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THE INFLUENCE OF THE APPLICATION OF COOPERATIVE LEARNING MODEL TYPE STUDENT TEAM ACHIEVEMENT DIVISION (STAD) ON THE SCIENCE LEARNING OUTCOMES OF GRADE V STUDENTS AT SDN PANAIKANG 1, PANAKUKANG SUBDISTRICT, MAKASSAR CITY

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ABSTRACT

This study is an experimental research project aimed at determining whether the implementation of the STAD-type cooperative learning model affects the science learning outcomes of Grade V students at SDN Panaikang 1, Panakukang District, Makassar City. The independent variable in this study is the implementation of the STAD-type cooperative learning model, while the dependent variable is the students' science learning outcomes regarding the water cycle topic. The population consisted of all Grade V students at SDN Panaikang 1, Panakukang District, Makassar City, while the sample comprised Grade V.a students (35 students). A non-probability sampling technique—specifically purposive sampling—was used to select the sample; Class V.a (35 students) was designated as the experimental class, and Class V.b (31 students) as the control class. Data collection techniques included observation, testing, and documentation. Data analysis involved both descriptive and inferential statistics, specifically the independent sample t-test. Research data were obtained by administering pre-tests and post-tests on the water cycle topic. The data were analyzed using SPSS version 24. Based on the inferential statistical analysis, a post-test value of 0.000 < 0.05 was obtained. It can be concluded that the implementation of the STAD-type cooperative learning model has an effect on the science learning outcomes of Grade V students at SDN Panaikang 1, Panakukang District, Makassar City.

Keywords: STAD model, learning outcomes, water cycle.

INTRODUCTION

According to Law No. 20 of 2003 (Depdiknas, 2003), education is a conscious and planned effort to create a learning atmosphere and process wherein students actively develop their potential—cultivating spiritual and religious strength, self-control, personality, intelligence, and noble character, as well as the skills required by themselves, society, the nation, and the state. Meanwhile, citing Herman H. Horn, Rosdiana defines education as "an eternal process of higher adjustment for a physically and mentally developed being—one that is free and conscious of God—as manifested in the surrounding environment, as well as in the intellectual, emotional, and volitional aspects of human beings" (Rosdiana, 2009: 11–12).Science instruction involves an interaction between students and their surrounding environment. Consequently, science learning must prioritize the student's role in the teaching-learning process, resulting in student-centered instruction where the teacher acts as a facilitator. Teachers are responsible for enhancing students' learning experiences to achieve the objectives of science education. These objectives are inextricably linked to the nature of science as a product, a process, and a set of scientific attitudes. Therefore, science instruction must employ appropriate pedagogical principles to ensure that students achieve optimal learning outcomes.

Natural Science (IPA) is a discipline that possesses a specific subject matter and employs the scientific method; therefore, it warrants inclusion in the elementary school curriculum.

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Conant (cited in Samatowa, 2006:1) defines Natural Science as "a series of interconnected concepts and conceptual schemes that evolve through experimentation and observation, and which serve as a basis for further observation and experimentation."

The STAD (Student Teams-Achievement Divisions) cooperative learning model prioritizes collaboration among students within groups to achieve learning objectives. As a specific type of cooperative learning, STAD emphasizes a structure designed to influence student interaction patterns with the aim of enhancing academic mastery. The core idea behind STAD is to motivate students to support and assist one another in mastering the skills taught by the teacher.

Group-based interaction in the STAD model allows the teacher to create a learning atmosphere that fosters a sense of mutual need among students. This interaction, characterized by mutual need, constitutes "positive interdependence." Positive interdependence can be achieved through interdependence regarding goals, tasks, learning resources, roles, and rewards (Mulyono Abdurrahman, 2012:88).

