THE EFFECT OF USING A REFLECTIVE MODEL ON STUDENT LEARNING OUTCOMES ON THE SUBJECT MATTER OF HUMAN GROWTH AND DEVELOPMENT IN CLASS VIII JUNIOR HIGH SCHOOL OF BINA BERSAUDARA MEDAN.

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Abstract

This study aims to determine the effect of using the Reflective Model on Student Learning Outcomes on the Subject Matter of Growth and Development in Humans in Class VIII Junior High School of Bina Bersaudara Medan.

The population consisted of 3 classes with a total of 102 students and the sample in this study was Random sample, where class VIIIA was used as the sample. This research instrument is in the form of questions as many as 22 items with 4 multiple choice options.

The results showed an increase in student learning outcomes with a mean post test of 74.91 higher than the mean pre test of 59.13. For hypothesis testing, the t test was used, and from the results of data processing, it was obtained t count > t table, namely 9.5014 > 1.9872 which is located outside the H_0 acceptance area, so it can be concluded that there is a positive effect of the Reflective model.

INTRODUCTION

Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character, and skills needed by themselves and society (Pristiwanti et al., 2022). In accordance with the objectives of national education, the role of the teacher is very important in the learning process to achieve the learning objectives themselves. These learning objectives are the learning outcomes for students after carrying out the learning process under the guidance of the teacher in conducive conditions (Teguh Triwiyanto, 2014).

Teachers have a great responsibility to improve the quality of education. Teachers must be able to organize learning materials (Nurgiansah, 2020). Many teachers have extensive experience in the field of study, but fail in organizing learning materials, because at this time many teachers present subject matter with conventional methods, which are considered less able to improve student learning outcomes, because students do not take an active role in teaching and learning activities, lack of attention of students to the subject matter provided (Annur et al., 2021)(Mayasari et al., 2022).

The low student learning outcomes at Junior High School of Bina Bersaudara Medan can be seen in the completeness of student learning outcomes that have not been achieved. However, not all students get scores below the Minimum Completion Criteria (KKM), some students also get quite high scores even above the KKM. Students are said to have completed learning if they achieve a score greater than or equal to the KKM, which is 65. From these learning outcomes, it can be seen whether students complete learning or not. This may be due to the use of varied methods that are rarely done. Therefore, a real approach is needed so that students are motivated

and creative in learning science. One of the expected efforts is the right learning method so that it can involve students more actively.

A learning model is a plan or pattern that can be used to shape curriculum and long-term learning, design learning materials, and guide learning in the classroom or outside the classroom (Sukaisih et al., 2020). The learning model can be used as a pattern of choice, meaning that teachers can choose an appropriate and efficient learning model to achieve learning objectives. Some models that can be used are *constructivism*, *inquiry*, *questioning*, *learning community*, *modeling*, *reflection*. The model used in this study is a reflective learning model (Musdalifah et al., 2023)(Yanti & Novitasari, 2021).

The Reflection Model is a way of thinking about what has just happened or has just been learned. In other words, reflection is thinking back about what has been done in the past, because through this kind of learning students are expected to recall and match what is remembered with what is being learned (Rahman & Ilmadi, 2020)(Muid & Hamdani, 2021). It is hoped that this model can be used as a way out that can help overcome obstacles in the learning process, especially in class VIII junior high school of Bina Bersaudara Medan on the subject matter of human growth and development.
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METHODS

Research Model and Design.

This research method is a quasi-exsperimen method through the use of Reflective learning models in learning science on the subject matter of human growth and development which is expected to produce changes in learning outcomes. This research design uses a pre-test and post-test design as shown in the table below:

Table 1. Research Design

Kelas	Pre test	Perlakuan	Pos test
VIII-A	Test I	VIIIA	Test II

Description:
Test I   = pre-test before using Reflective learning model in science learning.
Test II   = post-test after using Reflective learning model in science learning.
P   = Learning treatment using Reflective learning model on the subject matter of human
                growth and development in class VIIIA.

Research Procedure:
1. Implementation of research in class VIII SMP Swasta Bina Bersaudara Medan.
2. Conducting an initial test before conducting the learning process. This activity is carried out to determine students' initial mastery of the subject matter of human growth and development.
3. The researcher presents the material using the Reflective learning method with the following steps: (a) prepare pictures or pieces of paper (b) provide opportunities to observe the picture (c) students are asked to tell the picture (d) students are asked to match the results of their reflections with what they have learned.

