUTDOOR LEARNING ON SEVENTH GRADE STUDENTS COLLABORATIVE CHARACTER IN ALGEBRA

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ABSTRACT

The development of collaborative character is one of the important demands in 21st-century education. However, mathematics learning in schools still tends to be teacher-centered and emphasizes cognitive aspects, resulting in limited opportunities for students to develop collaborative skills. Initial observations at SMP Negeri 7 Muaro Jambi (a public junior high school) indicate that students' collaborative character in mathematics learning is relatively low, and outdoor learning based on traditional games has not been optimally implemented. In addition, studies that integrate traditional game-based outdoor learning into mathematics learning with a primary focus on students' collaborative character remain limited. This study aims to analyze the influence of outdoor learning based on the traditional Gobak Sodor game on students' collaborative character in mathematics learning. This study employed a quasi-experimental method with a nonequivalent control group design. The research subjects consisted of grade VII students divided into an experimental class and a control class. Data were collected using validated collaborative character questionnaires and observation sheets. Data analysis was conducted using descriptive statistics and inferential analysis with the Mann–Whitney U test. The results showed that the average posttest score of students' collaborative character in the experimental class reached 20.74, which was higher than the control class with an average score of 17.76. The hypothesis testing results indicated a significant difference between the two groups with an Asymp. Sig. (2-tailed) value of $0.005 < 0.05$. These findings indicate that outdoor learning based on the traditional Gobak Sodor game has a positive effect on improving students' collaborative character in mathematics learning. This learning approach can serve as an innovative alternative for mathematics teachers and contributes theoretically to mathematics education oriented toward character development.

Keyword: Algebra, Collaborative Character, Gobak Sodor, Mathematics Education, Outdoor Learning, Traditional Games.

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INTRODUCTION

Education in the 21st century emphasizes not only the mastery of academic knowledge but also the development of essential skills such as collaboration, communication, critical thinking, and creativity, which are crucial for students. Mathematics education has an important role in developing students' logical, systematic, and critical thinking skills. In addition to being oriented towards mastering concepts and numeracy skills, mathematics learning also

contributes to the formation of students' character through the process of interaction and cooperation during learning. Strengthening character in mathematics learning is an important part of the effort to create meaningful learning that is oriented towards the overall development of students. Appropriately designed mathematics learning can be a means to cultivate students' social character, including collaborative character (Simarmata et al., 2023).

However, the reality is that mathematics learning in schools is still dominated by a teacher-centered approach that emphasizes the purely cognitive aspect. This condition causes students' active involvement in learning to be low and opportunities to interact and cooperate with peers to be limited. Based on the results of initial observations at SMP Negeri 7 Muaro Jambi, the collaborative character of grade VII students has not developed optimally. This can be seen from the low cooperation between students, lack of communication in group activities, and students' difficulties in sharing roles during mathematics learning. In addition, abstract mathematics material is also one of the factors that cause students to be less enthusiastic and have difficulty understanding learning.

One of the alternatives that can be applied to overcome these problems is outdoor learning. Outdoor learning enables abstract mathematical concepts to be transformed into more concrete and contextual learning experiences, allowing students to engage actively in problem-solving processes. Learning activities conducted outside the classroom provide wider opportunities for social interaction and teamwork through meaningful group tasks. Furthermore, game-based outdoor learning encourages students to collaborate, coordinate actions, and make collective decisions in real learning situations (Sitepu et al., 2025). Outdoor learning is a learning activity that is carried out outside the classroom by utilizing the surrounding environment as a learning resource (Sofnidar et al., 2017). This learning provides a more concrete and contextual learning experience because students are directly involved in learning activities. Through outdoor learning, students have greater opportunities to interact, discuss, and cooperate in completing learning tasks, thus potentially supporting collaborative character development.

In addition to outdoor learning, the use of traditional games also has the potential to support mathematics learning. Traditional games function as educational media that naturally embed moral and social values through cooperative play activities (Noor, 2021). Traditional games contain social values such as cooperation, responsibility, and sportsmanship that can be instilled through play activities (Aqobah et al., 2020). Traditional games also play a role in shaping students' social attitudes through direct interaction between players (Hajeni et al., 2023). Previous studies also indicate that traditional games significantly contribute to the development of cooperation and social interaction among. One of the traditional games that has high collaborative value is Gobak Sodor. This game requires cooperation, coordination, communication, and strategy between players to achieve a common goal (Puspitasari et al., 2022).