Based on the background provided, the research questions are formulated as follows: (1) How is the STAD cooperative learning model implemented in Natural Science lessons for fifth-grade students at SDN Panaikang 1, Panakukang District, Makassar City? (2) What are the Natural Science learning outcomes for fifth-grade students at SDN Panaikang 1, Panakukang District, Makassar City? (3) Does the implementation of the STAD cooperative learning model influence the Natural Science learning outcomes of fifth-grade students at SDN Panaikang 1, Panakukang District, Makassar City? Based on the problem formulation, the objectives of this study are to obtain an overview of the following: (1) the implementation of the STAD-type cooperative learning model in Science lessons for fifth-grade students at SDN Panaikang 1, Panakukang District, Makassar City; (2) the Science learning outcomes of fifth-grade students at SDN Panaikang 1, Panakukang District, Makassar City; and (3) the influence of the STAD-type cooperative learning model on the Science learning outcomes of fifth-grade students at SDN Panaikang 1, Panakukang District, Makassar City.

METHOD

This study employed a quasi-experimental research design to examine the effect of the Student Teams Achievement Division (STAD) cooperative learning model on students' science learning outcomes. The study adopted a nonequivalent control group design, in which the experimental and control groups were selected without random assignment at the individual participant level.

The research was conducted at SDN Panaikang I, Makassar City, from April 18 to May 15, 2022, over five science learning sessions. The population consisted of all fifth-grade students enrolled at SDN Panaikang I during the 2021/2022 academic year, comprising two classes with a total of 66 students.

The sample was selected using a combination of purposive sampling and simple random sampling techniques. Purposive sampling was applied because the science topic investigated was taught exclusively in Grade V. Subsequently, simple random sampling, through a lottery procedure, was used to determine which class would serve as the experimental group and which would serve as the control group. Based on the lottery results, Class VA was assigned as the experimental group, while Class VB served as the control group. Consequently, the study involved 66 participants, consisting of 35 students in the experimental group and 31 students in the control group.

The study involved two variables. The independent variable was the implementation of the Student Teams Achievement Division (STAD) cooperative learning model, whereas the dependent variable was students' science learning outcomes. Operationally, the STAD model

refers to a cooperative learning approach that emphasizes collaboration among students working in small groups to achieve common learning objectives. Science learning outcomes refer to students' cognitive achievement in science, measured through standardized achievement tests administered after the instructional intervention.

The research procedures consisted of five stages: (1) preparing the lesson plans and instructional materials; (2) administering a pre-test to assess students' prior knowledge; (3) implementing the STAD cooperative learning model as the treatment; (4) administering a post-test to measure students' learning outcomes; and (5) analyzing the collected data using an independent-samples *t*-test.

Data were collected through classroom observation, achievement tests, and documentation. The research instruments included a 20-item multiple-choice achievement test, an observation checklist for teacher activities, and an observation checklist for student learning activities. The collected data were analyzed using both descriptive statistics and inferential statistics. Inferential analysis was performed using an independent-samples *t*-test with IBM SPSS Statistics Version 24, applying a significance level of 0.05.

RESULTS

1. Implementation of the Student Teams Achievement Division (STAD) Cooperative Learning Model among Fifth-Grade Students at SD Negeri Panaikang 1, Makassar City

This quantitative study was conducted over three instructional sessions in each fifth-grade class. Class VA served as the experimental group, in which the Student Teams Achievement Division (STAD) cooperative learning model was implemented, while Class VB served as the control group and received conventional instructional methods.

Prior to the implementation of the STAD cooperative learning model, students in the experimental group completed a pre-test to assess their initial knowledge. Subsequently, the STAD learning model was implemented during science lessons on the topic of the Water Cycle. Classroom observations were carried out simultaneously to monitor both teacher and student activities throughout the instructional process.

The study was conducted over a two-week period, with learning activities taking place every Tuesday, Wednesday, and Saturday beginning at 7:30 a.m. During each lesson, the researcher observed the implementation of the STAD cooperative learning model and documented the interactions between the teacher and students.

The implementation of the STAD model followed several instructional stages. During the first meeting, the teacher reviewed the previous lesson as an introductory reflection. Although the classroom atmosphere was conducive to learning, student participation remained relatively low. Furthermore, the teacher had not yet organized students into heterogeneous groups based on their cognitive abilities, resulting in less effective classroom management and an incomplete implementation of the STAD learning procedures.

