Jurnal Mimbar Ilmu
Volume 28, Number 3, 2023, pp. 515-522
P-ISSN: 1829-877X E-ISSN: 2685-9033
Open Access: https://doi.org/10.23887/mi.v28i3.65168

Improving Students' Collaboration Ability and Scientific Literacy through the Group Investigation Type Cooperative Learning Model

Kadek Sonia Prayoga[1*], I Ketut Gading[2]

[1,2] Jurusan Pendidikan Dasar, Universitas Pendidikan Ganesha, Singaraja, Indonesia

ARTICLE INFO

Article history:
Received July 04, 2023
Revised July 11, 2023
Accepted November 30, 2023
Available online December 25, 2023

Kata Kunci:
Investigasi Kelompok, Kolaborasi dan Literasi Sains

Keywords:
Group Investigation (GI), Collaboration Skills and Scientific Literacy

ABSTRAK

Banyak faktor yang mempengaruhi literasi sains, diantaranya adalah kurangnya keaktifan dan minat membaca siswa dalam proses pembelajaran. Berdasarkan observasi diketahui bahwa kemampuan kolaborasi siswa masih perlu ditingkatkan, dengan persentase 60% belum memahami kolaborasi. Hal ini disebabkan siswa kurang aktif dalam berkomunikasi dan berinteraksi, sehingga model pembelajaran yang diterapkan guru perlu lebih kreatif dan inovatif. Penelitian ini menguji pengaruh model pembelajaran kooperatif tipe Group Investigation (GI) terhadap kemampuan kolaborasi dan literasi sains siswa kelas V Sekolah Dasar. Jenis penelitian yang dilakukan adalah penelitian eksperimen, dengan desain nonequivalent pre-test and post-test control group design. Populasi penelitian ini adalah 133 siswa. Sampel dalam penelitian ini melibatkan 19 siswa pada kelas eksperimen dan 18 siswa pada kelas kontrol. Data kemampuan kolaborasi dikumpulkan dengan menggunakan instrumen angket dan instrumen tes berupa soal objektif literasi sains. Selanjutnya data dianalisis menggunakan teknik statistik deskriptif dan inferensial (uji t dan Manova). Berdasarkan analisis uji-t ditemukan bahwa secara simultan model pembelajaran kooperatif tipe GI berpengaruh terhadap kemampuan kolaborasi dan literasi sains siswa. Berdasarkan analisis deskriptif, rata-rata skor kelompok eksperimen lebih signifikan dibandingkan rata-rata skor kelompok kontrol. Model pembelajaran kooperatif tipe GI berpengaruh terhadap kemampuan kolaborasi dan literasi sains.

ABSTRACT

Many factors influence scientific literacy, including students' lack of activeness and interest in reading in the learning process. Based on the observations, it was found that students' collaboration abilities still needed to be higher, with a percentage of 60% not understanding collaboration. This is because students are less active in communicating and interacting, and the learning model applied by teachers needs to be more creative and innovative. This research examines the effect of the Group Investigation (GI) type cooperative learning model on the collaboration abilities and scientific literacy of fifth-grade elementary school students. The type of research carried out was experimental research, with a nonequivalent pre-test and post-test control group design. The population of this study was 133 students. The sample in this study involved 19 students in the experimental class and 18 students in the control class. Collaboration ability data was collected using questionnaire instruments and test instruments in the form of objective questions for scientific literacy. Next, the data was analyzed using descriptive and inferential statistical techniques (t-test and Manova). Based on the t-test analysis, it was found that simultaneously, the GI-type cooperative learning model influenced students' collaboration abilities and scientific literacy. Based on descriptive analysis, the average score of the experimental group was more significant than the average score of the control group. The GI type cooperative learning model influences collaboration skills and scientific literacy.

