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The Student Teams Achievement Divisions Learning Model in Its Influence on the Motivation and Science Learning Outcomes of Elementary School Students

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Abstract: This study aims to examine the effect of the Student Team Achievement Divisions learning model on the motivation and science learning outcomes of elementary school students. This study used an experimental research method with a non-equivalent group pretest-posttest design without a random control group. The subjects of this research were the fourth grade elementary school students, totaling 30 students. Where the experimental class amounted to 15 people and the control class amounted to 15 people. The research instruments were in the form of questionnaires and tests. The analysis technique used the independent sample t-test technique with a significance level of 0.05. The results of this study indicate First, there are differences in science learning outcomes between students who take lessons with the Student Team Achievement Divisions learning model and students who take lessons with conventional learning models. Second, there are differences in the level of motivation between students who take lessons with the Student Team Achievement Divisions learning model and students who take lessons using conventional learning models. This cooperative learning increases motivation because of the fun game by interacting with each other in the group. Third, there is a significant effect between the Student Team Achievement Divisions learning model on motivation and science learning outcomes compared to conventional lecture learning models.

Keywords: STAD model, motivation to learn, science learning outcomes, primary school

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INTRODUCTION

Cooperative learning is learning that demands the active role of students in working together and interacting. The process of interaction that occurs in cooperative learning can form social skills as individual characters (Suryanto, 2020; Yang, 2015). The simplest cooperative learning model is Student Team Achievement Divisions (STAD). This learning model provides opportunities for students to interact in solving a given problem (Cacciamani et al., 2018; Ellis et al., 2020; Gómez et al., 2019). STAD cooperative learning demands student learning activities and learning is more fun (Shih et al., 2010). In practice, STAD is carried out in a learning team consisting of four people who are mixed according to their level of performance, gender and ethnicity. The teacher presents the lesson then students work in teams to ensure that all team members have mastered the lesson. Finally, all students are given a quiz about the material with notes, during the quiz they are not allowed to help each other (Arends, 2012; Bonwell & Eison, 1991). STAD Cooperative Learning Model is a Cooperative Learning approach that emphasizes activities and interactions between students to motivate each other and help each other in mastering the subject matter in order to achieve maximum achievement. Cooperative learning model is a learning model that can improve students' academic achievement and social attitudes throughs cooperation between them (Bonwell & Eison, 1991; Diaconu-Gherasim et al., 2019; Shih et al., 2010). Cooperative learning means doing something together by helping each other as a group or as a team (Ellis et al., 2020; Tadesse et al., 2020).

The STAD type cooperative learning model is a cooperative learning model that focuses on student group work in the form of small groups. This STAD model is a cooperative learning model where students learn in small groups of four heterogeneously and students work together in positive interdependence, and are responsible independently. Each team member uses academic worksheets (student worksheets) then helps each other to master the teaching materials through question and answer or discussion between team members individually or in teams, every week or two an evaluation is held to determine their academic mastery. material that has been studied. studied. Each student and each team is given a score for mastery of the teaching material, and individual students or teams who achieve high achievements or get perfect scores are given awards. Sometimes some or all teams get an award, if they are able to achieve certain criteria or standards (Shih et al., 2010; Ukkonen-Mikkola & Varpanen, 2020). Interaction occurs as long as they study

together and give each other opinions that make all students excited in completing the given task (Suryanto et al., 2021; Webb et al., 2017).

STAD learning provides experience for students to be creative in completing a given task so as to make students excited to complete it (Markova et al., 2020; Gómez et al., 2019; Suryanto et al., 2021). The use of methods that are in accordance with the characteristics of students and the material being taught can increase students' interest in participating in learning. When students enjoy learning, the level of knowledge that is the goal of learning will be easily achieved (Anderson & Krathwohl, 2001). The use of STAD in practice is more attractive to elementary school students because they can learn while playing. Learning in Indonesia, especially elementary school students is still oriented to memorizing activities, so learning for elementary school students becomes boring (Degeng, 2013). When students are not interested in participating in learning activities, learning objectives become difficult to achieve, motivation to complete the assigned tasks decreases (Barnes, 2020; Grinfelde & Veliverronena, 2018; Tyng et al., 2017). Motivation as a form of encouragement from within and from outside a person which is indicated by their existence (Bandura, 1982; Brindley et al., 2009; Donelan & Kear, 2018).