During the second meeting, the teacher continued implementing the STAD cooperative learning model. However, several essential components of the model had not yet been fully executed. These included conducting an effective apperception activity, clearly communicating the learning objectives, presenting the instructional material systematically, providing constructive feedback, and guiding students in solving learning tasks. In addition, the teacher had not yet organized students into cooperative learning groups, resulting in a less effective implementation of the model.

At the third and final meeting, the teacher implemented the STAD learning model more comprehensively by following its prescribed instructional procedures. Students were organized into several heterogeneous groups consisting of four to five members each. Each group

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received a Student Worksheet (LKS) related to the topic of the Water Cycle. The teacher guided each group throughout the discussion process, after which each group presented the results of its discussion to the class. Group rewards were then provided based on students' achievement scores. Finally, the teacher reinforced the key concepts of the lesson, administered the post-test, and conducted interviews with both the teacher and students to obtain additional information regarding the implementation of the learning model.

The fidelity of the STAD cooperative learning model implementation was evaluated using an observation checklist designed to assess the extent to which each stage of the instructional model was implemented during the teaching and learning process.

The recapitulation of the implementation scores for the Student Teams Achievement Division (STAD) cooperative learning model across the three instructional meetings is presented in Table 4.1.

Table 1 Description of the Implementation of the Student Teams Achievement Division (STAD) Cooperative Learning Model

Meeting	Score Obtained / Max Score	Percentage	Qualification
Meeting I	25	39%	Poor
Meeting II	35	54%	Fair
Meeting III	55	85.93%	Very Good

Source: Teacher Observation Sheet

Based on Table 1, the implementation of the Student Teams Achievement Division (STAD) cooperative learning model showed continuous improvement across the three instructional meetings. During the first meeting, the implementation score was 25, corresponding to an implementation percentage of 39.00%, which was classified as Poor. At the second meeting, the score increased to 35, with an implementation percentage of 54.00%, categorized as Fair. By the third meeting, the implementation score reached 55, representing 85.93%, which fell into the Very Good category.

These findings indicate that the implementation of the Student Teams Achievement Division (STAD) cooperative learning model improved progressively throughout the study and was implemented effectively by the end of the instructional sessions.

Table 2 Description of Student Activeness

Meeting	Score Obtained / Max Score	Percentage	Qualification
Meeting I	21	47%	Poor
Meeting II	23	52%	Poor
Meeting III	41	93%	Very Good

Source: Student Observation Sheet

Based on Table 2, students' learning participation demonstrated a progressive improvement across the three instructional meetings. The highest level of student participation was observed during the third meeting, with an obtained score of 41, corresponding to 93% of the maximum score, which was categorized as Very Good. This result indicates that students' participation reached the expected level of performance.

The implementation of the Student Teams Achievement Division (STAD) cooperative learning model successfully encouraged students to become more active and engaged in the learning process while fostering creativity during classroom activities. Furthermore, the model promoted more innovative teaching practices, creating an enjoyable learning environment that increased students' interest in learning and reduced classroom boredom, thereby supporting the achievement of the intended learning objectives.

2. Science Learning Outcomes of Fifth-Grade Students at SDN Panaikang 1, Makassar City

The science learning outcomes of the fifth-grade students at SDN Panaikang 1, Makassar City, were measured using a research instrument consisting of a 20-item multiple-choice achievement test. The students' scores were subsequently analyzed using descriptive statistical analysis to describe their science learning outcomes.

a. Pre-test Data Description

Following the completion of the research activities, the pre-test data were analyzed to describe the initial science learning outcomes of both the experimental and control groups prior to the implementation of the Student Teams Achievement Division (STAD) cooperative learning model. The results of the pre-test are presented as follows:

Table 3. Descriptive Statistics of the Pre-test Scores for the Experimental and Control Groups Using IBM SPSS Statistics

Statistic	Experimental Class (N=35)	Control Class (N=31)
Mean	59.57	48.06
Median	60.00	50.00
Mode	65	65
Std. Deviation	12.389	15.148
Minimum	30	10
Maximum	80	75

Source: *IBM SPSS Statistics Version 24*

1) Description of the Science Learning Outcomes of the Experimental Group

Based on Table 3, the mean pre-test score of the students in the experimental group was 59.57 out of an ideal score of 100, which was categorized as Poor. The standard deviation was 12.389, indicating that the pre-test scores were distributed from a minimum score of 30 to a maximum score of 80, with a range of 50. The mode was 65, while the median was 60.00.