1. INTRODUCTION

Education is a form of conscious and planned effort, which is carried out to develop various skills in life. In the implementation of education, students are not only taught about various scientific concepts,

Corresponding author
*E-mail addresses: prayogasoni0@gmail.com (Kadek Sonia Prayoga)

but also taught various social skills, with the aim that students can blend in well in the community environment (Jalmo et al., 2019; Mawaddah et al., 2022). One form of skill taught in the educational process is collaboration skills, where collaboration skills are related to the process of communicating and working with group members (Hakim, 2020; Tekad & Pebriana, 2022). Collaboration ability can be said to be the skill of working together to complete tasks as a group (Dewi & Parmiti, 2022; Hutama et al., 2019). In developing collaboration skills, students are challenged to be able to develop sharing ideas, express their own thoughts, and be actively involved in discussions (Ariyanto & Muslim, 2019; Wati, 2022). Then the activity that the teacher must carry out in the collaboration process is to arrange the learning situation. The most important element in structuring a collaborative learning situation is designing an appropriate learning task to actively engage students (Aldriani et al., 2021; Putra et al., 2019). In group activities, as one of the collaboration skills possessed by students, it is hoped that they can improve their mental and communication abilities at a higher level (Hutama et al., 2019). Collaboration skills developed in students will be able to increase mental abilities to an even higher level (Hutama et al., 2019; Ulhusna et al., 2020).

Collaboration skills can help students to gain other competencies, such as scientific literacy competencies (Ulhusna et al., 2020). Collaboration skills and scientific literacy are both interrelated, where collaboration skills are very important for every student to have, whether in learning activities, practicums or activities outside the classroom. This activity is very important because students can find scientific knowledge in accordance with simple facts, and can use their scientific knowledge in solving problems and drawing conclusions (Alfaeni et al., 2022; Oktaviani, 2022). This means that through collaboration scientific literacy can be achieved. Scientific literacy refers to students' ability to identify, obtain, explain and draw conclusions from various existing problems. So this shows that literacy skills do not only focus on developing reading and writing abilities, but also involve thinking skills which make them a generation of literature in science learning (Kristyowati & Purwanto, 2019; Rohmaya, 2022). Scientific literacy is a very important ability to solve scientific problems personally and socially, so scientific literacy skills are very important for students to train and develop because they are related to the benefits obtained for the scientific community and the country as well as improving individual lives (Harahap et al., 2022; Syaifa et al., 2023; Wati, 2022).

However, the reality on the ground shows that not all students have good collaboration and literacy skills, this is because there are many factors that influence scientific literacy, such as the lack of student activity and interest in reading in the learning process. This is due to learning models that are less creative and innovative (Amir et al., 2021; Sari et al., 2017). Factors causing low scientific literacy are students' lack of reading and students being less active in asking questions. However, in reality, students tend to get bored while studying, so an understanding of the learning models that can be used by teachers is needed so that students are interested in learning. However, the facts on the ground show that the application of learning models in the classroom learning process is still not effective and not appropriate. This is in accordance with the results of observations and interviews with teachers, it was found that students' collaboration abilities were still relatively low with a percentage of 60% not understanding collaboration. This is because students are less active in communicating and interacting, and the learning model applied by teachers is less creative and innovative. The learning model applied is still conventional, which only involves learning to repeat and memorize lessons, so it cannot improve students' collaboration abilities. Apart from that, it was found that scientific literacy was still relatively low with a percentage of 70% not having scientific literacy. This is caused by several factors, such as students not being used to solving scientific literacy-based questions, because students are used to memorizing material rather than understanding learning material. Students also find it difficult to understand the material and apply it in everyday life. Students tend not to like answering questions in descriptive form and prefer to answer in multiple choice form, because students are not yet able to use their reasoning in depth.

Problems that arise in the process of developing collaboration skills and scientific literacy, if left unchecked, will have an impact on reducing students' abilities in the learning process. One effort that can be made to overcome this problem is by implementing a group investigation type cooperative learning model. The GI type cooperative learning model is group-based learning that provides opportunities for students to be able to discuss, think critically, and be responsible for the learning they do (Petriza & Eliyasni, 2020; Ratunguri et al., 2022; Sumertha, 2019). This learning model begins with identifying topics and dividing groups, planning tasks to be studied, carrying out investigations, preparing final reports, presenting final results, and carrying out evaluations (Ariyanto & Muslim, 2019; Buaton et al., 2021; Harepa & Simamora, 2021). In addition, the GI type learning model can increase student activity in their groups and can develop the ability to actively grow their own knowledge, so that knowledge can be developed within the group of students (Nurdin, 2021; Rusdiana & Sucipto, 2018).

