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The effect of the group to group exchange method on high school students' learning outcomes on environmental change materials

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Abstract

The low ability of student learning outcomes is because teachers never manipulate the ability of learning outcomes, and many teachers still use conventional learning approaches. The purpose of this study was to determine whether the Group to Group Exchange method has no effect on student learning outcomes on environmental change in one of the Islamic high schools in Medan. This research is a quasi-experimental study with a Nonequivalent pretest-posttest control group design. Data analysis of student learning outcomes used the t_{test} formula, with the help of SPSS version 25 data processing. Data analysis of student learning outcomes by calculating the average learning outcomes showed that the experimental class using the Group to Group Exchange method was higher than the control class. The prerequisite test proved that the data were normally distributed and homogeneous. The results of the calculation of the t_{test} test show that t_{count} is higher than t_{table}, so there is an influence so that it shows $t_{count} > t_{table}$ then H_{a2} is accepted. The results of this study indicate that there are influences and differences before and after the application of the Group to Group Exchange method on student learning outcomes on environmental change material in one of the Islamic high schools in Medan so that the findings obtained can be applied by teachers in carrying out learning, especially biology subjects.

Abstrak

Rendahnya kemampuan hasil belajar siswa disebabkan guru tidak pernah memperdayakan kemampuan hasil belajar dan masih banyak guru yang menggunakan pendekatan pembelajaran konvensional. Tujuan penelitian ini adalah untuk mengetahui adanya tidak pengaruh metode *Group To Group Exchange* terhadap hasil belajar peserta didik pada materi perubahan lingkungan di salah satu SMA Islam di Medan. Penelitian ini merupakan penelitian *quasi experiment* dengan *Nonequivalent pretest posttest control Group design*. Analisis data hasil belajar peserta didik menggunakan rumus uji t_{test}, dengan bantuan pengolahan data SPSS versi 25. Analisis data hasil belajar peserta didik dengan hasil perhitungan rerata hasil belajar menunjukan kelas eksperimen yang menggunakan metode Group to Group Exchange lebih tinggi dari kelas kontrol. Uji prasyarat terbukti data berdistribusi normal dan homogen. Hasil perhitungan uji t_{test} diperoleh bahwa t_{hitung} lebih tinggi dari t_{tabel}, maka ada pengaruh sehingga menunjukan $t_{hitung} > t_{tabel}$ maka H_{a2} diterima. Hasil penelitian ini menunjukkan bahwa terdapat pengaruh dan perbedaan sebelum dan sesudah penerapan metode *Group to Group Exchange* terhadap hasil belajar peserta didik pada materi perubahan lingkungan di salah satu SMA Islam di Medan. Sehingga temuan yang diperoleh, dapat diterapkan oleh guru dalam melaksanakan pembelajaran khususnya mata pelajaran biologi.

A. Introduction

Education is a process to influence students to adapt as best as possible to their environment. Thus it will cause changes in himself that enable him to function in people's lives. The teacher is in charge of directing this process so that the goals of the difference can be achieved as desired (Arif & Hasyim, 2021). Learning is an activity that supports student learning and involves student-student interaction, students and teachers to understand knowledge or information to achieve a goal. Learning plays a vital role in education development, especially for students (Lestari & Darmawati, 2022). Every learning activity, of course, always expects to produce maximum learning. In the process of achieving it, various factors strongly influence learning achievement. One of the main factors that influence the success of learning is the presence of teachers.

