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An Implementation of Rotating Trio Exchange (RTE) Assisted by Couple Card toward Biology Learning Outcome

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ABSTRACT

This research aims at finding the effect of the Rotating Trio Exchange (RTE) model assisted by the couple card media on the biology learning outcomes of SMAS DDI Maros. The research method was quantitative with a quasi-experimental and non-equivalent group pretest-posttest design. The research results were obtained through hypothesis testing. The pretest value in the control and the experimental classes was 0.138, where Sig. was higher than α. Therefore, there was no significant learning outcomes difference in the pretest values in both classes. Furthermore, the obtained posttest value was 0.000, where Sig. was lower than α. Therefore, there were significant learning outcomes differences between the two classes.

Penerapan Model Pembelajaran *Rotating Trio Exchange* (RTE) Berbantuan Media *Couple Card* Terhadap Hasil Belajar Biologi

Abstrak: *Tujuan Penelitian ini adalah untuk mengetahui pengaruh pembelajaran model Rotating Trio Exchange (RTE) berbantuan media couple card terhadap hasil belajar biologi SMAS DDI Maros; Metode yang digunakan adalah kuantitatif jenis quasi eksperimen. Bentuk dari metode quasi eksperimen yang digunakan adalah non equivalent group pretest posttest design; Populasi dalam penelitian ini adalah seluruh siswa kelas XI semester genap SMAS DDI Maros yaitu sebanyak 2 Kelas. Sampel dalam penelitian ini adalah Kelas XI IPA 1 yang berjumlah 29 orang dan Kelas XI IPA 2 yang berjumlah 29 orang; Teknik Pengumpulan data dalam penelitian ini adalah observasi dan tes; Instrumen penelitian yang digunakan berupa soal pilihan ganda sebanyak 30 nomor; Analisis data menggunakan software SPSS versi 25; hasil temuan diperoleh hasil uji hipotesis nilai hasil belajar pretest pada kelas kontrol dan kelas eksperimen diperoleh 0,138 dimana Sig > α artinya tidak ada perbedaan yang signifikan atau hasil belajar nilai pretest dari kedua kelas tidaklah berbeda. Sedangkan, pada hasil belajar posttest kelas kontrol dan kelas eksperimen diperoleh nilai pada uji-t posttest diperoleh 0,000 dimana Sig < α artinya kedua kelas mengalami perbedaan yang signifikan sehingga terdapat perbedaan hasil belajar dari kedua kelas. Sehingga dapat disimpulkan bahwa penerapan model pembelajaran Rotating Trio Ecchange (RTE) berbantuan media couple card berpengaruh terhadap hasil belajar siswa di SMAS DDI Maros.*

INTRODUCTION

Education is an effort to help students physically and mentally from their natural traits to achieve better humanity and civilization (Sujana, 2019; Wahyuni dkk., 2019). Education is an individual's maturation process through life experiences (Komarudin dkk., 2020). The maturation process involves the individuals carrying out various activities called experiences or learning to shape their thinking, actions, feeling, and speaking (Dewanti dkk., 2014). The learning process is an important aspect of improving the quality of education. It is essential to improve the quality of education, starting from the learning process. Every education requires meaningful learning by applying an effective learning model. One of the learning models that can increase students' activities that will affect their learning outcomes is the Rotating Trio Exchange (RTE) model.

Rotating Trio Exchange (RTE) fosters curiosity, cooperation between students, students' thinking skills, and students' activities. Rotating Trio Exchange (RTE) model can increase students' active participation during learning by optimizing small discussion activities between group members (Sahril dkk., 2018; Yahya & Bakri, 2020). According to (Isjoni, 2014), the RTE model consists of a group of 3 students, each numbered 0, 1, and 2. Number 1 moves clockwise, and number 2 moves counterclockwise, while number 0 stays in place. Each group is given a question to discuss. After that, the group rotates again and forms a new trio.

The couple card media assist the Rotating Trio Exchange (RTE) learning model. The media are cards containing questions and answers to ease the discussions. Couple card media is easy to make and easy to get. Each new trio is given a new, more difficult question to discuss. Another advantage of the couple card media is that it can invite students to find a partner while learning about a concept in a fun atmosphere.

Several researchers have conducted similar research. The Rotating Trio Exchange cooperative learning model in physics subjects for the eleventh-grade science students of SMA Negeri 1 Polongbangkeng Utara can improve students' learning outcomes based on the achievement in cycle I (50.00%) and cycle II (78.12%) (Yuliati dkk., 2016).

