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Cooperative Abilities and Cognitive Learning Outcomes: Study Group Investigation on Life Cycle Topic

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ABSTRAK

Kemampuan kerjasama dan hasil belajar kognitif siswa di Kota Ambon masih rendah hal ini dibuktikan dengan hasil belajar IPA siswa. Solusi yang dapat dilakukan adalah menggunakan model-model pembelajaran yang dapat merangsang berkembangnya kemampuan kerjasama dan kognisi siswa, salah satunya adalah group investigation. Penelitian ini bertujuan untuk menganalisis hubungan antara kemampuan kerjasama dengan hasil belajar kognitif pada pembelajaran IPA dengan model kooperatif tipe GI. Tipe penelitian yang digunakan adalah korelasional dengan sampel sebanyak 50 orang. Instrumen pengumpulan data yang digunakan pada penelitian ini meliputi angket kemampuan kerjasama siswa, serta instrumen tes hasil belajar kognitif. Analisis data menggunakan regresi linier sederhana. Hasil penelitian menunjukkan bahwa besar hubungan antar kemampuan kerjasama dan hasil belajar kognitif siswa pada pembelajaran muatan IPA materi siklus makhluk hidup dengan model kooperatif tipe GI termasuk dalam kategori cukup. Terungkap juga sumbangan variabel kemampuan kerjasama terhadap hasil belajar kognitif menunjukan bahwa GI berkontribusi terhadap kemampuan kersama dan hasil belajar kogntif siswa.

ABSTRACT

The cooperative ability and cognitive learning outcomes of students in Ambon City still need to improve. The results of students learning science evidence this. The solution that can be done is to use learning models that can stimulate the development of students' cooperative and cognition abilities, one of which is group investigation. This study aims to analyze the relationship between cooperative abilities and cognitive learning outcomes in science learning with the GI cooperative model. The type of research used is correlational, with a sample of 50 people. The data collection instruments used in this study included questionnaires on students' collaboration abilities and cognitive learning outcomes test instruments—data analysis using simple linear regression. The results showed the sufficient category was the relationship between cooperative abilities and students' cognitive learning outcomes in science content learning the life cycle material with the Group Investigation type cooperative model. It was also revealed that the contribution of the cooperative ability variable to cognitive learning outcomes proves that GI contributes to students' cooperative abilities and cognitive learning outcomes.

1. INTRODUCTION

Science education is rare among students. Students are less interested in learning science and less motivated by science subjects. These things are due to traditional learning concepts that teachers still apply, so students do not become smart and fast in learning (Haleem et al., 2022; Jones & Burrell, 2022; Stuckey et al., 2013). Inappropriate science learning produces gaps and creates poor learning outcomes. In practice, it is common for students to be required to discuss and work together to understand better the concepts contained in science learning (Hsiao et al., 2017; Imanuel, 2015). Science learning outcomes are not solely based on what is presented by the teacher but on the child's learning process, which is influenced by the interaction between the various information that the child receives and how the child processes this information with the knowledge he has previously possessed (Lodge et al., 2018; Taber, 2018). In the science learning process, many activities require students to achieve a basic competition, whether these activities are carried out individually or in groups.

Learning is a multi-directional interaction between students and students, students and teachers, and learning resources in a systematic and programmed learning environment that can help individuals learn to achieve goals (Buchs et al., 2017). The demands of 21st-century education emphasize students' abilities to think critically and analytically, think creatively and innovatively, communicate, and collaborate (Bayley, 2022; Hadkaew & Liewkongsthaporn, 2016). Through group learning, students are accustomed to

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practicing working together in teams to achieve success at school and in the community (Candia et al., 2022; Liebech-Lien, 2021). Studying in groups is not only limited to completing assignments given by the teacher but there is a more important process when students complete their group assignments by working together so that the portion of the assignment is balanced and no one feels burdened (Fenanlampir et al., 2021; Segundo-Marcos et al., 2022). Cooperation is an interactive process between people who need each other to achieve the same goals and interests. Collaboration is the synergy of the strength of several people in achieving a desired goal (Alsubaie, 2022; Huang et al., 2017).

Facts related to the cooperative ability of elementary school students learning outcomes need serious attention. Several conditions were recorded that could have been more effective, including first, some students wanted to get attention and even more attention from the teacher or their group mates. Second, there needs to be more concern among fellow students. Third, some students feel insecure/ashamed of working with their group mates due to differences between those who are capable and some who are unable. As a result of weak cooperation among students when working in groups, cognitive learning outcomes also decrease. Especially during the Covid-19 pandemic, student learning hours in class were reduced when studying online or offline. The cooperation needed in this case does not mean students are unable to do school work independently, but activities that lead to students' ability to complete a portion of problem-solving responsibly and form independence in certain activities (Hsu, 2021; Wen & Walters, 2022). To direct students' abilities in collaboration, a learning model is needed that emphasizes cooperative activities and increases cognitive learning outcomes (Albus et al., 2021; Tuaputty, 2021).