Population

The population of this study were all the students class of VIII Junior High School Bina Bersaudara Medan consisting of three classes totaling 102 people.

Table 2. Population

Class	Jumlah Siswa	Male	Female
VIIIA	40 Students	17 Students	23 Students
VIIIB	32 Students	12 Students	20 Students
VIIIC	30 Students	9 Students	21 Students
Total	102 Students	38 Students	64 Students

Sampel

Sampling in this study with random or random sampling techniques, namely by randomly drawing population classes where each class is entitled to be a sample in the study so that one class is obtained to be used as a research sample, class VIIIA totaling 40 peoples.

Research Instruments and Data Collection Techniques

Before conducting research, the number of pre-test questions was 50 multiple choice questions with 4 choices, namely a, b, c, and, d, and the number of post-test questions was 22 questions given to students to determine learning outcomes. The question grids are made based on learning objectives, so that the grids can be seen in Table 3 below.

Table 3. Science Learning Outcomes Test Grid Students on the Subject Matter of Human Growth and Development Class VIII SMP Bina Bersaudara Medan.

| No | Indicator | % | Cognitive Levels (Bloom) | | | | | | Total of Questions |
			C1 20%	C2 34%	C3 20%	C4 26%	C5	C6	
1.	Describe the stages of human growth and development from infancy, childhood, adolescence, and adulthood.	42%	4,7,8 30	5,9,10, 11,13, 15,17, 20	14,23, 28,43	16,31, 38,46, 47	-	-	21
2.	Explain the differences in characteristics each stage of human development	36%	6,18, 24,41	1,19,26 ,39,50	29,37, 40,44	12,22, 27,45, 48	-	-	18
3.	Explaining the factors of growth and development	18%	36,42	2,3,21	25,49	33,35	-	-	9
4.	Explain the types of infectious diseases	4%	-	-	-	32,34	-	-	2
	Total	100%	10	16	10	13	-	-	50

Description:

C1 = Knowledge C3 = Application C5 = Evaluation
C2 = Understanding C4 = Analysis C6 = Creation

Of the 50 questions selected, the validity of the test is carried out, as for the steps, namely testing the difficulty level of the question, testing the differentiating power of the question, testing the validity of the question, and testing the reliability of the test. After the validity of the test, out of 50 questions, there are 22 questions that are valid and feasible to be used as test instruments in the form of multi choice questions covering growth and development material in humans. The tests conducted in the research class were in the form of an initial test and a final test without changing table 3 of the learning outcomes grid on the subject matter of growth and development in humans above.

1. Pre-test

This test is given before the learning process takes place, this test is to determine the ability of students about the subject matter of human growth and development.

2. Post-test

This is to determine student learning outcomes after the learning process takes place. This test uses multiple choice questions with 4 answer choices (multi choice) which have been tested for difficulty, differentiation, validity and reliability which are in accordance with the standards, so it can be said that this question is suitable to be used as a test instrument. This test is to determine the learning outcomes of students who are taught using the Reflective learning method.

Instrument testing

Before the research was carried out, the questions that would be used as research instruments were first tested. The test of the test instrument was carried out in class IX of Bina Bersaudara Medan Private Junior High School. The test of this instrument includes the level of difficulty of the question, differentiating power, validity test and reliability test. Of the 50 questions, 22 questions were declared worthy of being used as research questions.

1. Difficulty level

To determine the level of difficulty of the question the formula used is :

$$P = \frac{B}{JS} \quad \text{(Arikunto, 2014)}$$

Description:

P = Difficulty index JS = Total number of students taking the test

B = The number of students who answered the question correctly

The questions that have a level of difficulty are 10 items that are classified as difficult, namely on numbers 4, 21, 22, 26, 27, 31, 32, 37, 40, 44. There are 32 question items classified as moderate, namely on numbers 1, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 23, 25, 28, 29, 30, 33, 35, 36, 38, 39, 43, 45, 46, 47, 49, 50, and 8 question items classified as easy, namely on numbers 2, 3, 8, 24, 34, 41, 42, 48. The next step is to test the differentiating power of the question, the questions used are those that have a moderate category only while the questions that have a difficult category are not used or discarded.