Given that the existence of teachers in the process of teaching and learning activities is very influential, the quality of teachers should be considered (Syafi'i et al., 2018). According to (Rahmawati et al., 2018), the role of the teacher is very much needed in the learning process because the teacher is one of the determining factors for the success of learning. Teachers have a vital role in the learning process. Astuti (2017) stated that the teacher's essential role in education is that there will be no superior student output without a teacher who works professionally. One way to improve students' cognitive learning outcomes is that teachers must be able to design innovative learning processes by applying various learning methods that can increase students' interest in learning and, in the end, can improve cognitive learning outcomes that involve students actively (Natalia et al., 2017)

Learning methods are needed in schools, especially for learning in the classroom. Trianto (2010) states that the learning model is a plan or pattern used to guide classroom learning or tutorial learning. Nuraiha (2020) also says that the learning method is part of an instructional strategy; the learning method functions as a way to present, describe, and give examples. Fathurrohman & Sutikno (2014) argue that the more appropriate the technique used by the teacher in teaching, the more effective it is expected to be and the achievement of learning objectives. According to (Irwansyah & Eresmawati, 2019), many learning methods can be used in presenting lessons to students, such as lecture methods, discussions, question and answer, problem-solving, practicum, and others. In using learning methods at school, a teacher can use different learning methods from one class to another, thus requiring the teacher's ability to master and apply various kinds of learning methods. Learning better techniques will be more effective in achieving goals (Nasution, 2017).

Group to Group Exchange is an active learning method that requires students to think about what they have learned, have the opportunity to discuss with friends, ask questions and share the knowledge gained with others. According to Silberman (2018), Group to Group Exchange gives different tasks to groups of participants, and then each group does what is learned by all participants. This learning model requires students to always be active in learning and are asked to teach each other to fellow students.

The learning process described also occurred in one of the Islamic high schools in Medan City, North Sumatra. The findings obtained by the researchers indicate that learning in one of the Islamic high schools in Medan is still teacher-centered. Learning is still centered on the teacher using the lecture method, resulting in students being less active in education. So that the learning process is centered on the teacher who actively explains without any reciprocal relationship between the teacher and students because the students are passive and only listen and record information entirely from the teacher.

Based on the observations made at an Islamic high school in Medan, a learning method is needed to improve student learning outcomes, especially in environmental change material. In using this method, students are expected to be no longer passive in learning but to apply an active learning process with the Group to Group Exchange method to improve learning outcomes.

Various studies on the effect of the Group To Group Exchange method on student learning outcomes have been carried out in several schools in Indonesia. But in general, in some of the current research results, the variables used by researchers are as done by Sitepu & Sarwono (2018); Lestari & Darmawati (2022); Putra et al. (2021); Puspita et al. (2018) are learning outcomes. In addition, research by Kamil & Hasanah (2019) related to the influence of examining the effect of the Group to Group Exchange method on student learning outcomes. Based on this, research that examines the impact of the Group to Group Exchange method on student learning outcomes has not been carried out much. This study also has differences, namely in the test instrument for biology learning outcomes on environmental change, namely the

Pretest and Posttest with learning outcomes that can distinguish this research from other studies.

The reason for choosing the Group To Group Exchange (GGE) method in this study is because this research works in groups, so students are more active in learning and are asked to teach each other to fellow students. Putra et al. (2021) suggested that the Group to Group Exchange (GGE) model is a discussion format that gives different assignments to different groups of students. (Sitepu & Sarwono, 2018) explains that the Group Group Exchange (GGE) model requires students to think about what students are learning, provide opportunities to discuss or socialize with friends, ask questions, and share knowledge with other friends. Hasanah et al. (2021) added that the Group to Group Exchange (GGE) model is learning that applies fast, fun, supportive, and engaging steps, as well as training students' self-responsibility and leadership, students will also be motivated to participate in learning activities and all students will gain a lot of knowledge and experience. Then according to (Lestari & Darmawati, 2022), through the implementation of Group to Group Exchange, students can interact openly, dialogue, and interactively under the guidance of teachers and peers so that students are motivated to master the teaching materials presented.

Research on the Group to Group Exchange (GGE) method has been carried out by several researchers before. Research by Rohmah (2016); Hasanah et al. (2021); Fajriana (2022) shows the application of group-to-group exchange active learning strategies can improve students' mathematics learning outcomes. Based on the previous research described above, the researcher wants to try this method titled "The Effect of the Group To Group Exchange Method on Student Learning Outcomes in the Material of Environmental Change in Class X SMA/MA Students." This study aims to determine whether the Group to Group Exchange method affects student learning outcomes on environmental change material at an Islamic high school in Medan.