Previous research shows that the traditional game of Gobak Sodor can be used as a learning medium that supports the development of students' character. (Nevitaningrum et al., 2023) stated that the Gobak Sodor game is able to foster an attitude of cooperation and social interaction between students. In addition, the use of traditional games in learning can also increase student involvement in the learning process. Other research confirms that traditional game-based learning significantly strengthens students' collaborative character through structured group activities (Astuti & Thohir, 2025). Nonetheless, most of the research still focuses on character development in general or is applied to subjects other than mathematics.

Based on the study, research that integrates traditional game-based outdoor learning specifically into mathematics learning is still limited. In addition, studies that place collaborative character as the main focus in traditional Gobak Sodor game-based mathematics

learning have also not been found. This condition shows that there is a research gap that needs to be studied further.

Research on the traditional game of Gobak Sodor in the field of education has been done with a lot of diverse focuses. A number of studies place Gobak Sodor as an object of ethnomathematical study that aims to identify mathematical concepts contained in games, such as geometry and number patterns (Widya Ningtias & Soraya, 2024). The main focus of the research is on the exploration of mathematical concepts, not on the impact of learning on students' character. Another study examined Gobak Sodor as a learning medium to introduce the relationship between culture and mathematics, with descriptive and conceptual approaches (Panjaitan et al., 2025). However, the study has not examined the empirical influence of learning on student character development. In addition, there are studies that utilize the Gobak Sodor game to develop students' social attitudes or character values, such as courage and cooperation, but this research was not carried out in the context of formal mathematics learning (Ramandha et al., 2024). The characters studied have also not been specifically focused on collaborative characters that are operationalized with measurable indicators.

In contrast to previous studies, this study explicitly places collaborative character as the main variable, not as a side effect of play activities. The collaborative character in this study is operationalized through indicators of effective cooperation, responsibility for group tasks, and respect for the contribution of each member. In addition, this research was carried out in the context of mathematics learning, so that the traditional game of Gobak Sodor not only functions as a cultural activity, but as a systematically designed mathematics learning strategy. This research also integrates an outdoor learning approach, which provides a contextual learning experience and demands direct social interaction between students.

In terms of methodology, this study uses a quasi-experimental design with the control group, thus producing stronger empirical evidence than previous research dominated by qualitative or descriptive approaches. Thus, this study fills the research gap related to the use of traditional Gobak Sodor games in mathematics learning which is oriented towards strengthening students' collaborative character.

Conceptually, this study expands the understanding of mathematics learning by showing that mathematics learning is not only oriented towards cognitive achievement, but can also be systematically designed to develop collaborative character as a learning goal. This research also makes a conceptual contribution by integrating traditional games as a context of mathematics learning, so that mathematics concepts are not learned in the abstract, but through contextual and meaningful learning experiences. This approach strengthens the study of local culture-based mathematics learning that emphasizes the linkage between mathematics and students' daily lives.

This research makes an important contribution to mathematics education by emphasizing that mathematics learning can be systematically designed to develop a collaborative character, rather than focusing only on mastering cognitive concepts. These findings are in line with research results that show that collaborative learning approaches can increase student activeness and social interaction in mathematics learning, thereby encouraging more meaningful student involvement in the learning process. Furthermore, collaborative learning has been shown to strengthen communication and cooperation skills between students in the context of mathematics, which are important skills in 21st century learning. This is supported by research that shows that collaborative learning, including those integrated with technology, is able to improve social interaction and a participatory learning environment that supports mathematical understanding.

Therefore, this study aims to analyze the influence of outdoor learning based on traditional Gobak Sodor games on the collaborative character of students in mathematics learning in grade VII of SMP Negeri 7 Muaro Jambi. This research is expected to make

practical contributions as an innovative learning alternative for teachers as well as a theoretical contribution in the development of mathematics learning oriented to strengthening students' collaborative character. Based on this aim, the research problem is formulated as follows: Is there a significant difference in students' collaborative character between students who participate in mathematics learning through outdoor learning based on the traditional Gobak Sodor game and those who participate in conventional mathematics learning? Accordingly, this study proposes the hypothesis that there is a difference in students' collaborative character between the two learning groups.