RTE improves the eight-grade students' learning outcomes at SMP Muhammadiyah Mataram in the 2016/2017 academic year (Sabrun, 2017). The provision is based on the achieved indicator of 85% out of 70. The result of student evaluations in the first cycle was 64.70%, while the result in the second cycle was 88.23%. Therefore, this research has met the desired indicators of success.

The Rotating Trio Exchange learning strategy influences students' learning outcomes in the DPPB course on cognitive and affective aspects (Sadikin, 2017). Furthermore, the Rotating Trio Exchange (RTE) learning model is better than the conventional learning model (Muharomah dkk., 2020). There is an increase in mathematical concept understanding through the Rotating Trio Exchange (RTE) learning model. The increase is in the average pretest and posttest results (0.602). Furthermore, there are differences in students' learning outcomes before and after using the Rotating Trio Exchange (RTE) learning model assisted by the couple card media (Rahmi dkk., 2018). Also, the RTE model assisted by the couple card media has presented a significant positive effect on the biology learning competence of students at SMA Pembangunan Laboratorium UNP (Oktaviani & Fitri, 2020).

Previous research was limited to using the Rotating Trio Exchange (RTE) learning model only without combining it with the couple card media. As for the research that combined RTE with the couple card media.

This research was focused on the students' learning outcomes before and after implementing the Rotating Trio Exchange, assisted by a couple of card media. This research was imperative to determine the effect of Rotating Trio Exchange assisted by a couple of card media at SMAS DDI Maros.

METHOD

This research was conducted on the eleventh-grade students of SMA DDI Maros in the 2020/2021 academic year on the reproductive system subject. This research was quantitative research with a quasi-experimental approach. The design used in this research was the pretest-posttest control group design. The quasi-experimental approach used was the non-equivalent pretest-posttest design because the experimental and control classes were not chosen randomly.

Table 1. Research Design

O1	X	O2
O3		O4

Source: (Sugiono, 2014)

Description:

X : Treatment (RTE model assisted by couple card)

O1 & O3 : Pretest (Experimental and control classes before treatment)

O2 & O4 : Posttest (Experimental and control classes after treatment)

The population in this research were all eleventh-grade students in the second semester of SMAS DDI Maros in the academic year of 2020/2021. The research sample consisted of class XI IPA 1 and class XI IPA 2. The number of students in class XI IPA 1 was 29 students, and the number of students in class XI IPA 2 was 29 students. The sampling technique applied in this research was the purposive sampling technique. The technique determines the sample based on certain considerations.

The researchers collected the research data by administering 30 items of multiple-choice tests to determine students' pretest and posttest results. The data obtained were analyzed using the N-gain test, descriptive statistics, and inferential statistics, namely the t-test.

RESULTS AND DISCUSSION

The description of the descriptive data analysis and inferential data analysis to determine the differences in the biology learning outcomes of students who were taught using the Rotating Trio Exchange (RTE) model assisted by couple card media (experimental class) and the conventional model (control class).

Descriptive statistical analysis of the control class can be seen in Table 2.

Table 2. Descriptive Statistical Analysis of the Control Class

Statistics	Pretest	Posttest
Sample Size	29	29
Average	55.00	75.03
Lowest Score	37	60
Highest Score	70	87
Standard Deviation	8.916	6,822

Table 2 shows the control class' average score before learning (55.00) and after learning (75.03). The lowest score is 37 in the pretest and 60 in the posttest. The highest was 70 in the pretest and 87 in the posttest. The standard deviation value is 8,916 in the pretest and 6,822 in the posttest.

The following is a bar chart describing the control class's pretest and posttest results.

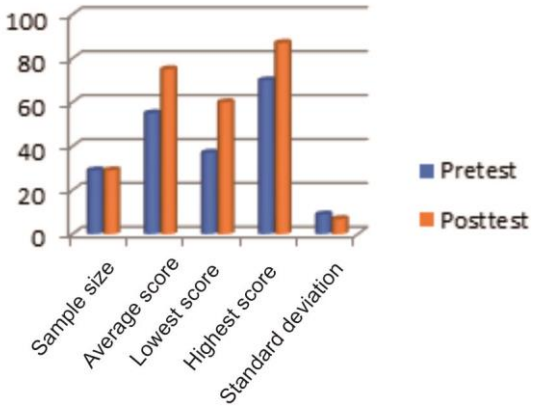

Figure 1. The Description of Control Class Learning Outcomes

The descriptive statistical analysis of the experimental class can be seen in Table 3.