B. Material and Method

This research method uses a quasi-experiment or quasi-experiment. This research design is Nonequivalent (Pretest and posttest), while the sample is taken using purposive sampling. Purposive sampling is a random sampling methodology. There are two groups, namely the experimental class and the control class. The two classes were given a pretest and posttest, and only the experimental group received treatment. The experimental class is the class that gets treatment, while the control class is the group that doesn't get treatment. Each class receives a different treatment: one class of learning procedures using the Group to Group Exchange learning method and one class using conventional learning methods. Then, it is compared whether there is an influence after the Group to Group Exchange method is applied in the learning process on environmental change material.

Participant

This research was conducted at one of the Islamic high schools in Medan. This research was conducted in January 2023 until completion. The population in this study were students of class X consisting of 2 classes, with a total of 60 people. In this study, the samples used were class X IPA 1 and class X IPA 2. For the experimental class in class X IPA 1, this study used the Group to Group Exchange learning method. The control class, X IPA 2, used the conventional method, namely lectures. This conventional learning is teacher-centered learning, where the role of the teacher controls most of the education presentation or can also be referred to as the lecture method.

Instrument

The instrument used in this study tested learning outcomes in biology on environmental change, namely the Pretest, and Posttest. The pretest is given at the beginning of the learner to find out the students' initial knowledge, and the Posttest is given at the end of the learning activity to find out the student's learning outcomes after being given treatment. The instrument consisted of 50 questions before being validated, with each question having four possible answers, namely A, B, C, D, and only one correct answer. Furthermore, the questions were tested in non-sample classes, and the items' validity, difficulty level of the test items, the differentiating power of the tests, and valid instruments were carried out that could be used in the experimental class.

The test items are designed to include six cognitive insights according to Bloom's taxonomy, namely, aspects of remembering (C1), understanding (C2), applying (C3), analyzing (C4), synthesizing (C5), and evaluating (C6). Analysis of the research instrument was carried out by quantitative analysis. Quantitative analysis is the selection of items that are appropriate for use as a test instrument by considering the analysis of the validity of the items, the level of difficulty of the items, and the distinguishing power of the items. If the answer is correct, the score obtained by students is given a score of 1, and if the answer is

wrong is given a score of 0. Then each student's total number is converted into a value using Formula 1.

$$Score = \frac{Obtained\ score}{Total\ score} \text{X } 100\% \text{.....Formula 1}$$

Procedure

The research procedure consists of research steps and learning steps. The research steps consisted of the research preparation stage: literature study, instrument design, and research instrument validation. In addition, a survey of school conditions was carried out, research permits, discussions with the biology teacher in the class concerned to obtain information about the characteristics of students in the class, discussed research implementation schedules and class management, which researchers would later carry out. The preparatory stage compiles learning tools through learning implementation plans (RPP), teaching materials, and the instruments used during the data collection. Then make teaching preparations with the Group to Group Exchange learning method, namely the first step, conveying or displaying environmental change material, aims to open up students' knowledge related to the material to be studied. After that, the teacher determines how many topics will be distributed to students based on the number of groups. Then students are divided into four groups, each getting different material. Groups 1 and 2 are environmental, and water pollution, and 3 and 4 are air and soil pollution. The next step is that each group determines a spokesperson for each group, and these spokespersons make presentations to other groups in turn, followed by questions and answers between groups regarding the material that has been presented. This way, students will learn more actively and gain knowledge from other groups. The next stage is to carry out the learning process in the control and experimental classes in the even semester of the 2021/2022 school year by using the Group to Group Exchange learning method and conventional learning methods. For the experimental class in class X IPA 1, apply the Group to Group Exchange learning method, and in class X IPA 2, use the conventional learning method. The next stage is the reporting stage. At this stage, data processing and data analysis is carried out. After that, the stage of working on the results and discussion and drawing conclusions from the data is carried out.