METHOD

This study uses a quantitative approach with a quasi-experimental design, namely a nonequivalent control group design. The study involved two groups, namely an experimental class and a control class, which were given a pretest and posttest to examine differences in students' collaborative character before and after treatment.

Table 1. Nonequivalent Control Group Design

Sampling	Group	Pretest	Treatment	Posttest
Non random	Experiment	O_1	x	O_2
Non random	Control	O_2	-	O_1

In the sampling in this study, probability sampling techniques were used with cluster random sampling. Probability sampling is a sampling technique that provides an equal opportunity for each member of the population to be selected as a research sample (Sugiyono, 2020).

The research subjects were seventh-grade students of SMP Negeri 7 Muaro Jambi in the 2025/2026 academic year. Class VII B served as the control class and received conventional mathematics instruction, while Class VII F was designated as the experimental class and received outdoor learning based on the traditional Gobak Sodor game.

The research instrument was a collaborative character questionnaire developed based on collaborative character indicators and measured using a four-level Likert scale. The questionnaire was administered at the pretest and posttest stages to assess students' collaborative character.

Data analysis began with prerequisite tests, including normality and homogeneity tests. The normality test results indicated that the data were not normally distributed, while the homogeneity test (Levene's test) showed that the data were homogeneous. Therefore, hypothesis testing was conducted using nonparametric statistical analysis, namely the Mann–Whitney U test, to determine differences in collaborative character between the experimental and control classes. All data analyses were carried out using statistical data processing software.

In addition to the hypothesis test, this study also used an effect size test to find out how much of an influence outdoor learning based on the traditional game of gobak sodor on the collaborative character of students. Effect size is a measure of effectiveness that not only shows whether or not there is an effect of a treatment, but also explains how big the effect. Because the research data is not normally distributed, the effect size calculation used is rank-biserial correlation, which is suitable for nonparametric analysis with the Mann–Whitney U test.

The effect size test was carried out to measure how much influence of the fish was given in this study. Because the data is not normally distributed, the hypothesis test uses Mann–Whitney U, so the effect size test is carried out using the Rank Biserial Correlation Effect Size

method. The following effect size test values use the Rank Biserial Correlation Effect Size formula.

$$r = \frac{z}{\sqrt{N}}$$

Description :

r = Effect Size

Z = Z value in the Mann-Whitney test

N = Number of samples

The following is the determination of the effect size test category.

Table 2. Category Uji Effect Size

Effect Size	Criteria
$0 < d \leq 0,2$	Small effect
$0,2 < d \leq 0,5$	Medium effect
$0,5 < d \leq 0,8$	Large effect
$d > 0,8$	Very large effect

RESULT

Descriptive Analysis

Descriptive analysis was carried out to describe the collaborative character of students in the experimental class and the control class based on the results of the pretest and posttest. Data was obtained through a student collaborative character questionnaire. Because the questionnaire data is ordinal-scale, before further statistical analysis is carried out, the data is first converted to the interval scale using the Successive Interval Method (MSI). The descriptive analysis includes mean, median, mode, standard deviation, and variance values to see the trends and distribution of data in each class.

To facilitate the interpretation of the results of the descriptive analysis, the collaborative character assessment scale as presented in Table 1 is used.

Table 3. Likert Scale Questionnaire Scoring

Description	Shoes
Strongly Agree/always/very positive	4
Agreed/often/positive/good	3
Disagree/almost never/negative	2
Strongly disagree/never	1

(Sugiyono, 2020)

Result of Desscriptive Analysis of Experimental Classes:

Descriptive statistical analysis was used to analyze the results of collaborative character questionnaires and data on the implementation of learning by teachers and student activities in learning carried out during teaching and learning activities. The data obtained was then obtained to find out the mean value, minimum value, maximum value, median, mode, and standard deviation. Based on the data of the students' collaborative character questionnaire, pretest and posttest scores were obtained as presented in table 4.