Several previous studies have revealed that the group investigation learning model assisted by flash card media significantly influences students' science knowledge competency (Lengari et al., 2020).

The results of other research reveal that the group investigation type cooperative learning model influences student learning outcomes in thematic learning in elementary schools (Buaton et al., 2021). The results of subsequent research revealed that the Tri Hita Karana-based group investigation learning model significantly influenced science knowledge competency (Widiartini et al., 2019). Based on several research results, it can be said that the group investigation learning model has a positive effect on improving student learning outcomes. It's just that in previous research, there have been no studies that specifically discuss the analysis of increasing students' collaboration skills and scientific literacy through the group investigation type cooperative learning model. So this research focuses on this study with the aim of testing the effect of the Group Investigation (GI) type cooperative learning model on the collaboration abilities and scientific literacy of fifth grade elementary school students.

2. METHOD

This research is classified as quantitative research with an experimental type. This research design follows the basic design pattern with a Nonequivalent Pretest Post-Test Control Group Design. The population in this study involved 133 fifth grade elementary school students. The condition for drawing lots to determine the sample is that the population must be equal. The equality test was carried out using Anova. The data used in carrying out the equality test is the value of students' collaboration abilities and scientific literacy (science knowledge). The sampling technique in this research is random sampling. Random class sampling is a technique for obtaining samples at random, in this technique all subjects are considered the same. A sample of 19 students was obtained from the experimental group and 18 students from the control group. Data collection in this research was carried out using questionnaires and tests, with research instruments in the form of questionnaires and multiple choice tests. In more detail the research instrument grid can be seen in Table 1 and Table 2.

Table 1. The Collaboration Ability Questionnaire Instrument Grid

No	Dimensions	Indicator	Number of Items
1	Cooperation	Work together with diverse group members in solving problems found in the group.	2
2	Responsibility	Take the initiative to organize yourself in groups to work on tasks together.	4
		Each group member is involved in carrying out the assigned task.	2
3	Communication	Able to discuss the problems they face with each other so that an agreement is reached.	2
		Pay full attention to what is being heard.	2
4	Compromise	Efforts to reach agreement on the problem being solved.	2
		Involvement of group members in conducting discussions to make joint decisions.	2
5	Flexibility	Complete group assignments on time	2
		Adapt to each group member to solve problems.	2

Table 2. The Multiple Choice Test Instrument Grid

Dimensions	Sub Dimensions	Basic Competencies	Learning Indicators	Question Indicator	Question Item Number
Knowledge of science	Analyzing concepts to be able to understand certain truths	Analyze the effect of heat on changes in temperature and shape of objects in everyday life	Analyze the properties of objects (solid, liquid and gas) in everyday life	Analyze the shape of objects based on statements about the properties of solid, liquid and gas objects	1, 2, 5
	Examining hypotheses related to scientific method	Analyze the effect of heat on changes in temperature and shape of objects	Analyze changes in the states of solid, liquid and gas in everyday life	Choose a hypothesis about changes in the form of objects	3, 4, 6, 8

Dimensions	Sub Dimensions	Basic Competencies	Learning Indicators	Question Indicator	Question Item Number
	procedures	in everyday life			
	Analyze facts, concepts, and laws related to events in life	Analyze the effect of heat on changes in temperature and shape of objects in everyday life	Analyze the effect of heat on changes in temperature and shape of objects in everyday life	Examining facts, concepts, laws and theories related to changes in the temperature of objects which are influenced by heat in life	7, 9, 10

The collaboration ability and scientific literacy data obtained were then analyzed using descriptive statistics and inferential statistics. Descriptive statistics functions to group data, process and present processed results. Descriptive analysis functions to determine the level of collaboration and scientific literacy abilities of students who are taught using the GI type cooperative model. Meanwhile, inferential statistics functions to generalize the results of research conducted on samples to the population. Inferential statistics is used to test hypotheses through the t-test and Manova test which begins with prerequisite analysis, namely normality, homogeneity and variance-covariance matrix homogeneity tests. However, before carrying out the t-test, first look for the normalized score gain from the pre-test and post-test results for each class.