2. Question Differentiation

According to Arikunto (2012: 218), the differentiating power of the question is used to determine whether or not a question can distinguish the aspects measured. To determine the differentiating power, the following formula is used:

$$DP = \frac{B_A}{J_A} - \frac{B_B}{J_B} = P_A - P_B$$

Description:

D = Differentiating power B_A = The number of upper group participants who answered the question correctly

J = Number of test takers B_B = The number of lower group participants who answered the question correctly

J_A = Number of upper group participants P_A = Proportion of upper group participants who answered correctly

J_B = Number of lower group participants P_B = Proportion of lower group participants who answered correctly

As for the questions that have sufficient and good differentiation, namely on item number 12 items that are classified as good, namely on numbers 7, 10, 11, 17, 19, 20, 23, 25, 28, 29, 33, 38

and 11 items that are classified as sufficient, namely on numbers 8, 9, 12, 14, 15, 16, 25, 32, 35, 40, Furthermore, testing the validity of the test, the questions used are items that have sufficient and good differentiation. Meanwhile, questions that have sufficient and good differentiation. While the bad category questions are not used or discarded.

Test Validity

A test can be said to be valid if the test can actually measure learning outcomes in understanding the subject matter of human growth and development.
The formula for calculating item validity is:

$$r_{xy} = \frac{N \sum XY - (\sum X)(\sum Y)}{\sqrt{\{N \sum X^2 - (\sum X)^2\}\{N \sum Y^2 - (\sum Y)^2\}}}$$

Description:

N	= Total of students	X	= Item score (number of students who answered correctly)
r_{xy}	= Correlation coefficient between variable x and variable y	Y	= Total question score
XY	= Sum of multiplication of X score and Y score		

Test Reliability

To calculate the reliability of the question, the Kuder Richardson formula (KR-20) is used, namely:

$$r_{11} = \left(\frac{n}{n-1}\right)\left(\frac{S^2 - \sum pq}{S^2}\right)$$

$$S^2 = \frac{k \sum x^2 - (\sum x)^2}{k(k-1)}$$

Description:

r_{11}	= Overall test reliability	Σpq	= The sum of the product of p and q
P	= Proportion of subjects who answered the item correctly	n	= Banyak item
q	= Proportion of subjects who answered the item incorrectly	S^2	= Standard deviation of the test

If it is equal to or greater than 0.70, it means that the learning outcome test being tested for reliability is declared to have high reliability or reliable. If it is smaller than 0.70, it means that the learning outcomes test that is being tested for reliability is declared not to have high reliability or is not reliable (Sudijono 2012: 60).

Data Analysis Technique

The data obtained were analyzed using qualitative descriptive analysis techniques which aim to know the predicate of each aspect of learning effectiveness that has been determined so that it is known whether the learning implemented is effective or not. The data analysis carried out is as follows:

1. Mean

$$\overline{x} = \frac{\sum f_i x_i}{\sum f_i} \qquad \text{(Sudjana, 2016)}$$

Description:
$\overline{x}$ = Mean
fi = Frequency
x_i = value

2. Standard deviation

$$S^2 = \frac{n \sum x_i^2 - (\sum x_i)^2}{n(n-1)}$$

Description:
S^2 = Standard deviation
n = Many samples
x_i = Mean

Data Analysis Requirements Test

1. Normality Test

Data normality test, Liliefors test is used to determine whether the research variables are normally distributed. According to Sudjana (2016: 466) as follows:

a. Observations X_1, X_2, ..., X_n are made into standardized numbers Z_1, Z_2, Z_3, ..., Z_n. By using the formula: $Z_1 = \frac{x_1 - \overline{x}}{s}$ where ($\overline{x}$ and S are the mean and standard deviation of the sample respectively).

b. For each standard number using the standard normal distribution list, then calculate the probability of F (Z_1) = P (Z ≤ Z_2).

c. Calculate the proportion of X_1, X_2,.........., X_n that is less than or equal to Z_1. If this proportion is expressed by S(Z_1) then :

$$S(Z_1) = \frac{many \ldots\ldots\ldots, X_1, X_2, \ldots\ldots\ldots, X_n}{N}$$

d. Calculate the difference between F(Z_1) - S(Z_2), then determine the absolute price.

e. Taking the largest price Between the absolute prices of the difference F(Z_1) - S(Z_2) is called L_O

f. Comparing the L_O price with its critical price at the real level α with the test criteria:
   1) If L_O < L then the sample table is normally distributed.
   2) If L_O > L then the sample table is not normally distributed.