Table 3. The Descriptive statistical Analysis of the Experimental Class

Statistics	Pretest	Posttest
Sample Size	29	29
Average	51.38	81.93
Lowest score	33	67
Highest score	67	93
Standard Deviation	9,424	6,995

Table 3 displays that the average score of the experimental class with the Rotating Trio Exchange (RTE) learning model assisted by the couple card media is 51.38 in the pretest and 81.93 in the posttest. The lowest score is 33 in the pretest and 67 in the posttest 67. The highest score is 67 in the pretest and 93 in the posttest. The pretest standard deviation is 9,424, and the posttest standard deviation is 6,995.

A bar chart describes the experimental class's pretest and post-test results.

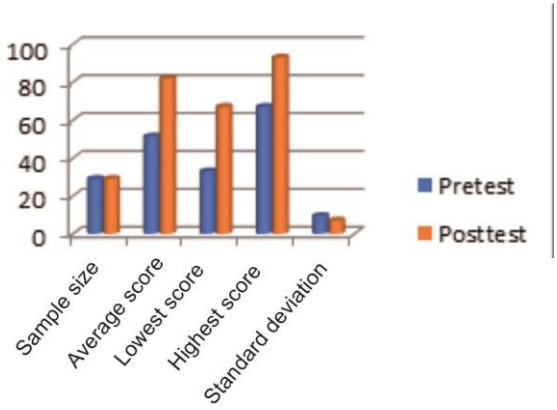

Figure 2. The Description of Experimental Class Learning Outcomes

The N-gain test was conducted to determine the category of the average score improvement in the control class and experimental classes. According to (Hake, 1999), if the N-gain average value is lower than 40%, then the criteria are not effective, 40-50% are less effective. If the N-gain value is 56-75%, the criteria are quite effective. Furthermore, if the N-gain value is higher than 76, the criteria are effective. The analysis can be seen in Table 4.

Table 4. N-gain Test Results

Class	N-gain %	Category
Control	42.8	Less effective
Experiment	62.7	Quite effective

Source: Hake (1999)

Based on Table 4, the N-gain value of the control class is 42.8 in the less effective category, and the N-gain value in the experimental class is 62.7 in the quite effective category.

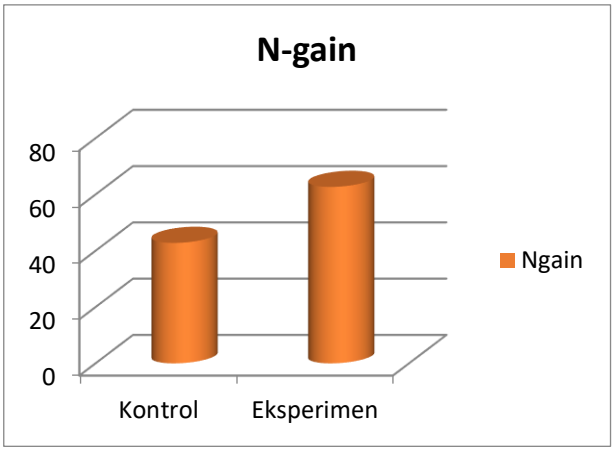

Figure 3. The N-gain of the Control Class and Experiment Class

The inferential data analysis was assisted by the SPSS version 25 to calculate the t-test. However, the researchers performed the normality test and the homogeneity test on students' learning outcomes data before performing the t-test. The normality test was conducted to determine whether the data obtained were normally distributed. The normality test used was the Shapiro-Wilk method because the sample data was small. The results of the normality test can be seen in Table 5.

Table 5. The Normality Test Results

Class	Condition	*Shapiro-Wilk*	Description
Pretest Control	Sig. (α) > 0.05	0.133	Normally distributed
Posttest Control		0.194	
Pretest Experimental		0.326	
Posttest Experimental		0.222	

Based on the normality test using the Shapiro-Wilk method in Table 4.4, a significant value was obtained in the control class, namely 0.133 for the pretest and 0.194 for the posttest. At the same time, the experimental class' significant value was 0.326 in the pretest and 0.222 in the posttest. Therefore, the sample obtained was normally distributed because all the data obtained were higher than 0.05.

The homogeneity test was performed to determine whether the data were homogeneous. The homogeneity test result can be seen in Table 6.

Table 6. Homogeneity Test Results

Students' learning outcomes		*Sig.*	Description
Pretest	*Based on Mean*	0.774	Same variant (homogeneous)
Posttest	*Based on Mean*	0.851	

Based on the homogeneity test in Table 6, a significant value was obtained in the pretest (0.774 > 0.05) and posttest (0.851 > 0.05). Therefore, it can be concluded that all data from the two groups were homogeneous.