3. RESULT AND DISCUSSION

Result

Hypothesis testing in this research uses inferential statistics with the t-test and Manova test to test the hypothesis. Before testing the hypothesis, you must carry out prerequisite tests including normality tests, homogeneity of variance, and homogeneity of the variance-covariance matrix, which can be described as in Table 3.

Table 3. The Recapitulation of Normality Test Results

Tests of Normality				
	Class	Kolmogorov-Smirnov		
		Statistics	df	Sig.
Collaboration Capabilities	Pre-Test Experimental Group	0.195	19	0.055
	Post-Test Experimental Group	0.190	19	0.071
	Pre-Test Control Group	0.141	17	0.200
	Post-Test Control Group	0.150	17	0.200
Scientific Literacy	Pre-Test Experimental Group	0.163	19	0.200
	Post-Test Experimental Group	0.173	19	0.138
	Pre-Test Control Group	0.198	17	0.074
	Post-Test Control Group	0.179	17	0.149

The normality test data in table 3 shows that the significant value (sig) for all data is good, namely with a significance level in the Kolmogorov-Smirnov test > 0.05. This means that the distribution of data on students' collaboration abilities and scientific literacy in the experimental group and control group is normally distributed. After obtaining the normality test results, the research then continued with the homogeneity test, as in Table 4.

Table 4. The Recapitulation of Variance Homogeneity Test Results

		Levene Statistics	df1	df2	Sig.
Collaboration Capabilities	Based on Mean	2,929	1	34	0.096
Scientific Literacy	Based on Mean	0.257	1	34	0.615

Based on the results of the homogeneity of variance test above, it can be seen that the significant value (sig) is 0.096 for collaboration ability and 0.615 for scientific literacy. This significant value is greater than 0.05, so it can be stated that the variance between the experimental class and the control class is homogeneous. From testing the Homogeneity of the Variance-Covariance Matrix with the Box's M Statistical Test, it can be seen that the significant value (sig) is 0.170 > 0.05. Thus, it can be stated that the data on collaboration abilities and scientific literacy in the experimental and control classes are homogeneous. So that all prerequisites are met and hypothesis testing can be continued. The first hypothesis test is related to the GI type cooperative learning model which influences the collaboration ability of fifth grade elementary school students. The significant value of collaboration ability in the Equal variances assumed column is 0.000 and is smaller than 0.05, so it can be stated that the null hypothesis (H_0) is rejected and hypothesis H_1 is accepted. Thus, it can be concluded that there is an influence of the GI type cooperative learning model on the collaboration abilities of fifth grade elementary school students.

The second hypothesis testing is related to the GI type cooperative learning model which has an effect on the scientific literacy of fifth grade elementary school students. Obtaining a significant value of scientific literacy in the Equal variances assumed column is 0.000 and is smaller than 0.05, so it can be stated that the null hypothesis (H_0) is rejected and hypothesis H1 is accepted. Thus, it can be concluded that there is an influence of the GI type cooperative learning model on the scientific literacy of fifth grade elementary school students. Testing the third hypothesis related to the GI type cooperative learning model having a simultaneous effect on the collaboration abilities and scientific literacy of fifth grade elementary school students, obtained a significant value for Pillai's Trace Wilks' Lambda Hotelling's Trace Roy's Largest Root of 0.000 and smaller than 0.05. This means that it can be stated that the null hypothesis (H_0) is rejected and H1 is accepted. Thus, it can be concluded that simultaneously, there is an influence of the GI type cooperative learning model on the collaboration abilities and scientific literacy of fifth grade elementary school students.