2. Homogeneity Test

The data used the formula for the largest variance compared to the smallest variance with the formula:

$$F_{count} = \frac{Largest \ variance}{Smallest \ variance}$$

Comparing the F_{count} value with F_{table} with the formula:
dk numerator = n – 1 (for largest variance) ; dk denominator = n - 1 (for smallest variant)
significant level (α) = 0.05, then look for it in the F table, with the test criteria:
If Fcount > Ftable means not homogeneous.
If Fcount < Ftable means homogeneous.

3. Hypothesis Test

To determine the hypothesis, the t test is used with a significant level α = 0.05 with degrees of

freedom (dk) = n-1. (Sudjana, 2005: 239). To test whether the research hypothesis is accepted or rejected, statistical testing is carried out with the formula:

$$t = \frac{Md}{\sqrt{\frac{\sum x^2 d}{N\,(N-1)}}}$$

Md   =   Mean of the difference between pretest and posttest

$\sum X^2 d$ =   Sum of squared deviations

N   =   Subjects in the sample

To test the significant effect, the tcount price is consulted to the t distribution table with the criterion t count > t table with a significant level α = 0.05 and dk = n - 1, then the effect is declared significant.

RESULTS AND DISCUSSION
Results

1. Describe Research Data.

       This study aims to determine data on student learning outcomes before and after being taught using the Reflective model, the data is calculated to determine the effect of using the Reflective learning model on student science learning outcomes.

       The data obtained in this study consisted of two types, the first was the initial test data used to see students' initial knowledge of human growth and development material in the class before being given treatment. The second is the final test data or data on student learning outcomes after treatment.

       The test instrument used was 22 questions with 4 answer choices (multiple choice). In the assessment, student learning outcomes are declared complete if the student's score is equal to or higher than the Minimum Completion Criteria (KKM) value, namely 65 which has been determined by Junior High School Bina Bersaudara Medan.

       Based on the pre-test that has been carried out, it is known that the highest score of students is 72.72 as many as 6 people and the lowest score is 36.36 as many as 5 people.

       To find the normality test on the pre-test and post-test, first find the average standard deviation.

Table 4. List of Frequency Distribution of Students' Pre Test Score

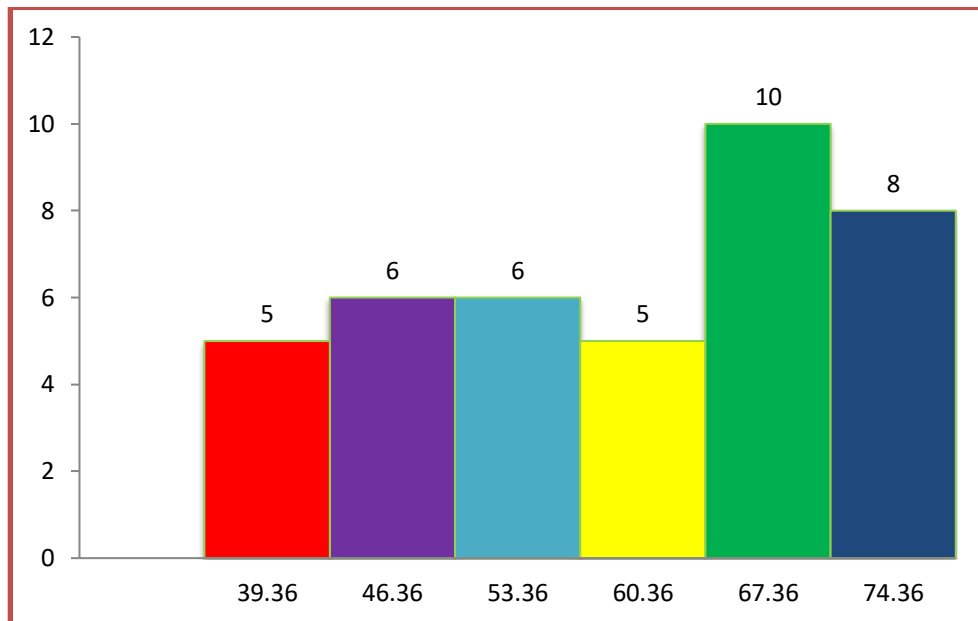| Interval	f	xi	x²	fi.xi	fi.xi²	Frelatif
36,36-42,36	5	39,36	1549,21	196,8	7746,048	12,5
43,36-49,36	6	46,36	2149,25	278,16	12895,5	15
50,36-56,36	6	53,36	2847,29	320,16	17083,74	15
57,36-63,36	5	60,36	3643,33	301,8	18216,65	12,5
64,36-70,36	10	67,36	4537,37	673,6	45373,7	25
71,36-77,36	8	74,36	5529,41	594,88	44235,28	20
	40	341,16	20255,86	2365,4	145550,9	100