Table 4. Descriptive Statistics of Pretest and Posttest of Experimental Class

Statistics	Pretest	Posttest
Mean	13.84	20.74
Median	18.08	22.04
Mode	19.06	23.38
Minimum Value	15.12	8.66
Maximum Score	21.33	23.38
Variance	86.83	11.37
Standard Deviation	9.32	3.37

The table above shows the descriptive statistics of students' collaborative character scores in experimental classes before and after being given outdoor learning treatment based on traditional Gobak Sodor games. Based on the results of data analysis, the average score (mean) of students' collaborative character score during the pretest was 13.84, while in the posttest it increased to 20.74. Thus, it can be concluded that outdoor learning based on Gobak Sodor traditional mining has a positive impact on increasing students' collaborative character scores in experimental classes.

Descriptive Analysis Result of Control Class

Descriptive analysis was also carried out in the control class to determine the collaborative character of students before and after participating in conventional learning. A summary of the descriptive statistics of the control class is presented in Table 5.

Table 5. Descriptive Statistics of Control Class Pretest and Posttest

Statistics	Pretest	Posttest
Mean	17.62	17.76
Median	20.19	20.29
Mode	-	22.32
Minimum Value	3.59	3.65
Maximum Score	23.12	23.32
Variance	32.87	32.77
Standard Deviation	5.73	5.72

Table 5 illustrates the descriptive statistics of students' collaborative character scores in the control class before and after learning that did not implement outdoor learning based on traditional Gobak Sodor games. Based on the results of data analysis, the average score of students' collaborative character in the pretest was 17.62 and in the posttest was 17.76. This shows that descriptively there was no increase in students' collaborative character scores in the control class.

Validity and Reliability Testing

The validity test was carried out by distributing a collaborative character questionnaire to grade VII students as research respondents. The data obtained was then analyzed using the help of the SPSS application version 26. The validity test aims to determine the feasibility of each statement item in the questionnaire. An item of a statement is declared valid if the value

of the correlation coefficient (r calculated) is greater than the value of the r -table at a significance level of 5%. Based on the results of the validity test that has been carried out, all indicators in the collaborative character questionnaire are declared valid, because each statement item has a greater calculated r value than the r table. Thus, all items in the questionnaire can be used to measure the collaborative character of students.

Furthermore, a reliability test was carried out to determine the level of consistency of the research instrument. The reliability test in this study used the Cronbach's Alpha coefficient with the help of the SPSS application version 26. The results of the reliability test showed that the value of Cronbach's Alpha of the collaborative character questionnaire was greater than 0.6, so it can be concluded that the instrument has a good level of consistency. This shows that all items in the questionnaire provide stable and consistent measurement results, so that the data obtained is declared reliable and suitable for use in the research.

Results of the Prerequisite Analysis (Normality Test)

Before hypothesis testing, a prerequisite test of analysis is first carried out to determine whether the data meets the assumption of normal distribution. The normality test in this study was carried out using the Shapiro–Wilk test with the help of the SPSS version 26 application. Normality tests were carried out on pretest and posttest data in the experimental class and the control class

The results of the normality test of pretest and posttest scores in the experimental and control classes are as follows.

Table 6. Results of the Normality Test of Experimental Class Pretest Scores

Tests of Normality		
Shapiro-Wilk		
Statistics	df	Sig.
,639	29	,000

Based on the table above, the experimental class sig pretest value is .000 which means that the sig value is smaller than 0.05 or ($.000 < 0.05$) then H_0 accepted H_1 and rejected, it is interpreted that the experimental class pretest score is not normally distributed.

Table 7. Normality Test Results of Control Class Pretest Score

Tests of Normality		
Shapiro-Wilk		
Statistics	df	Sig.
,297	32	,000

Based on the table above, the sig pretest value of the control class is .000 which means that the sig value is less than 0.05 or ($.000 < 0.05$) then H_0 accepted and H_1 rejected, it is interpreted that the pretest score of the control class is not normally distributed.

Table 8. Results of Normality Test Score Posttest Score for Experimental Class

Tests of Normality		
Shapiro-Wilk		
Statistics	df	Sig.
,244	29	,000

Based on the table above, the experimental class posttest sig value is .000 which means that the sig value is smaller than 0.05 or ($.000 < 0.05$) then H_0 accepted and H_1 rejected, it is interpreted that the experimental class posttest score is not normally distributed.