2) Description of the Science Learning Outcomes of the Control Group

As shown in Table 3, the mean pre-test score of the students in the control group was 48.06 out of an ideal score of 100, which was categorized as Fair. The standard deviation was 15.148, indicating that the pre-test scores ranged from a minimum score of 10 to a maximum score of 75, with a range of 65. The mode was 65, while the median was 50.00.

Table 4. Frequency Distribution of the Experimental Group Pre-test Scores

Experimental Group Pre-test

Pre Test Eksperimen

		Frequency	Percent
Valid	30	1	2.9

	35	2	5.7
	40	2	5.7
	45	1	2.9
	55	7	20.0
	60	5	14.3
	65	9	25.7
	70	4	11.4
	75	2	5.7
	80	2	5.7
	Total	35	100.0
Total		35	100.0

Source: *IBM SPSS Statistics Version 24*

Table 4 presents the pre-test results of the students in the experimental group. The results indicate that one student (2.9%) obtained a score of 30, two students (5.7%) scored 35, two students (5.7%) scored 40, one student (2.9%) scored 45, seven students (20.0%) scored 55, five students (14.3%) scored 60, nine students (25.7%) scored 65, four students (11.4%) scored 70, two students (5.7%) scored 75, and two students (5.7%) scored 80.

Table 5. Frequency Distribution of the Control Group Pre-test Scores Control Group Pre-test Pre Test Kontrol

		Frequency	Percent
Valid	10	1	2.9
	15	1	2.9
	30	2	5.7
	35	3	8.6
	40	4	11.4
	45	3	8.6
	50	4	11.4
	55	3	8.6
	60	4	11.4
	65	5	14.3
	75	1	2.9
	Total	31	100.0

Source: *IBM SPSS Statistics Version 24*

The table presents the pre-test results of the students in the control group. One student obtained a score of 45 (6.7%), three students scored 50 (20.0%), one student scored 60 (6.7%), one student scored 65 (6.7%), one student scored 70 (6.7%), four students scored 75 (26.7%), three students scored 80 (20.0%), and one student obtained a score of 90 (6.7%).

For a clearer presentation of the score distribution, the data are illustrated in the following histogram.

b. Description of the Post-test Data

Following the implementation of the Student Teams Achievement Division (STAD) cooperative learning model in the experimental group, the post-test data of both the experimental and control groups were collected. These post-test results were compared with the pre-test data obtained prior to the implementation of the learning model to determine the

effect of the Student Teams Achievement Division (STAD) cooperative learning model on students' science learning outcomes.

Table 6. Descriptive Statistics of the Post-test Scores of the Experimental and Control Groups

	Eksperimen	Kontrol
Mean	82.57	57.42
Median	80.00	60.00
Mode	75	60
Std. Deviation	10.598	13.346
Range	40	55
Minimum	60	25
Maximum	100	80
Sum	2890	1780

Source: *IBM SPSS Statistics Version 24*

1) Description of the Science Learning Outcomes of the Experimental Group

Based on Table 4.6, the mean post-test score of the students in the experimental group was 90.00 out of the maximum possible score of 100, which was categorized as Very Good. The standard deviation was 8.23, indicating that the post-test scores ranged from a minimum score of 75 to a maximum score of 100, with a range of 25. The mode was 85, while the median was 90.00.

2) Description of the Science Learning Outcomes of the Control Group

As presented in Table 4.6, the mean post-test score of the students in the control group was 70.00 out of the maximum possible score of 100, which was classified as Good. The standard deviation was 10.85, indicating that the post-test scores ranged from a minimum score of 50 to a maximum score of 85, with a range of 35. The mode was 70, while the median was 70.00.