Figure 1. Histogram Graph of Pre Test Results on the subject matter of human growth and development

Diagram of the pre-test results on human growth and development material, from the table above it is known that the results of giving the pre-test can be obtained the lowest score is 36.36 and the highest score is 72.72. The average value ($\bar{x}$) is 59.13 and the Standard Deviation (S) value is 12.06.

Table 5. List of Frequency Distribution of Student Post Test Values

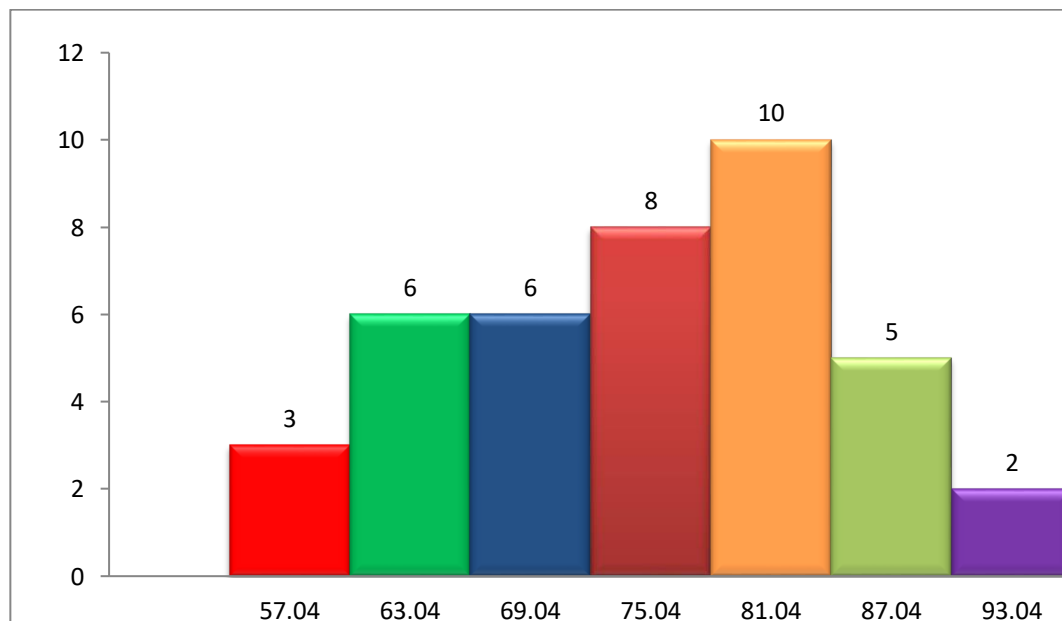| interval	fi	xi	xi²	fi.xi	fi xi²	Frelatif
54,54-59,54	3	57,04	3253,56	171,12	9760,68	7,5
60,54-65,54	6	63,04	3974,04	378,24	23844,25	15
66,54-71,54	6	69,04	4766,52	414,24	28599,13	15
72,54-77,54	8	75,04	5631,00	600,32	45048,01	20
78,54-83,54	10	81,04	6567,48	810,4	65674,82	25
84,54-89,54	5	87,04	7575,96	435,2	37879,81	12,5
90,54-96,54	2	93,54	8749,73	187,08	17499,46	5
	40	525,78	40518,30	2996,6	228306,16	100

Figure 2. Histogram Graph of Post Test on the subject matter of growth and development.

From the table above, it is known that the results of giving the post test obtained the lowest value is 54.54 and the highest value is 90.90. The average value ($\bar{x}$) is 74.91. And the Standard Deviation (S) value is 8.89.

2. Research Data Analysis Test

Normality test

Data normality testing is done with the Liliefors normality test. From the calculation results obtained L count < L table or 0.109 < 0.140 so it can be concluded that the data from the Pre Test is normally distributed. While after implementing the Reflective learning model obtained L count < L table or 0.128 < 0.140 so it can be concluded that the data from the Pre Test is normally distributed.