Table 9. Normality Test Results of Control Class Posttest Scores

Tests of Normality		
Shapiro-Wilk		
Statistics	df	Sig.
,302	32	,000

Thus, it can be concluded that the pretest and posttest scores of the experimental and control classes do not meet the normality assumptions.

Homogeneity Test Homogeneity Test

The homogeneity test was performed to determine whether the variance of the pretest data between the experimental class and the control class was homogeneous or not. The homogeneity test in this study uses the Levene test (Levene's Test for Equality of Variances) with the help of the SPSS version 26 application. The data is said to be homogeneous if the significance value (Sig.) is greater than 0.05.

The results of the homogeneity test of the experimental class pretest score and the control class are presented in the following table 10.

Table 10. Levene Test Results of Collaborative Character Score

Laven's Test for Equality of Variance		F	Sig.	t	df	Sig. (2-tailed)
Skor MSI Pretest	Equal variances assumed	1,909	,172	-1,928	59	,059
	Equal variances not assumed			-1,885	45,652	,066

The significance value (Sig.) obtained from the Levene test was 0.172. The value is greater than the significance level of 0.05 (Sig. > 0.05), so H_0 is accepted and H_1 is rejected. Thus, it can be concluded that the variance of the experimental class and control class pretest data is homogeneous.

However, even though the pretest data is homogeneous, the results of the normality test show that the data is not normally distributed. Therefore, the hypothesis test in this study does not use parametric statistical tests, but uses nonparametric statistical tests, namely the Mann–Whitney U test.

Hypothesis Testing

The hypothesis test was carried out to find out whether there was a difference in the collaborative character of students between the experimental class that was given outdoor learning treatment based on the traditional Gobak Sodor game and the control class that used conventional learning.

Based on the results of the analysis prerequisite test, it is known that the pretest and posttest data of the experimental class and control class are not normally distributed, Hypothesis while the homogeneity test results show that the data is homogeneous.

Therefore, the hypothesis test in this study uses a nonparametric statistical test, namely the Mann–Whitney U test with the help of the SPSS version 26 application.

Table 11. Results of the Mann-Whitney Test of Collaborative Character Scores

<i>Test Statistics^a</i>	
	Score Posttest
Mann-Whitney U	268.000
Wilcoxon W	796.000
Z	-2.832
Asymp. Sig. (2—tailed)	.005
a. Grouping Variable : Kelas	

Based on the results of the Mann–Whitney U test on students' collaborative character posttest scores, an Asymp score was obtained. Sig. (2-tailed) is .005. The value is smaller than the significance level of 0.05 ($.005 < 0.05$), so H_0 is rejected and H_1 is accepted.

The results of the hypothesis test showed that there was a significant difference in the improvement of collaborative character between students who participated in Gobak Sodor's traditional game-based outdoor learning and students who participated in conventional learning. Thus, it can be concluded that the application of outdoor learning based on traditional Gobak Sodor games has an effect on improving students' collaborative character in mathematics learning.

$$r = \frac{2,832}{\sqrt{61}} = \frac{2,832}{7,81} = 0,36$$

Based on the results of the calculation of the Rank Biserial Correlation Effect Size, an r value of 0.36 was obtained. The value is in the range of $0.2 < d \leq 0.5$ which is included in the medium effect category. This shows that outdoor learning based on the traditional game of gobak sodor has a moderate influence on the collaborative character of students.

DISCUSSION

The Influence of Traditional Game-Based Outdoor Learning on Collaborative Characters

The results of the study showed that the application of outdoor learning based on the traditional game of Gobak Sodor had a significant influence on improving students' collaborative character in mathematics learning. This is proven by the results of the Mann–Whitney U test which shows a significance value of .005, smaller than the significance level of 0.05. These findings indicate that learning that involves direct activities, social interaction, and group work is able to develop students' collaborative character more effectively than conventional learning (Husamah, 2013). Outdoor learning provides a more contextual and meaningful learning experience because students are directly involved in learning activities outside of the classroom. A more open learning environment encourages students to interact with each other, cooperate and communicate actively during the learning process (Chairad et al., 2019). At the elementary school level, research by Fahrezi & Hernawan (2024) shows that outdoor learning has a positive effect on improving the cooperative character of grade V students.