Drives and needs; hopes and ideals; appreciation and respect (Cheon et al., 2020; Liu et al., 2011). Indicators of learning motivation are diligent in dealing with tasks (can work continuously for a long time, never stop before finishing), tenacious in facing difficulties (not giving up easily), showing interest in various problems, preferring to work independently, getting bored quickly. on routine tasks (mechanical things, just repetitive, so less creative), can stand their ground (if you believe in something), doesn't give up easily (Cheon et al., 2020; Ramadhani et al., 2019; Suryanto et al., 2020). There are six factors that influence learning motivation, namely: Attitude, Need, Stimulation, Affection, Competence, Reinforcement. Students who have high motivation in learning will show great interest and attention to the material provided by the teacher in a fun game model (Broadbent & Fuller-Tyszkiewicz, 2018). The purpose of the study was to reveal the application of the STAD model in science lessons and how it affects motivation and learning outcomes. The investigation also observes how motivation is formed and what influences so that students are motivated to learn. This study only focuses on student motivation in the application of the STAD learning model and how it affects the learning outcomes of science material.

METHODS

Study Design

The research design used in this study is a quasi-experimental design. Data were obtained from the pretest posttest control group not randomly (nonequivalent group pretest-posttest design). Quasi-experimental design is used because the background of the subject is different (Kowalski et al., 2020). The research design used in this study was a non-equivalent group pretest-posttest design. This design compares two groups, namely the experimental class and the control class. The research design can be seen in the following figure.

NR_1	O_1	X_1	O_2
NR_2	O_3	X_1	O_4

Figure 1. Research design

Description :
NR1 = The experimental group was not chosen randomly
NR2 = Control group not chosen randomly
O1&O3 = Pre test (experimental and control group before treatment).
X1&X1 = Treatment
O2&O4 = Post test (Experimental and control groups after treatment)

The experimental class is the class that is given treatment using the STAD learning model, while the control class is not treated with the STAD learning model but still uses the conventional/lecture model. Both the experimental class and the control class were taught using the same science material.

Research subject

The subjects of this study were students who took part in science learning in class IV SDK Nazari Bulude totaling 30 students consisting of two parallel classes, namely class IVA with 15 students and class IVB with 15 students with the application of the STAD learning model.

Research instruments

The instruments used in this study include: (1) tests, and (2) questionnaires. The instrument that the researcher uses is an instrument that is arranged based on a grid that has been made. The test was conducted to determine the learning outcomes that became the objectives of science learning and questionnaires were given to investigate students' motivation in participating in STAD learning.

Data Analysis

Statistical analysis to test the hypothesis is to use the technique of independent sample t-test with a significance level of 0.05 with the help of SPSS 23 for windows program. test used for significant differences in the post-test scores of the experimental and control groups.

RESULT AND DISCUSSION

The results of this research data obtained information about learning outcomes in the control class and experimental class explained the detailed value of each class, the descriptive statistical table of the research results is described in the table below.

Table 1. Descriptive statistics of learning outcomes

		Pre Test Control Class	Pre Test Experiment Class	Post Test Control Class	Post Test Experiment Class
N	Valid	15	15	15	15
	Missing	15	15	15	15
Mean		49.67	51.20	53.27	80.67
Median		46.00	47.00	50.00	80.00
Mode		42[a]	34[a]	38	75
Std. Deviation		17.839	15.848	17.140	7.037
Variance		318.238	251.171	293.781	49.524
Range		58	53	55	25
Minimum		22	22	30	70
Maximum		80	75	85	95

The statistical descriptive table above shows the scores obtained in the control class and the experimental class at the time of pre-test and post-test. The lowest score in the control class pretest was 22 and the highest score was 80. While in the final test in the control class the lowest score was 22 and the highest score was 80. The control class pretest average was 49.67 with a standard deviation of 17.839. And the average post-test control class is 51.20 with a standard deviation of 15,848.