Table 7. Frequency Distribution of the Post-test Scores of the Experimental Group

Post Test Eksperimen

		Frequency	Percent
Valid	60	1	2.9
	65	1	2.9
	70	2	5.7
	75	9	25.7
	80	7	20.0
	85	5	14.3
	90	2	5.7
	95	3	8.6
	100	5	14.3
	Total	35	100.0

Source: *IBM SPSS Statistics Version 24*

The table presents the post-test results of the students in the experimental group. 2 students obtained a score of 75, representing 13.3% of the sample; 4 students obtained a score of 85, representing 26.7%; 2 students obtained a score of 90, representing 13.3%; 4 students obtained a score of 95, representing 26.7%; and 3 students obtained a score of 100, representing 20.0%.

Table 8. Frequency Distribution of the Post-test Scores of the Control Group

Post Test Kontrol

		Frequency	Percent

Valid	25	1	2.9
	35	2	5.7
	40	1	2.9
	45	3	8.6
	50	3	8.6
	55	3	8.6
	60	9	25.7
	65	1	2.9
	70	3	8.6
	75	4	11.4
	80	1	2.9
	Total	31	100.0

Source: *IBM SPSS Statistics Version 24*

The table presents the post-test results of the students in the control group. 1 student obtained a score of 50, representing 6.7% of the sample; 1 student obtained a score of 55, representing 6.7%; 2 students obtained a score of 60, representing 13.3%; 2 students obtained a score of 65, representing 13.3%; 3 students obtained a score of 70, representing 20.0%; 1 student obtained a score of 75, representing 6.7%; 3 students obtained a score of 80, representing 20.0%; and 2 students obtained a score of 85, representing 13.3%.

3. The Effect of the Implementation of the Student Teams Achievement Division (STAD) Cooperative Learning Model on the Science Learning Outcomes of Fifth-Grade Students at SDN Panaikang 1, Makassar City

Before testing the research hypothesis, prerequisite assumption tests were conducted, including the normality test and the homogeneity test.

a. Normality Test

The normality test was conducted to determine whether the collected data were normally distributed. The data used in the normality test were obtained from the students' pre-test and post-test learning outcome scores. The data were considered to be normally distributed if the significance value obtained was > 0.05. Conversely, the data were considered not normally distributed if the significance value obtained was < 0.05. The results of the normality tests for the pre-test and post-test data of the experimental and control groups are presented below.

Table 9. Results of the Normality Test for the Pre-test and Post-test Data of the Experimental and Control Groups

Tests of Normality

		Kolmogorov-Smirnov[a]		
	Kelas	Statistic	Df	Sig.
Hasil Belajar Siswa	Pre Test Eksperimen	.105	35	.200*
	Post Test Eksperimen	.117	35	.131
	Pre test Kontrol	.107	31	.200*
	Post Test Kontrol	.147	31	.059

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

a. Lilliefors Significance Correction

Source: *IBM SPSS Statistics Version 24*

The table above shows that the pre-test and post-test data of both the experimental and control groups were normally distributed. Based on the results of the normality test, the P-value

(Sig.) obtained was > 0.05. Therefore, it can be concluded that the data collected from both the experimental and control groups were normally distributed.

b. Homogeneity Test

The homogeneity test was conducted to determine whether the data obtained from the sample groups were homogeneous. The data subjected to the homogeneity test consisted of the pre-test and post-test scores of the experimental and control groups. The homogeneity test was performed using IBM SPSS Statistics Version 24. The data were considered homogeneous if the significance value obtained was > 0.05. Conversely, the data were considered not homogeneous if the significance value obtained was < 0.05. The results of the homogeneity test for the pre-test and post-test scores of the experimental and control groups are presented below.