The Group Investigation (GI) cooperative learning model can create a social learning environment for honing students' cooperative skills. Students are trained to work together to pursue their investigative assignments. In this model, students are organized into groups to carry out small investigations and cooperate in planning science projects, carrying out investigations, presenting findings, and evaluating their learning (Damini, 2014; Sugiharto, 2020; Tan et al., 2007). When Group Investigation is applied, the class becomes a community of inquiry, and each student is an investigator who coordinates their investigations with the class members. Therefore, Group Investigation is well suited for science lessons that aim to engage students in honing cooperative skills during scientific inquiry practice and encourage them to contribute to overall learning. In addition, Group Investigation also helps students to develop their cognitive abilities because it involves higher-order thinking tasks such as identifying information that is relevant to their research topic, applying new knowledge in solving problems, using conclusions to formulate answers, and evaluating investigations of other people's performances (Abbas et al., 2023; Sharan & Sharan, 1990). According to previous research, students' positive attitudes toward learning science increased as students studied science using Group Investigation on many occasions (Doymus et al., 2008), especially if the topics discussed in the learning activities were relevant to students' everyday experiences.

Science learning in elementary schools is more oriented towards cognitive learning outcomes and pays less attention to affective and other psychomotor aspects. Several research reports indicate that learning models can potentially achieve cognitive learning outcomes in science content (Anja et al., 2023; Batlolona et al., 2020; Lamb et al., 2022). The learning model that has the potential to affect students' cognitive learning outcomes is the Group Investigation cooperative learning model. The results of studies examining the effect of this model on students' cooperative abilities and cognitive learning outcomes are also reported separately. It is proven that Group Investigation can improve students' science cognitive learning outcomes by 62.2 (Abbas et al., 2023). Besides that, the potential of Group Investigations on the ability to cooperate has also been studied in several studies. One study reported that Group Investigations were more effective in increasing students' collaborative skills, as seen from the average cooperative ability in the application of the Group Investigations learning model, which was very good (Damini, 2014; Suhartono et al., 2019)

The potential of Group Investigation on cooperative abilities and cognitive learning outcomes in science learning in elementary schools has yet to be widely disclosed. Even though this is important to provide information on the contribution of cooperative skills to cognitive learning outcomes that are useful in science learning practices with this model, suppose the contribution of the ability to cooperate to cognitive learning outcomes exists. In that case, the teacher can easily practice this in science learning so that once learning can reach various learning targets. Therefore, research was carried out with the hope that the implementation of Group Investigation could significantly impact students' cooperative abilities and cognitive learning outcomes so that the relationship and contribution of Group Investigation to work skills and cognitive learning outcomes were revealed through Group Investigation. Thus, this study aimed to analyze the relationship between the ability of cooperation with cognitive learning outcomes in science learning with the Group Investigation type cooperative model.

2. METHOD

With the Group Investigation cooperative learning model, this correlational study aims to reveal the relationship between cognitive learning outcomes and students' cooperative abilities in elementary schools in science learning. Cognitive learning outcomes are predictor or dependent variables, and students' cooperative abilities are criterion or independent. The population in this study were all fourth-grade students at SD Negeri 37 Ambon, totaling 52 people. The sample in this study is the entire population. Data collection techniques used in this study include test and non-test techniques. Test techniques are carried out to obtain information about cognitive learning outcomes. The test was conducted as posttest—non-test techniques by completing questionnaires to obtain data on students' cooperative abilities. In addition, observations were also made. The science material being taught is the life cycle, with the meeting duration in class four times.

Observation or observation is a way to get information by observing objects in a random and planned manner. Observation techniques aim to collect data, references, events, actions, and processes being carried out in research. The observations made in this classroom action research were in the form of observing and recording the entire learning process. Observations were made to determine students' preparation, attention, activeness, and ability to collaborate in learning science with Group Investigation. The data collection instruments used in this study included questionnaires on students' collaboration abilities and cognitive learning outcomes test instruments. The collaboration ability questionnaire consists of 32 statement items developed from indicators of mutual contribution (10 statement items), joint responsibility in completing work (6 question items), respecting individual opinions (7 statement items), being in a workgroup during ongoing activities (6 statement items), and complete assignments on time (3 statement items). The validity and reliability of the cooperation ability questionnaire after being tested were 0.63 and 0.95, respectively.