In the experimental class, the lowest pre-test score was 30 and the highest score was 85. Meanwhile, the post-test score for the experimental class had the lowest score of 70 and the highest score of 95. The experimental class had an average of 53.27 with a standard deviation of 17,140. While the post-test average of the experimental class was 80.67 with a standard deviation of 7.037. If you look at the comparison of the size of the standard deviation between the control class and the experimental class on the learning outcome variables, it can be concluded that the larger the standard deviation, the smaller the effect, and vice versa. This confirms that the STAD cooperative learning model has more influence on learning outcomes than conventional learning. After obtaining post-test scores in the experimental class, students were grouped according to predetermined criteria. The results of grouping student scores during the post-test in the experimental class are as follows.

Table 2. Grouping of Post-Test Scores for Experimental Class Students

Student scores	Motivation Category	Amount
Bigger than 80	Very high/ Very Good	9
60 to 79	High/ Good	6
50 to 59	Low/ Less	0
Less than 49	Very Low/ Very Less	0

Table 2 explains that students who are categorized as having very high motivation in learning increase to 9 people. As for students who have high motivation with a score range of 60-79 totaling 6 people. And there are no students who fall into the category of low and very low motivation. Thus it can be concluded that student learning outcomes increased significantly after the use of the STAD type cooperative learning model. After explaining the detailed scores for each class, a descriptive statistical table of research results is described

in the table below.

Table 3. Descriptive statistics on learning outcomes

		Pre Test Control Class	Pre Test Experiment Class	Post Test Control Class	Post Test Experiment Class
N	Valid	15	15	15	15
	Missing	15	15	15	15
Mean		49.67	51.20	53.27	80.67
Median		46.00	47.00	50.00	80.00
Mode		42[a]	34[a]	38	75
Std. Deviation		17.839	15.848	17.140	7.037
Variance		318.238	251.171	293.781	49.524
Range		58	53	55	25
Minimum		22	22	30	70
Maximum		80	75	85	95

The statistical descriptive table above shows the score acquisition in the control class and the experimental class at the time of pre-test and post-test. The lowest score in the control class pre-test was 22 and the highest score was 80. While the post-test in the control class the lowest score was 22 and the highest score was 80. The average pre-test control class was 49.67 with a standard deviation of 17.839. And the average post-test control class is 51.20 with a standard deviation of 15,848. In the experimental class, the lowest score for the pre-test was 30 and the highest score was 85. Meanwhile, the post-test for the experimental class had the lowest score of 70 and the highest score of 95. The pre-test of the experimental class had an average of 53.27 with a standard deviation of 17,140. While the post-test average of the experimental class was 80.67 with a standard deviation of 7.037.

If you look at the comparison of the size of the standard deviation between the control class and the experimental class on the learning outcome variables, it can be concluded that the larger the standard deviation, the smaller the effect, and vice versa. This confirms that the STAD cooperative learning model has more influence on learning outcomes than conventional learning.

The effect of STAD type cooperative learning model on science learning motivation

Table 4. The effect of the STAD type cooperative learning model on learning motivation

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Post Tes Motivasi	Equal variances assumed	.326	.573	5.509	28	.000	19.667	3.570	26.980	26.980
	Equal variances not assumed			5.509	27.693	.000	19.667	3.570	12.350	26.983

Table 4 above shows the results of the comparison between the control class learning motivation and the experimental class learning motivation. Based on the Independent Samples Test output table in the "Equal variances assumed" section, the Sig value is known. (2-tailed) of 0.000 <0.05, so as the basis for decision making in the Independent Sample T-Test, it can be concluded that H0 is rejected and Ha is accepted. Thus, it can be concluded that there is a significant difference between the motivation of students who are taught using the conventional learning model (control class) and the motivation of students who are taught using the STAD Type Cooperative learning model.

Furthermore, from the output table above, it is known that t_{count} is 5.509 with a t_{table} value of 2.048, so it is found that 5.509>2.048 or $t_{count}>t_{table}$. So based on the basis of decision making through a comparison of the t_{count} and t_{table} values, it can be concluded that H0 is rejected and Ha is accepted, which means that there is a significant difference between the learning motivation of the control class using the conventional learning model and the learning motivation of the experimental class using the STAD learning model. So, it can be concluded that teaching science using the STAD learning model has a significant influence on student

motivation in class IV SDK Nazari Bulude.