Discussion

Based on the results of the research conducted, it was found that there was an influence of the GI type cooperative learning model on the collaboration abilities of class V students. This was because the sig.(2-tailed) value obtained was 0.000 < 0.05. Next, the second result was obtained, namely that there was an influence of the GI type cooperative learning model on the scientific literacy of class V students. This was because the sig (2-tailed) value obtained was 0.000 < 0.05. The third result is that there is a simultaneous influence of the GI type cooperative learning model on the collaboration abilities and scientific literacy of class V students. This is because the sig (2-tailed) value obtained is 0.000 < 0.05. In addition, based on the data obtained from the N-gain score in percentage form, it can be said that the GI type cooperative learning model is effectively applied compared to the conventional model which is not effectively applied. The effectiveness of the GI type cooperative learning model on students' collaboration abilities and scientific literacy is because teachers can directly train students to be more actively involved in the learning process in class (Arinda et al., 2019; Pratami et al., 2019). Apart from that, the application of this model is also able to train students to have good communication skills, and there is motivation that encourages students to be active in the learning process from the first stage to the final stage in learning (Buaton et al., 2021; Pahrurrozi, 2019). This then shows that the use of the GI learning model in the learning process in elementary schools will be more enjoyable because students are required to be able to play an active role in every activity in their group (Lengari et al., 2020; Petriza & Eliyasni, 2020). The GI type cooperative learning model is able to invite students to investigate a problem in groups and be directly actively involved in learning activities, so that student learning activities increase to the active category (Ariyanto & Muslim, 2019; Harepa & Simamora, 2021).

The application of the GI type cooperative learning model in the learning process requires students to have better abilities in communicating and in group process skills. This is because when studying in groups students carry out investigations, so that from investigative activities students actively ask questions and work together with their group friends to be able to solve the problems given (Petriza & Eliyasni, 2020; Ratunguri et al., 2022; Sumertha, 2019). Actively asking questions and working together in groups is something that can improve students' communication skills (Nurdin, 2021; Rusdiana & Sucipto, 2018). Apart from that, in GI type cooperative learning, students participate in activities from the beginning to the end of the learning in groups, so that students can know and experience for themselves how the GI type cooperative learning process works. Therefore, indirectly this can improve students' skills in processing in their groups. The application of the GI type cooperative learning model invites students to become active in learning in groups through an investigation in their group (Putra et al., 2019). This is because students are more interested in studying with groups, compared to studying alone, where the learning process tends to make students passive in learning. Studying in groups, students become active in

finding out in carrying out an investigation together with their group friends, so that students are encouraged to learn more actively in their group.

Learning carried out by applying the GI type cooperative model can improve students' social skills, this is because students will be required to find out information themselves through an investigation where students are trained to communicate and collaborate with other students. This communication includes improving students' social skills in learning (Matje, 2023). The GI type cooperative learning model can be used to improve collaboration skills and scientific literacy. This is in line with the research results obtained from the N-gain score that the collaboration ability and scientific literacy of experimental group students who followed the GI type cooperative learning model were on average higher than those of the control group students who followed the conventional learning model (Buaton et al., 2021; Ratunguri et al., 2022). Therefore, the GI type cooperative learning model influences collaboration abilities and scientific literacy, so that the GI type cooperative learning model is effectively used in learning. The results obtained in this study are in line with the results of previous research, which revealed thatThe group investigation learning model assisted by flash card media significantly influences students' science knowledge competency (Lengari et al., 2020). The results of other research reveal that the group investigation type cooperative learning model influences student learning outcomes in thematic learning in elementary schools (Buaton et al., 2021).The results of subsequent research revealed that the Tri Hita Karana-based group investigation learning model significantly influenced science knowledge competency (Widiartini et al., 2019). So based on several research results, it can be said that the group investigation learning model has a positive effect on improving student learning outcomes.

4. CONCLUSION

Based on the results of this research and discussion, it can be concluded that there is an influence of the GI type cooperative learning model on the collaboration abilities of fifth grade elementary school students. This GI type cooperative learning model also influences students' scientific literacy outcomes. So it is simultaneously proven that the GI type cooperative learning model has an effect on the collaboration abilities and scientific literacy of fifth grade elementary school students.