The researcher developed the cognitive learning outcomes test instrument according to the scope of the animal cycle material being taught. The indicators of cognitive learning outcomes that are measured are C1-C4 using the form of PG questions and essays. Before the cooperative ability questionnaire instrument and cognitive learning outcome test were used in the pretest and posttest, test items were tested to obtain information about the validity and reliability of the instrument. The data analysis technique used to test the research hypothesis that there is a relationship between cooperative abilities and cognitive learning outcomes is a linear regression with the SPSS 16.00 for the Windows program. Descriptive data were also analyzed using descriptive statistics.

3. RESULT AND DISCUSSION

Result

The prerequisite test occurs when the data is on an interval or ratio scale. Therefore, data on ordinal scale cooperation ability is transformed using MSI as an interval scale. Before the research data was analyzed using linear regression with the SPSS 16.00 for Windows program, a prerequisite test was carried out as a normality test. This test was conducted to determine the results of obtaining sample scores from populations with a normal distribution. The normality test is a preliminary analysis and a prerequisite for whether a statistical analysis technique can test hypotheses using residual data (Ghasemi & Zahediasl, 2012). The data obtained will be analyzed first with the normality test using the Kolmogorov-Smirnov and Shapiro-Wilk tests. The results of the analysis of the normality test using the Kolmogorov-Smirnov Test and Shapiro Wilk, respectively, are 0.200 and 0.720, which means that the data is normally distributed.

Another prerequisite test is linearity based on the Scatterplot graph. It can be seen that there is a pseudo-linear line that can be formed in the Scatterplot shown in Figure 1. Based on the linearity scatterplot test results of cooperative abilities and cognitive learning outcomes, it can be seen that not all of the dots are spread from the bottom left to the top right. The location of these dots seems unbalanced, so some converge to the upper right line because an increase in the score for cooperation ability is only sometimes followed by an increase in cognitive learning outcomes score data. It shows that the linearity requirements between the two variables still need to be fulfilled. Thus, the results of cooperative abilities and cognitive learning outcomes can be stated to lack a linear relationship.

Another requirement of the linear regression test is homoscedasticity. The Scatterplot graph shows that the data points and their distribution do not form a specific pattern. In addition, it can be seen that the data points gather more than just above or below. The results of the homoscedasticity scatterplot analysis of the data showed that the prerequisite test results found that the data normality and homoscedasticity tests were fulfilled. In contrast, the reliability test still needs to be fulfilled. Thus proceed to hypothesis testing. The correlational research hypothesis is that there is a linear relationship between the ability of cooperation with cognitive learning outcomes in learning using the Group Investigation cooperative model.

Whether there is a relationship between cooperative abilities and cognitive learning outcomes of fourth-grade students in science learning content with the Group Investigation type cooperative model can be seen in Table 1.

Table 1. ANOVA Relationship between Cooperation Ability and Cognitive Learning Outcomes

Model			df	Mean Square	F	Sig.
1	Regression	2079.064	1	2079.064	6.052	0.018
	Residual	16490.936	48	343.561		
	Total	18570.000	49			

Simple linear regression was carried out to predict the cognitive learning outcomes of elementary students based on cooperative ability scores. There is a significant regression equation. It is found that [F(1.48)=6.052 p<0.018], with an R2 of 0.112. The significance score is smaller than the alpha score (0.05), so it is also concluded that the alternative hypothesis (Ha) is accepted, meaning that there is a relationship between cooperative abilities and cognitive learning outcomes through science learning with GI with a correlation coefficient score of 0.335 (sufficient category). In addition, important information is also obtained that the variable of cooperative ability can significantly predict cognitive learning outcomes. The contribution of the cooperative ability variable to cognitive learning outcomes is 11.2%. The regression equation is also revealed through the relationship between the two variables, as shown in Table 2.

Table 2. Regression Equation Test Results for the Relationship of Cooperation Ability and Cognitive Learning Outcomes

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-13.147	32.524		-0.404	0.688
	Collaborative ability	0.788	0.320	0.335	2.460	0.018

Table 2 reveals that cognitive learning outcomes can be predicted using the regression equation y = - 13.147 + 0.788x. The regression coefficient (b = 0.788) indicates that an increase in the score of cooperation ability by 1 point will increase the score of cognitive learning outcomes by 0.788.