The effect of the STAD type cooperative learning model on science learning outcomes

Table 5. The effect of the STAD learning model on science learning outcomes

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Nilai Post Tes	Equal variances assumed	16.187	.000	6.581	28	.000	29.467	4.477	20.295	38.638
	Equal variances not assumed			6.581	19.314	.000	29.467	4.477	20.106	38.827

Based on the Independent Samples Test output table in the "Equal variances assumption" section, the Sig value is known. (2-tailed) is 0.000 < 0.05, so as a basis for decision making in the Independent Sample T-Test it can be concluded that H0 is rejected and Ha is accepted. Thus, it can be concluded that there is a significant difference between student learning outcomes taught using the conventional learning model (control class) and student learning outcomes taught using the STAD learning model.

Furthermore, from table 5 above, it is known that t_{count} is 6.581. With a t_{table} value of 2.048, it was found that 6.581 > 2.048 or $t_{count} > t_{table}$. So based on the basis of decision making through a comparison of the values of t_{count} and t_{table}, it can be concluded that H0 is rejected and Ha is accepted, which means that there is a significant difference between the learning outcomes of the control class using conventional learning. learning model and experimental class learning outcomes using the STAD learning model. So it can be concluded that science learning with the STAD learning model has a significant effect on the learning outcomes of fourth grade students of SDK Nazari Bulude.

The effect of STAD Learning Model on Motivation and science learning outcomes

Table 6. The effect of STAD learning model on motivation and science learning outcomes

		Pre Test Control Class	Pre Test Experiment Class	Post Test Control Class	Post Test Experiment Class
N	Valid	15	15	15	15
	Missing	15	15	15	15
Mean		59.67	79.33	51.20	80.67
Median		58.00	77.00	47.00	80.00
Mode		50[a]	71	34[a]	75
Std. Deviation		9.248	10.279	15.848	7.037
Variance		85.524	105.667	251.171	49.524
Range		29	31	53	25
Minimum		50	66	22	70
Maximum		79	97	75	95

Table 6 shows the comparison of the standard deviation and the mean (mean) between the control class and the experimental class on the variables of learning motivation and learning outcomes. Here, the standard deviation is the statistical value used to determine how distributed the data in the sample is, as well as how close the individual data points are to the mean or mean of the sample values. A lower standard deviation will indicate a higher mean value. From the data processing of students' learning motivation in the control class and the experimental class, the standard deviation value in the control class was 9.248 with an average value of 59.67. While in the experimental class the standard deviation value is 10.279 with an average value of 79.33. The average value of motivation in the experimental class using the STAD cooperative learning model is higher than the average value of motivation in the control class using the conventional learning model. This means that the learning motivation of the experimental class which is applied by the STAD Type Cooperative learning model is higher than the learning motivation of the control class which uses the conventional learning model.

Table 7. Comparison of t-test results of motivational variables and learning outcomes

Independent Samples Test										
Levene's Test for Equality of Variances				t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Post Test Motivation	Equal variances assumed	.326	.573	5.509	28	.000	19.667	3.570	12.354	26.980
	Equal variances not assumed			5.509	27.693	.000	19.667	3.570	12.350	26.983
Post-test learning outcomes	Equal variances assumed	16.187	.000	6.581	28	.000	29.467	4.477	20.295	38.638
	Equal variances not assumed			6.581	19.314	.000	29.467	4.477	20.106	38.827

The effect of the STAD Type Cooperative learning model is strengthened by the comparison of the t-count results on the motivational variables and learning outcomes. The results of the t-count of learning motivation and learning outcomes with a significance level of 0.05 indicate that the STAD Type Cooperative learning model has an effect on increasing learning motivation and science learning outcomes for fourth grade students of SDK Nazari Bulude.