Validity of Question Items

This validity test is used to determine whether the instrument is suitable for use or not. This validity test uses the product moment correlation formula (Supriadi, 2011), and an item is declared valid if $r_{count} > r_{table}$ with a significant level of 5%. If an item $r_{count} < r_{table}$ is declared invalid, with the distribution (table) for $\alpha = 0.05$.

The validity calculation in this study uses Microsoft Excel 2016. The calculation of the validation test of questions can be seen in the attachment. The results of the analysis of the validity of the items from the test instrument to test the cognitive abilities of students can be seen in Table 1.

Table 1 Instrument Test Results

Test Type	Category	Number of Questions
Validity	Valid	30
	Not Valid	20
Difficulty level	Hard	4
	Medium	29
	Easy	2
Discriminating Power	Very High	-
	High	-
	Medium	2
	Low	24
	Very Low	24

Based on the results of the instrument test in Table 1, the questions that were declared valid were 30 questions, and 20 questions were declared invalid, namely questions number 1, 5, 8, 9, 13, 14, 15, 18, 22, 23, 24, 25, 26, 27, 32, 38, 41, 42, 43, 47. Invalid questions cannot be used to measure learning outcomes. The test of the question's difficulty level is done to determine whether the question is classified as easy or difficult. The greater the value of P, the easier the test items are, Conversely, the smaller the P value, the more difficult the test items are.

Test items are said to meet the requirements if the P value ranges between: 0.20-0.80. If $P < 0.20$, it means the test items are too difficult; if $P > 0.80$, it means the test items are too easy. The

discriminating power test was carried out to examine the ability of the items to distinguish between students who have high abilities and those who have low abilities (Silitonga, 2014). The number that indicates the magnitude of the differential power of an item is called the discriminatory index (Discrimination Index), with "D" symbolized where the value of D ranges from -1 to +1. An item is declared eligible if D ranges from: +0.20 to +1.0 (Bagiyono, 2017).

C. Results and Discussion

The results of the study were in the form of pretest and posttest data which were carried out in two groups, namely the experimental class and the control class. The results of this study includes the calculation of the normality test, homogeneity test, and hypothesis testing.

Normality Test

The normality test must first be carried out before further testing as a prerequisite test in research. The normality test is an absolute requirement to carry out other tests. This normality test was carried out in the experimental class using the Group to Group Exchange learning method and in the control class using the conventional method. The normality test was seen in student learning outcomes, Experimental Pretest, Experimental Posttest, Control Pretest, and Control Posttest, with a sig level of 0,05. If Sig: Then the data is normally distributed. This test results can be seen in Table 2.

The study results were in the form of pretest and posttest data, which were carried out in two groups, namely the experimental and control classes. The results of this study are in the form of data analysis, which includes the calculation of the normality, homogeneity, and hypothesis test.

Homogeneity Test

Homogeneity test is carried out after the normality test, the test is carried out to find out whether the data is taken from homogeneous data. Decisions are taken with reference to the test criteria, namely: if sig > 0.05, the data is homogeneous.

Based on Table 3, the results of the class calculation test for the homogeneity of the control class and the experimental class were obtained with sig 0.733 > 0.05, so it can be concluded that sig > 0.05.

Table 2 Normality Test Results

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Class	Statistic	df	Sig.	Statistic	Df	Sig.
Student learning outcome	Experiment Pretest (GGE)	.097	30	.200*	.962	30	.356
	Experiment Posttest (GGE)	.110	30	.200*	.957	30	.258
	Control Pretest (Conventional)	.119	30	.200*	.950	30	.174
	Control Posttest (Conventional)	.165	30	.037	.927	30	.040

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Hypothesis Testing

After testing the normality and homogeneity of the data, the next test is the hypothesis test. This hypothesis test was carried out to test the HO (null hypothesis), which states that there is no effect of the Group to Group Exchange learning method on student learning outcomes, using a hypothesis test "t" test independent sample t_{test}. Test the research hypothesis with a sig level of 0.05.