Discussion

The study's results prove that cooperation can be used to predict students' cognitive learning outcomes. In other words, the ability to cooperate significantly correlates with cognitive learning outcomes in learning the natural science content of life cycle material using the group investigation (GI) learning model. The magnitude of the relationship between these two variables is 0.335, which is in the sufficient category. In addition, it was also revealed that the contribution of the cooperative ability variable to cognitive learning outcomes was 11.2%. The results of this study indicate that group investigation cooperative learning can continue to be used to foster cooperative abilities and cognitive learning outcomes of students.

Group Investigation is a type of cooperative learning where this model aims to encourage students to collaborate actively. Collaboration is carried out on the awareness that each student needs other people in learning. Other people, including peers, are important in exchanging ideas, contributing ideas, and building cohesiveness in achieving common and group goals. In this case, it is interpreted that cooperative learning through Group Investigation creates an intimate, harmonious, and open, cooperative relationship in the learning process, thus triggering an increase in student learning outcomes (Kazeni et al., 2018; Zubaidah et al., 2018). The results of this study indicate that the relationship between the two variables is linear, where if the ability to cooperate increases, the student's cognitive learning outcomes also increase or vice versa. Cooperative learning is useful in encouraging students to learn from one another. This process teaches students tolerance and respect for others so they strive to achieve and build more positivity and support. Working in groups during Group Investigation lessons helps to increase the sense of belonging in the classroom environment or among peers. As a result, students use this forum to express their ideas or ideas while discussing and completing group assignments to develop interpersonal skills (Healy et al., 2018; Merintika. L et al., 2021). The point is that in this learning, students experience more of how to work

together than just learning from cooperation. This positive thing encourages a relationship between the ability of cooperation with cognitive learning outcomes in Group Investigation cooperative learning.

In cooperative learning Group Investigation, each group wants the best learning outcomes. The group with the best learning outcomes shows an active learning experience, leading to the best learning outcomes. Learning implemented with the Group Investigation type can encourage deeper learning, positive social interaction, and the development of skills that are important for the future, as with other types of cooperative learning. Learning through Group Investigation can encourage interpersonal skills through group collaboration activities in investigations (Aini et al., 2018; Baer, 2003). Deep learning is done to master the concepts the teacher gives, not just memorizing, but students are trained to think at a higher level, for example, by analyzing something. Each question that is given to be worked on in a group requires analysis which, of course, can work well if there is a cooperation between group members to remind each other, look for each other, and formulate solutions to each other's tasks.

In cooperative learning type Group Investigation, students can choose to plan what is learned and investigated. Students are formed in small groups heterogeneously, and each group is assigned a different project. Collaboration in learning is certainly very influential in teaching and learning activities in the classroom (Asmi et al., 2018; Suprihatin., 2015). Because cooperation refers to mutual trust, support, open communication, accepting conflict as a natural thing, and mutual respect's differences. Previous research argues that cooperation is an activity in which groups work on and complete a task together. In this collaboration, group interaction usually occurs and has the same goals to be achieved together (Castañer & Oliveira, 2020). From this understanding, cooperation is the desire to work together with other people and be part of a group in solving a problem. Therefore it needs to be planted and built-in students to be better at participating in learning in working groups, not being selfish, and helping each other when there are friends who have difficulty learning.

Students' cooperative abilities also contribute to cognitive learning outcomes. The existence of good and unselfish learning collaboration with fellow friends will help the learning process become easier and more enjoyable. High enthusiasm in participating in learning and attention during learning will strengthen cooperation abilities so that it will have an increasing impact on learning outcomes. Therefore, improving good learning outcomes can be done by increasing and cultivating a good and unselfish cooperative learning attitude (Baker, 2015; Tan et al., 2007). So that students can follow the learning well to obtain good learning outcomes as well. Because students can understand the material, they are studying properly and correctly. Therefore student cooperation is a factor that contributes to student cognitive learning outcomes. So student cooperation certainly plays an important role in improving student learning outcomes.

The implications of this study provide an overview of the implementation of group investigations on students' cooperative abilities and cognitive learning outcomes on the life cycle topic. This research will be very useful for teachers, especially those who want to emphasize cooperation and improve students' cognitive learning outcomes. This research is still limited to the scope of research, which only examines life cycle topics and involves students in only one school. Therefore, it is hoped that future research will deepen and broaden the scope of research related to group investigation.

4. CONCLUSION

Based on data analysis and research results, cooperative abilities can be used to predict student learning outcomes in science learning with Group Investigation. The relationship between the two variables is in the moderate category, and there is little contribution to the ability of cooperation to the science learning outcomes of elementary school students. Based on the results of this study, it can be suggested that teachers develop learning with Group Investigation properly according to the correct syntax. Furthermore, it is necessary to examine other factors that influence the relationship between the two variables, the cooperation ability and cognitive learning outcomes of students at other educational levels.

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