The effect of the STAD learning model on learning motivation

After conducting research in the control class and experimental class, the researcher compared the learning motivation of students who were taught by the conventional model (control class) and the learning motivation of students who were taught by the STAD learning model. From the results of research on the experimental class of SDK Nazari Bulude, it is known that students' learning motivation has increased. This can be proven by the results of the learning motivation questionnaire. For the pre-test, it is known that from 15 students in the experimental class, there are 10 students with low and very low motivation categories. While 5 people are included in the category of high and very high motivation. Collaborative learning cooperative methods increase students' interest and motivation during learning activities (Bandura, 1982; Barnes, 2020; Stevanović et al., 2021). Seeing these results, it can be said that the level of student motivation in the experimental class at the time of the pre-test was low. This is inversely proportional to the results of the categorization of students' motivation levels in the experimental class at the time of the post-test, where 9 students were found to be in the very high motivation level category and 6 students were in the very high category. high motivation category. So it can be said that with the STAD learning model students' learning motivation increases. So it can be concluded that the STAD learning model has a significant effect on students' learning motivation.

The level of influence of the STAD learning model can also be seen from the results of t_{count}, where from the research results obtained t_{count} of 5.509. The value of t_{count} here is greater than t-table 2.048. These results indicate that there is an influence between the STAD type cooperative learning model on students' learning motivation in Class IV SDK Nazari Bulude. The advantage of cooperative learning is that through cooperative learning it can develop students' abilities to test their own ideas and understanding, receive feedback (Ellis et al., 2020; Zacharia et al., 2011). In addition, there is an effect of cooperative learning model on motivation, because the STAD learning model contains factors that arouse students' learning motivation. "Student motivation arises because of the student's own interest in learning, motivation also arises due to student extrinsic factors, namely the amount obtained after studying, getting prizes, competition or competition in learning, ego-involution, evaluation results after learning and the praise given by the teacher to students. students who get the best scores (Prince, 2004; Suryanto et al., 2021).

The effect of STAD learning model on science learning outcomes

Based on the results of the research on the control class and the experimental class, the researcher compared the post-test results of the class that was taught with the conventional learning model and the class that was taught with the STAD learning model. The comparison results can be seen from the t test value of 6.581. When compared with the t_{table} value, it is 6.581 > 2.048, or $t_{count} > t_{table}$. And when viewed from the value of Sig. (2-tailed) then the result is 0.000. The significance value is less than 5% ($p < 0.05$), meaning that there is a significant difference between learning using the STAD Type Cooperative learning model and conventional learning models. Science learning if done with collaborative learning and providing opportunities to be directly involved in learning can improve creative skills (Jenkins et al., 2019; Suryanto et al., 2021; Wang & Nickerson, 2017). So it can be concluded that the STAD learning model has a significant effect on

science learning outcomes for fourth grade students of SDK Nazari Bulude.

The results of the research above are in line with the research conducted by Chandra Wilman in 2015 entitled "The Effect of the STAD Type Cooperative Learning Model on Civics Learning Outcomes for Fifth Grade Elementary School Students. This research is using experimental method. The form of research used is a quasi-experimental type of None equivalent Control Group Design. The population in this study was the fifth grade students of SD Negeri 17 Pontianak, totalling 58 students. The technique used in data collection is a measurement technique. The data collection tool used is a test with a written test type in the form of an objective as many as 20 questions. Based on data analysis using parametric statistical analysis techniques, the average student learning outcomes after being given treatment in the experimental class was 80.01. Based on the results of hypothesis testing, it was concluded that the STAD learning model had a significant effect on the learning outcomes of fifth graders. The learning model with games is preferred by elementary school students where the stages are very playful and this makes students enthusiastic to learn (Daniela, 2015; Zumbrunn et al., 2019).

The effect of the STAD learning model on science learning outcomes in grade IV SDK Nazari Bulude, can also be seen from the increase in scores during the post test. The results of the pre-test and post-test scores of the experimental class showed that at the time of the pre-test, from 15 students in the experimental class there was an average pre-test score of 53.27. After the implementation of the STAD learning model, a post-test was held and the average score of 15 students was 80.67. This means that there is an increase in learning outcomes by 51.43%. So from these results it can be concluded that the STAD learning model has a significant effect on science learning outcomes in class IV SDK Nazari Bulude. The learning outcomes are: "The process of changing behavior in students, which can be observed and measured in changes in knowledge, attitudes and skills (Darwin, 2011; Nemiro, 2021). Change can be interpreted as an improvement and development that is better than before, for example from not knowing to knowing, being rude to being polite and so on.