Table 10. Results of the Homogeneity Test for the Experimental and Control Groups

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Hasil Belajar Siswa	Based on Mean	1.029	1	64	.314
	Based on Median	.755	1	64	.388
	Based on Median and with adjusted df	.755	1	59.978	.388
	Based on trimmed mean	.909	1	64	.344

Source: *IBM SPSS Statistics Version 24*

The table above shows that the post-test homogeneity test results for the experimental and control groups yielded a significance value of 0.314, indicating that the data were homogeneous, as the significance value was greater than 0.05 (0.314 > 0.05).

c. Hypothesis Testing

A Paired-Samples *t*-Test was used to analyze the data. The analysis was conducted by comparing the pre-test scores of the experimental group and the pre-test scores of the control group using IBM SPSS Statistics Version 24. The results were considered statistically significant if the Sig. (2-tailed) value was < 0.05. This analysis aimed to determine whether there was a significant difference in students' learning outcomes between the experimental and control groups before the instructional treatment was administered.

Table 11. Results of the Paired-Samples *t*-Test for the Pre-test Scores of the Experimental and Control Groups

Paired Samples Test

		Paired Differences					t	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	PreTest Eksperimen–PostTest Eksperimen	-23.000	13.890	2.348	-27.771	-18.229	-9.796	34	.000

Pair 2	Pre Test Kontrol - PostTest Kontrol	-9.355	20.279	3.642	-16.793	-1.916	-2.568	30	.015

Source: *IBM SPSS Statistics Version 24*

Based on the table above, the Sig. (2-tailed) values are < 0.05, indicating that there was a significant difference in students' learning outcomes between the group that was taught using the Student Teams Achievement Division (STAD) cooperative learning model and the group that was taught without using the Student Teams Achievement Division (STAD) cooperative learning model.

Based on these findings, the results of the hypothesis testing can be summarized as follows:

H_0: There is no effect of implementing the Student Teams Achievement Division (STAD) cooperative learning model on the science learning outcomes of fifth-grade students at SDN Panaikang 1,MakassarCity.
(Rejected because Sig. (2-tailed) < 0.05)

H_1: There is an effect of implementing the Student Teams Achievement Division (STAD) cooperative learning model on the science learning outcomes of fifth-grade students at SDN Panaikang 1, MakassarCity.
(Accepted because Sig. (2-tailed) < 0.05)

Discussion

The implementation of the Student Teams Achievement Division (STAD) cooperative learning model began with the administration of a pre-test to assess the initial knowledge of the fifth-grade students. The pre-test consisted of 20 multiple-choice questions. Following the pre-test, the students received the instructional treatment through the implementation of the Student Teams Achievement Division (STAD) cooperative learning model. After the treatment, a post-test was administered to evaluate the effectiveness of the STAD model in improving the science learning outcomes of the fifth-grade students at SDN Panaikang I. The findings indicate that the Student Teams Achievement Division (STAD) cooperative learning model is an effective instructional approach for improving students' science learning outcomes. Prior to the implementation of the treatment, the fifth-grade students at SDN Panaikang I, Makassar City, who participated in this study generally demonstrated low science learning achievement, as reflected in their pre-test scores.

Based on all the observed indicators, the results of the classroom observations showed a continuous improvement in the teacher's ability to implement the Student Teams Achievement Division (STAD) cooperative learning model. During the first meeting, the teacher obtained an implementation score of 25, representing 39%, which was categorized as Poor. In the second meeting, the implementation score increased to 35, with an implementation percentage of 54%, which was categorized as Fair. During the third meeting, the implementation score further increased to 55, representing 85.93%, which was categorized as Very Good. These findings indicate that the implementation of the Student Teams Achievement Division (STAD) cooperative learning model improved progressively throughout the instructional sessions and was implemented effectively.

The descriptive statistical analysis of students' learning activities also revealed a substantial improvement in student participation throughout the learning process. During the first meeting, the observation score was 21, representing 47%, which was categorized as Poor. In the second meeting, the score increased to 23, representing 52%, which was still categorized as Poor. However, during the third meeting, students' learning participation increased considerably, with

an observation score of 41, corresponding to 93%, which was categorized as Very Good. These findings suggest that the implementation of the Student Teams Achievement Division (STAD) cooperative learning model successfully encouraged students to participate more actively and creatively in classroom learning. Furthermore, the model promoted more innovative teaching practices, creating an enjoyable learning environment that enhanced students' motivation and minimized classroom boredom, thereby supporting the achievement of the intended learning objectives.