5. REFERENCES

Aldriani, S. N. F., Chitta, F., Zulfikar, M. R., & Mardhiyah, R. H. (2021). Pentingnya Keterampilan Belajar di Abad 21 sebagai Tuntutan dalam Pengembangan Sumber Daya Manusia. *Lectura : Jurnal Pendidikan*, *12*(1), 29–40. https://doi.org/10.31849/lectura.v12i1.5813.

Alfaeni, D., Nurkanti, M., & Halimah, M. (2022). Kemampuan Kolaborasi Siswa Melalui Model Project Based Learning Menggunakan Zoom Pada Materi Ekosistem. *Bioedukasi (Jurnal Pendidikan Biologi)*, *13*(2), 143. https://doi.org/10.24127/bioedukasi.v13i2.6330.

Amir, A., Azmin, N., Rubianti, I., & Olahairullah. (2021). Meningkatkan Motivasi Dan Hasil Belajar Siswa Melalui Model Pembelaran Index Card Match Pada Pelajaran IPA Terpadu Jurnal PIPA: Pendidikan Ilmu Pengetahuan Alam. *Jurnal PIPA: Pendidikan Ilmu Pengetahuan Alam*, *02*(01), 1–6. https://jurnal.habi.ac.id/index.php/JP-IPA/article/view/48.

Arinda, Y., Wilujeng, İ., & Kuswanto, H. (2019). The Application Group Investigation (GI) Learning Model assisted Phet to Facilitate Student Scientific Work Skills. *International Journal of Educational Research Review*, *4*(2), 254–261. https://doi.org/10.24331/ijere.518069.

Ariyanto, S. R., & Muslim, S. (2019). Peningkatan Keterampilan Kolaborasi Siswa SMK Melalui Implementasi Pembelajaran Kooperatif Tipe Group Investigation. *Jurnal Vokasi Teknik Otomotif*, *1*(1), 25–33. https://www.researchgate.net/publication/340844202.

Buaton, R. A., Sitepu, A., & Tanjung, D. S. (2021). Pengaruh Model Pembelajaran Kooperatif Tipe Group Investigation terhadap Hasil Belajar Siswa pada Pembelajaran Tematik di Sekolah Dasar. *Edukatif : Jurnal Ilmu Pendidikan*, *3*(6), 4066–4074. https://doi.org/10.31004/edukatif.v3i6.1398.

Dewi, K. P. K., & Parmiti, D. P. (2022). Dampak Model Two Stay Two Stray terhadap Keterampilan Kolaborasi dan Hasil Belajar IPS Kelas V. *MIMBAR PGSD Undiksha*, *10*(1), 33–38. https://doi.org/10.23887/jjpgsd.v10i1.43362.

Hakim, M. S. H. I. (2020). Implementasi Kolaborasi Orang Tua dan Guru Dalam Pelaksanaan Pembelajaran Daring pada PAUD. *JIEES : Journal of Islamic Education at Elementary School*, *1*(1), 26–33. https://doi.org/10.47400/jiees.v1i1.8.

Harahap, D. G. S., Nasution, F., Nst, E. S., & Sormin, S. A. (2022). Analisis Kemampuan Literasi Siswa Sekolah Dasar. *Jurnal Basicedu*, *6*(2), 2089–2098. https://doi.org/10.31004/basicedu.v6i2.2400.

Harepa, J. E., & Simamora, P. (2021). Pengaruh model pembelajaran kooperatif tipe group investigation (GI)

terhadap pengetahuan konseptual fisika siswa. *INPAFI (Inovasi Pembelajaran Fisika)*, *9*(3). https://doi.org/10.24114/inpafi.v9i3.27788.

Hutama, P. D., Relmasira, S. C., & Hardini, A. T. A. (2019). Perbedaan Kemampuan Kolaborasi Dan Hasil Belajar Matematika Siswa Kelas 4 SD Menggunakan Model Pembelajaran Numbered Head Together Dan Teams Games Tournament. *Edukatif : Jurnal Ilmu Pendidikan*, *1*(2), 80–87. https://doi.org/10.31004/edukatif.v1i2.11.