Based on Table 4 and Table 5, the t_{test} results for the experimental and control classes have been obtained with a t_{count} of 3,053 and a t_{table} of 1.671, indicating that $t_{count} > t_{table}$. From the previous decision ($t_0 > t_t$: Ha is accepted), with an average experimental posttest value of 80.62 and an average control posttest value of 37.50, Ha is accepted. They prove the hypothesis that there is an influence on student learning outcomes after applying the Group to Group Exchange method.

The hypothesis testing carried out with the independent sample test showed that there was an influence of the Group to Group Exchange Method on student learning outcomes in the Material of Environmental Change, with the results obtained t_{count} is 3.053 and t_{table} is 1.671 so that it shows $t_0 > t_t$ so that Ha is accepted. In the experimental class, N-Gain test results were 0.64 in the medium category, while the results in the control class were 0.25 in the low category. This means that the development of student learning outcomes is better by using the group-to-group exchange learning method. So it can be said that the Group to Group Exchange method affects student learning outcomes.

Table 3 Homogeneity Test Results

Test of Homogeneity of Variance					
		Levene Statistic	df1	df2	Sig.
Student learning outcome	Based on Mean	.117	1	58	.733
	Based on Median	.117	1	58	.733
	Based on Median and with adjusted df	.117	1	57.720	.733
	Based on trimmed mean	.117	1	58	.734

Table 4 Experimental Class and Control Class t_{test} Results

Independent Samples Test										
		Levene's Test for Equality of Variances		t_{test} for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Student learning outcome	Equal variances assumed	117	.733	3.053	58	.003	9.667	3.166	3.329	16.005
	Equal variances not assumed			3.053	57.984	.003	9.667	3.166	3.329	16.005

Group Statistics					
	Class	N	Mean	Std. Deviation	Std. Error Mean
Student learning outcone	Experiment Posttest (GGE)	30	80,62	12.365	2.258
	Control Posttest (Conventional)	30	37.50	12.159	2.220

Table 5 t_{test} Calculation Results Data

Test Type	t_{count}	t_{table}	Index	Interpretation
Experiment Class and Control Class Posttest	3.053	1.671	$t_{count} > t_{table}$	Ha Accepted

The results of this study show very strong support for previous research on the Group to Group Exchange learning method, including the following: The research by Putra et al. (2021) shows that using the Group to Group Exchange (GGE) learning method has an effect and can improve social studies learning outcomes for students, in other words, there is an influence of the Group to Group Exchange method on social studies learning outcomes for class IV SD Negeri Perigi 04 Tangerang Selatan. Furthermore, research by Puspita et al. (2018) stated that the Group to Group Exchange Method affected student learning outcomes in Civics learning material, showing a high score. Also, Buchori & Cintang (2018); Kudri et al. (2018) state the Group to Group Exchange (GGE) method, also known as group exchange with groups, is an active learning method.

The conventional lecture method makes students passive, while the Group to Group Exchange method makes students active and proves that students' communication skills also impact students' learning outcomes (Vina et al., 2014; Rahmawati et al., 2018). Using the Group to Group Exchange method, students become more active in learning because students are allowed to discuss with groups and ask questions. Students understand the material better because they can teach it to other students, increase cooperation, and are more active in the learning process. This proves that the Group to Group Exchange Method is more effective in the biology learning process than the lecture method. Based on the mutual support of the results of this study with previous research, the Group to Group Exchange method of learning can improve student learning outcomes. It can be applied by teachers in education, especially in biology subjects.

D. Conclusion

Using the Group to Group learning method affects student learning outcomes on environmental change material at an Islamic high school in Medan. Looking at the average score, which shows a reasonably high score, this learning method effectively influences student learning outcomes, especially in environmental change material. Thus, the Group to Group Exchange learning method can

be used by teachers in teaching and learning activities in class to improve student learning outcomes on environmental change material. Theoretically, a more in-depth study can be carried out regarding the use of the Group to Group Exchange learning method by modifying the dependent variable and other subjects.

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