After conducting the normality and homogeneity tests, an independent sample t-test was performed. The test criteria are that H_0 is accepted and H_1 is rejected if the value of $t_{obs.}$ is lower than $t_{critical}$, which means that there is no difference in learning outcomes between the control class and the experimental class. H_0 is rejected, and H_1 is accepted if the value of $t_{obs.}$ is higher than $t_{critical}$. If Sig. is higher than α, then H_0 is accepted, and if Sig. is lower than α, H_0 is rejected.

Table 7. Hypothesis Test Results

Student's learning outcomes	$t_{obs.}$	*Sig. (2-tailed)*	Conclusion
Pretest	*-1.503*	0.138	H_0 is rejected, and H_0 is accepted.
Posttest	*0.851*	0.000	

Table 7 shows that, in the pretest, the t-test value before the treatment was 0.138. The Sig. value was higher than α; therefore, H_0 was accepted, and H_1 was rejected. In conclusion, there was no significant difference between the control class and the experimental class. Furthermore, in the

posttest, the t-test value was 0.000, where Sig. was lower than α. Therefore, H_0 was rejected, and H_1 was accepted. In conclusion, there was a significant difference in the posttest learning outcomes of the control class and the experimental class.

By analyzing the data obtained, the two groups were given different treatments. The control class was treated with conventional learning or lectures, and the experimental class was treated with the Rotating Trio Exchange (RTE) learning model assisted by the couple card media.

Based on the descriptive statistical data analysis, the Rotating Trio Exchange (RTE) method assisted by couple card media produced a higher average score than the conventional learning. The experimental and posttest results in the experimental class experienced a higher increase than in the control class. When viewed from the effectiveness category by paying attention to the N-gain test result, the Rotating Trio Exchange (RTE) assisted by couple card media was quite effective compared to the lecturing method. The Rotating Trio Exchange (RTE) learning model assisted by the couple card media made students more enthusiastic about receiving the subject matter because they felt that the learning model was innovative. The students who were taught by the lecturing method tended to be passive and less motivated. Therefore, the students were less responsive to the researchers' questions in the learning process.

The stages of the Rotating Trio Exchange (RTE) learning model assisted by the couple card media were carried out by grouping students. Each group consisted of three students, and each student was given a symbol of 0, 1, and 2. After the students were divided into groups, the researchers distributed the couple card of reproductive system material, which would be discussed together. Students who were given the symbol 0 stayed in place. Students given symbol 1 moved to another group in a clockwise direction, while symbol 2 moved to the other group in a counterclockwise direction. The researchers distributed other sets of cards to be discussed, and then the students rotated again. After all the questions had been finished, the results of student discussions were presented in front of the class.

The Rotating Trio Exchange (RTE) in physics learning can improve student learning outcomes (Asmawati, 2016). This result is also supported (Rahmi dkk., 2018) that the Rotating Trio Exchange (RTE) learning model assisted by the couple card media can improve students' learning outcomes in the nomenclature of hydrocarbon compounds. Likewise, research by (Durrouwi dkk., 2018) and (Heliyandari dkk., 2018) state that the Rotating Trio Exchange (RTE) learning model influences students' learning outcomes. The rotation made by students during the learning process can increase students' physical activity so that they are more enthusiastic about learning. Based on research conducted by (Utami dkk., 2019) and (Rahmi dkk., 2018), physical activity in the Rotating Trio Exchange (RTE) model can increase students' enthusiasm so that they are more focused on receiving information. Activities in learning cause students to be more enthusiastic in receiving lessons and indirectly influence their learning outcomes.

In the hypothesis test, the pretest value in the control class and the experimental class was 0.138, where Sig. was higher than α. Therefore, there was no significant difference, or the learning outcomes of the pretest scores of the two classes were not different. On the other hand, the posttest learning outcomes of the control class and the experimental class were 0.000, where Sig. was lower than α. Therefore, the two classes experienced significant differences, so there were differences in the learning outcomes of the two classes.

The results of this research are supported by (Rahmi dkk., 2018) that there

are differences in student learning outcomes before and after using the Rotating Trio Exchange (RTE) cooperative learning model assisted by the couple card media in the sub-material of nomenclature of hydrocarbon compounds.

CONCLUSIONS AND SUGGESTIONS

Based on the research and discussion results, it can be concluded that the Rotating Trio Exchange (RTE) learning model assisted by the couple card media affected students' learning outcomes at SMAS DDI Maros.

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