The findings of this study demonstrate that the cooperative learning model creates a more engaging and interactive classroom environment. Through the implementation of the Student Teams Achievement Division (STAD) model, students were encouraged to think critically, express their ideas with greater confidence, and actively participate in classroom discussions. In this instructional approach, learning activities were primarily student-centered, while the teacher served as a facilitator, learning guide, and provider of instructional support.

The results of this study indicate that the Student Teams Achievement Division (STAD) cooperative learning model had a significant effect on the science learning outcomes of fifth-grade students. The hypothesis testing results confirmed that H_1 was accepted, indicating that the implementation of the Student Teams Achievement Division (STAD) cooperative learning model significantly influenced students' science learning outcomes. This finding was further supported by the results of the *t*-test, which yielded a significance value of 0.000, lower than the significance level of 0.05. Therefore, it can be concluded that the implementation of the Student Teams Achievement Division (STAD) cooperative learning model had a positive and statistically significant effect on students' science learning outcomes.

CONCLUSION

Based on the findings of this study entitled "The Effect of the Implementation of the Student Teams Achievement Division (STAD) Cooperative Learning Model on the Science Learning Outcomes of Fifth-Grade Students at SDN Panaikang 1, Panakukang District, Makassar City," the following conclusions can be drawn:

The implementation of the Student Teams Achievement Division (STAD) cooperative learning model in science instruction for fifth-grade students at SDN Panaikang 1, Panakukang District, Makassar City, was categorized as Very Good.

The science learning outcomes of the fifth-grade students following the implementation of the Student Teams Achievement Division (STAD) cooperative learning model were categorized as Good.

The Student Teams Achievement Division (STAD) cooperative learning model had a significant effect on the science learning outcomes of fifth-grade students at SDN Panaikang 1, Panakukang District, Makassar City. Overall, the students' science learning outcomes were categorized as Good.

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The author hopes that this research article will prove beneficial to the advancement of educational science, particularly in enhancing the quality of science instruction in primary schools.

REFERENCES

Anitah. (2009). *Metode Penelitian Pendidikan*. Bandung: PT Remaja Rosdakarya.

Ansari. (2004). *Landasan Psikologi Proses Pendidikan*. Bandung: PT Remaja Rosdakarya.

Bloom. (2012). *Kerangka Landasan untuk Pembelajaran, Pengajaran dan Asesmen*. Yogyakarta: Pustaka Pelajar.

Depdiknas. (2003). *Undang-Undang Republik Indonesia Nomor 20 Tahun 2003 tentang Sistem Pendidikan Nasional*. Jakarta: Depdiknas.

Gobel, I., Mursalin, & Runginger, R. (2013). *Penerapan Model Pembelajaran Kooperatif Tipe Jigsaw Berbasis Metode Eksperimen Terhadap Hasil Belajar Siswa Pada Materi Cahaya* (Undergraduate thesis). Universitas Negeri Gorontalo.

Hamalik, O. (2014). *Proses Belajar Mengajar*. Jakarta: Bumi Aksara.

Huda, M. (2014). *Cooperative Learning*. Yogyakarta: Pustaka Pelajar.

Permendikbud. (2016). *Salinan Lampiran Peraturan Menteri Pendidikan dan Kebudayaan Nomor 22 Tahun 2016 tentang Standar Proses Pendidikan Dasar dan Pendidikan Menengah*.

Robert E. Slavin. (2010). *Cooperative Learning*. Bandung: Nusa Media.

Rusman. (2016). *Model-model Pembelajaran: Mengembangkan Profesionalisme Guru*. Jakarta: Rajawali Pers.

Trianto. (2015). *Model Pembelajaran Terpadu: Konsep, Strategi, dan Implementasinya dalam Kurikulum Tingkat Satuan Pendidikan (KTSP)*. Jakarta: Bumi Aksara.