Jalmo, T., Fitriyani, D., & Yolida, B. (2019). Penggunaan Problem Based Learning untuk Meningkatkan Keterampilan Kolaborasi dan Berpikir Tingkat Tinggi. *Jurnal Bioterdidik: Wahana Ekspresi Ilmiah*, *7*(3), 77–87. http://jurnal.fkip.unila.ac.id/index.php/JBT/article/view/17480.

Kristyowati, R., & Purwanto, A. (2019). Pembelajaran Literasi Sains Melalui Pemanfaatan Lingkungan. *Scholaria: Jurnal Pendidikan Dan Kebudayaan*, *9*(2), 183–191. https://doi.org/10.24246/j.js.2019.v9.i2.p183-191.

Lengari, E., Agustika, M. P., & Sastra, G. N. (2020). Pengaruh Model Pembelajaran Group Investigation Berbantuan Media Flash Card Terhadap Kompetensi Pegetahuan Ipa. *Jurnal Penelitian Dan Pengembangan Pendidikan*, *4*(1), 65. https://doi.org/10.23887/jppp.v4i1.25032.

Matje, I. (2023). Meningkatkan Hasil Belajar IPS Sub Tema Lingkungan dan Manfaatnya melalui Model Pembelajaran Tipe Group Investigation Siswa Kelas V-B SD Negeri 24 Buton Kabupaten Buton INFO. *Arus Jurnal Psikologi Dan Pendidikan (AJPP)2*, *2*(1). https://jurnal.ardenjaya.com/index.php/ajpp/ article/view/163.

Mawaddah, R., Triwoelandari, R., & Irfani, F. (2022). Kelayakan Lks Pembelajaran Ipa Berbasis Stem Untuk Meningkatkan Keterampilan Kolaborasi Siswa Sd/Mi. *Jurnal Cakrawala Pendas*, *8*(1), 1–14. https://doi.org/10.31949/jcp.v8i1.1911.

Nurdin, S. (2021). Penerapan Pembelajaran Kooperatif Tipe Group Investigation Untuk Meningkatkan Keterampilan Proses Sains Siswa Kelas VI SD. *Pionir: Jurnal Pendidikan*, *10*(2). https://jurnal.ar-raniry.ac.id/index.php/Pionir/article/view/10621/5900.

Oktaviani, R. N. (2022). Implementasi Model Pembelajaran Problem Based Learning (Pbl) Berbasis Lesson Study Untuk Meningkatkan Keterampilan Komunikasi Dan Kolaborasi Mahasiswa Pada Mata Kuliah Perencanaan Pembelajaran Di SD. *ELSE (Elementary School Education Journal) : Jurnal Pendidikan Dan Pembelajaran Sekolah Dasar*, *6*(2), 257. https://doi.org/10.30651/else.v6i2.11095.

Pahrurrozi, P. (2019). Penerapan Model Pembelajaran Kooperatif Group Investigasi untuk Meningkatkan Hasil Belajar dan Kemampuan Berpikir Kritis. *Jurnal Penelitian Dan Pengkajian Ilmu Pendidikan: E-Saintika*, *2*(2), 142. https://doi.org/10.36312/e-saintika.v2i2.115.

Petriza, N., & Eliyasni, R. (2020). Peningkatan Hasil Belajar Pada Pembelajaran Tematik Terpadu Menggunakan Model Kooperatif Tipe Group Investigation di Sekolah Dasar. *Jurnal Inovasi Pendidikan Dan Pembelajaran Sekolah Dasar*, *4*(2), 1. https://doi.org/10.24036/jippsd.v4i2.109919.

Pratami, A. Z., Suhartono, S., & Salimi, M. (2019). Penerapan model pembelajaran group investigation untuk meningkatkan hasil belajar Ilmu Pengetahuan Sosial. *Harmoni Sosial: Jurnal Pendidikan IPS*, *6*(2), 164–174. https://doi.org/10.21831/hsjpi.v6i2.23535.