The Role of Gobak Sodor's Traditional Game in Developing Collaborative Characters

The traditional game of Gobak Sodor used in this study plays an important role in improving the collaborative character of students. This game requires teamwork, strategic coordination, and communication between group members to achieve common goals. These values are in line with the indicators of collaborative character developed in this study. Traditional games contain strong social values, such as cooperation, responsibility, and sportsmanship, which can be instilled through play activities. To further explain why outdoor learning based on Gobak Sodor effectively enhances collaborative character, it is important to examine the learning mechanisms that occur during the game activities. The improvement of students' collaborative character can be influenced by real activities experienced during the outdoor learning process based on the traditional game Gobak. Based on observations during the process and execution of the game, students are required to plan the team's strategy, such as deciding who will be the first attacking player, who will be the data recorder. These discussions encourage active participation and shared decision-making. Additionally, role rotations between forwards and guards train students to accept different responsibilities and reward each member's contribution to the team's success. These discussions encourage active participation and shared decision-making. Additionally, role rotations between forwards and guards train students to accept different responsibilities and reward each member's contribution to the team's success. Another opinion was also put forward by Listyaningrum, (2018) the lesson taken from the game of gobak sodor is to learn compact cooperation between one guard and the other. In addition to that according to Anisa & Sit, (2024) outdoor games also provide opportunities for students to develop social skills through direct interaction such as mutual understanding, respect for religion, innovation, problem-solving, communication, and decision-making.

During matches, students must also make quick decisions and communicate continuously to help teammates avoid being touched by the guard player. This interaction requires cooperation, flexibility, and shared responsibility, which explains the significant increase in collaborative character scores in experimental classes, where the results showed that the increase in the value of the experimental class was given the game treatment. Traditional gobak sodor is larger than the control class that is not given treatment.

Outdoor Learning as a Learning Environment that Supports Social Interaction Learning that takes place outside of the classroom provides a wider space for students to interact freely and naturally. A learning environment that is not limited to the classroom creates a more relaxed atmosphere, so that students can more easily build communication and cooperation with their peers (Omeri, 2015). Implications of Mathematics Learning on Collaborative Character Strengthening In mathematics learning, collaborative character has an important role in helping students understand abstract concepts, such as algebra. Through group work, students can exchange ideas, discuss, and solve problems together, so that the learning process becomes more effective (Fanani et al., 2024).

The results of this study reinforce the view that character education, especially collaborative character, should be integrated into the learning process, rather than taught separately. The integration of outdoor learning with traditional Gobak Sodor games provides a holistic learning experience, which not only focuses on the cognitive aspect, but also on the development of students' social character (Puspitasari et al., 2022).

CONCLUSION AND SUGGESTIONS

Based on the results of the research and discussion that has been described, it can be concluded that the application of outdoor learning based on the traditional game of Gobak Sodor has a significant effect on improving the collaborative character of students in

mathematics learning. This is proven by the results of the Mann–Whitney U test which shows a significance value of 0.005, which is smaller than the significance level of 0.05. Students who participated in learning with an outdoor learning approach based on traditional Gobak Sodor games showed a better collaborative character compared to students who participated in conventional learning. The learning process encourages students to work together, communicate effectively, share roles, and be responsible in groups, so that students' collaborative character can develop well. Thus, outdoor learning based on the traditional game of Gobak Sodor can be used as an effective learning alternative to develop students' collaborative character in mathematics learning.

Conclusion the results of the study showed that outdoor learning based on traditional games (gobak sodor) had a significant effect on the collaborative character of students. This is proven by the Mann-Whitney U test with an Asymp value. Sig. $0.005 < 0.05$, which means that there is a difference between students who learn with this method and students who learn conventionally. Implications this research shows that traditional play-based outdoor learning can be an effective strategy to develop students' collaborative character through cooperative activities, communication, and group responsibility. The results of this research can also be a reference for the development of learning theories and further research. Suggestions teachers are advised to implement outdoor learning based on traditional games such as gobak sodor to improve the collaborative character of students. Researchers can then research with different types of games, materials, or levels of education. Subsequent research may also combine this method with other learning models or add different character variables.

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