The effect of the STAD learning model on motivation and science learning outcomes

The results showed that there was a significant difference between the learning motivation of the control class using the conventional learning model and the learning motivation of the experimental class using the STAD learning model. Likewise, there is a significant difference between the science learning outcomes in the control class using the conventional learning model and the science learning outcomes in the experimental class using the STAD learning model. The selection of learning models needs to consider the characteristics of students as learning objects so that learning objectives can be achieved (Bandura, 1982; Cheon et al., 2020; Elliot & Moller, 2003). From the results of the study in the control class, the researchers obtained the results of a student learning motivation questionnaire at the time of the pre-test showing that from 15 students there were 4 people who had high and very high motivation levels, while 11 others were in the low and very low motivation level categories. After getting learning with conventional learning models, the results of the motivation questionnaire showed that of the 15 students in the control class, there were 7 students who were in the high motivation category and 8 students included in the very low motivation category. Many students experience boredom if learning is dominated by the teacher while students are busy reading, this causes the motivation to learn to decrease. (Donelan & Kear, 2018; Neroni et al., 2019; Suryanto et al., 2021). This shows that the conventional learning model has no effect on increasing students' learning motivation.

The level of motivation in the experimental class using the STAD learning model showed different results. This can be proven by the results of the learning motivation questionnaire. For the pre-test, it is known that from 15 students in the experimental class, there are 10 students with low and very low motivation categories. While 5 people are included in the category of high and very high motivation. After being given treatment, namely the application of the STAD learning model, it was found that 9 students were in the very high motivation level category and 6 students were in the high motivation level category. So it can be said that with the STAD learning model students' learning motivation increases. The involvement of students in learning with games is very good for increasing student motivation in participating in learning (Hulleman & Cordray, 2009; Xue & Churchill, 2019). So it can be concluded that the STAD Type Cooperative learning model has a significant effect on students' learning motivation.

For learning outcomes, there is also a difference between the learning outcomes of the control class using the conventional learning model and the learning outcomes of the experimental class applying the STAD learning model, (t-count = 6.581; this value is significant at a significance level of 0.05). The average score of science learning outcomes in the control class at the time of the pre-test was 49.67 and the average post-test score was 51.2. There was only an increase of 3.08%. Compared to the average science learning outcomes in the experimental class at the time of the pre-test was 53.27 and the average learning outcomes after the STAD learning model (post-test) was applied was 80.67. There was an increase of 51.43%. Increased

motivation can affect the level of understanding of students' knowledge related to learning materials, class situations and student characteristics that must be considered in preparing lesson plans (Aydın & Michou, 2019; Brindley et al., 2009; Wirthwein et al., 2019). The results of this study indicate that: First, the achievement motivation of students who study with STAD learning is significantly better than students who follow the conventional learning model (F= 79.790; p<0.05). Second, the science learning outcomes of students who were taught with STAD learning were significantly better than students who followed conventional learning models (F= 41.804; p<0.05). Third, simultaneously achievement motivation and science learning outcomes among students who follow the STAD Type Cooperative learning are significantly better than students who follow the conventional learning model.

Based on the analysis and discussion as described above, the following conclusions can be drawn: First, there are differences in science learning outcomes between students who follow the STAD learning model and students who study with the conventional learning model. Cooperative learning is preferred by elementary school students because they can learn together so that learning becomes fun (Adams et al., 2021; Bendall & Thompson, 2016; Borowski, 2021). Second, there are differences in the level of motivation between students who follow the STAD learning model and students who follow the conventional learning model. Third, there is an interaction effect between learning models and learning motivation on science learning outcomes for fourth grade students of SDK Nazari Bulude.

CONCLUSION

STAD learning model increases interaction during the learning process so that learning is more fun with games that are done in class. The STAD learning model improves science learning outcomes by increasing their enthusiasm in participating in learning. This cooperative learning can provide direct experience for students to work together in groups and complete tasks together. Learning motivation is also influenced by the use of learning models that involve all students to be directly involved in learning.

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