Putra, P. G. N., Margunayasa, I. G., & Wibawa, I. M. C. (2019). Pengaruh Model Pembelajaran Kooperatif Tipe Group Investigation (GI) Berbasis Lesson Study Terhadap Penguasaan Konsep IPA. *Jurnal Pedagogi Dan Pembelajaran*, *1*(2), 84. https://doi.org/10.23887/jp2.v1i2.19329.

Ratunguri, Y., Pangalila, T., Supit, D., Assa, F. F., & Tintingo, F. A. (2022). Penerapan Model Pembelajaran Kooperatif Tipe Group Investigation Untuk Meningkatkan Hasil Belajar Ilmu Pengetahuan Alam Siswa Kelas IV SD GMIM 2 Woloan. *Jurnal Pendidikan Dan Konseling*, *4*(6), 1349–1358. https://doi.org/10.31004/jpdk.v4i6.8577.

Rohmaya, N. (2022). Peningkatan Literasi Sains Siswa Melalui Pembelajaran IPA Berbasis Socioscientific Issues (SSI). *Jurnal Pendidikan MIPA*, *12*(2), 107–117. https://doi.org/10.37630/jpm.v12i2.553.

Rusdiana, E., & Sucipto, S. (2018). Peningkatan Kemampuan Berpikir Kritis Matematis melalui Penerapan Model Cooperative Learning Tipe Group Investigation (Studi pada Siswa SMK Dr. Soetomo Surabaya). *Jurnal Ilmiah Soulmath : Jurnal Edukasi Pendidikan Matematika*, *6*(1), 25–36. https://doi.org/10.25139/sm.v6i1.925.

Sari, D. N. A., Rusilowati, A., & Nuswowati, M. (2017). Pengaruh Pembelajaran Berbasis Proyek terhadap Kemampuan Literasi Sains Siswa. *PSEJ (Pancasakti Science Education Journal)*, *2*(2), 114. https://doi.org/10.24905/psej.v2i2.741.

Sumertha, I. G. (2019). Penerapan Model Pembelajaran Kooperatif Tipe Group Investigation (GI) untuk Meningkatkan Hasil Belajar IPA Siswa. *Jurnal Pedagogi Dan Pembelajaran*, *2*(2), 195. https://doi.org/10.23887/jp2.v2i2.17908.

Syaifa, H., Khairunnisa, Y., & Yulinda, R. (2023). Pengembangan Poster Digital Multimodal Sistem

Pernapasan Manusia Dalam Melatih Kemampuan Literasi Sains Pada Aspek Pengetahuan Sains Peserta Didik Smp. *Dalton : Jurnal Pendidikan Kimia Dan Ilmu Kimia*, *6*(1), 40. https://doi.org/10.31602/dl.v6i1.10459.

Tekad, T., & Pebriana, R. (2022). Pengaruh Model Pembelajaran Team-Based Project terhadap Keterampilan Komunikasi dan Keterampilan Kolaborasi pada Mata Kuliah Bahasa Indonesia. *Jurnal PTK Dan Pendidikan*, *7*(2). https://doi.org/10.18592/ptk.v7i2.5445.

Ulhusna, M., Putri, S. D., & Zakirman, Z. (2020). Permainan Ludo untuk Meningkatkan Keterampilan Kolaborasi Siswa dalam Pembelajaran Matematika. *International Journal of Elementary Education*, *4*(2), 130. https://doi.org/10.23887/ijee.v4i2.23050.

Wati, M. (2022). Pengaruh Model Pembelajaran Problem Based Learning Berbantuan Media Mobile Learning Terhadap Kemampuan Kolaborasi Matematika Siswa Kelas IV SD. *Indonesian Journal of Educational Science (IJES)*, *5*(1), 56–64. https://doi.org/10.31605/ijes.v5i1.1834.

Widiartini, P. D. O., Made Putra, M. P., & Manuaba, I. B. S. (2019). Pengaruh Model Pembelajaran Group Investigation Berbasis Tri Hita Karana Terhadap Kompetensi Pengetahuan IPA. *Jurnal Ilmiah Sekolah Dasar*, *3*(3), 332. https://doi.org/10.23887/jisd.v3i3.19476.