Table 6. Data Normality Test Results.

Group	L_{count}	L_{table}	Conclusion	Description
Pre Test	0,128	0,140	0,128<0,140	Normal
Pos Test	0,109	0,140	0,109<0,1401	Normal

Homogeneity test

Data homogeneity testing is carried out to determine whether the sample used in the study is homogeneous or not and whether the sample used in this study can represent the entire existing population. Based on the results of the calculation obtained the price of F count 1.94 then compared with F table obtained F count < F table or 1.94 < 2.14 so that the sample comes from the group in this study is declared homogeneous. This means that the data obtained can represent the entire population.

Table 7. Homogeneity Test Results

Group	Varians	F_{hitung}	F_{tabel}	α	Description
Pre Test	145,44	1,94	2,14	0,05	Homogen
Pos Test	74,82				

Hypothesis Test

The hypothesis was tested using the t test. Based on the calculation, the tcount price = 9.5014 was obtained, then this price was consulted with the t table at α = 0.05 dk = n-1 = 39 and obtained the t table price of 2.14. It can be concluded that the price of t count> t table (9.5014> 1.9872) so that the hypothesis is declared correct and acceptable, that is, there is a significant positive effect of using the Reflective learning model on the results of human growth and development material.

Based on the results of the hypothesis calculation, a curve can be drawn as shown below:
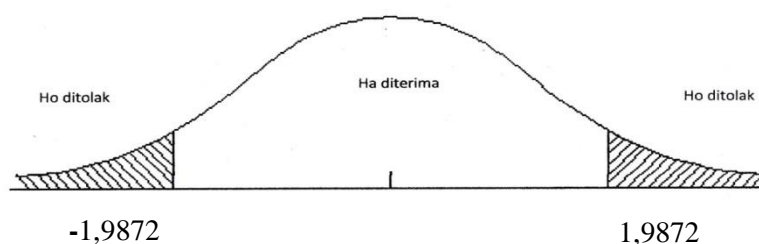
Figure 3. Hypothesis curve

DISCUSSION

Discussion of Research Results

The results showed that there was a difference in the average scores of the pre-test and post-test, amounting to 59.13 and 74.91 respectively. It is known that in the pre test the highest score was 16 with a value of 72.72 and the lowest score was 5 with a value of 36,36. While in the post test the highest score was 20 with a value of 90.90 and the lowest score was 12 with a value of 54,54. After obtaining the pre-test and post-test scores, the next step is data processing which includes testing the validity of the test, testing reliability, difficulty level and differentiating power.

These values are then processed with the "t" test formula After testing the hypothesis, the value $\sum x^2 d = 4882,978$ value $Md = 40$. From this formula, the value of tcount = 1.94 is obtained. To test the significant effect of using the Reflective model on student learning outcomes, the price is consulted to the t distribution value table, with the criteria t count > t table and a significant level $\alpha = 0.05$ and dk = 39 with a total of 40 students obtained t table = 2.14 then obtained t count > t table, namely 9.5014 >1.9872. Thus it is concluded that the effect is said to be significant, this indicates that the alternative hypothesis (Ha) can be accepted.

Research, reflective learning models can improve learning outcomes because these models can make it easier for students to understand the teaching material because through the basic images conveyed to students, so that learning is more interesting because it is in accordance with daily experience (Istarani2011: 223) in his research also revealed that the application of reflective learning models can increase student scores.

Thus it is concluded that the effect is said to be significant, this shows that the alternative hypothesis (Ha) can be accepted. Through the Reflective model, the teacher teaches the material of Human Growth and Development through pieces of images so that conveying the material is easier and students become more understanding in absorbing information from the teacher and adding insight to students. This can be seen from the difference in pre-test and post-test scores obtained by students. Furthermore, researchers tested using the t test and obtained significant results.

CONCLUSION

Based on the results of research and data analysis conducted on the Effect of the Use of Reflective Models on Student Learning Outcomes on the Subject Matter of Human Growth and Development in Class VIII of Junior High School Bina Bersaudara Medan:

1. The average pre-test score before learning was 59.13 and the standard deviation was 12.06 and the highest score was 72.72 and the lowest score was 36,36.
2. The average post-test score was 74.91 and the standard deviation was 9.89 and the highest score was 90.90 and the lowest score was 54.54 students who reached the KKM 31 people (77.5%), and students who did not reach the KKM 9 people (22.5%) after being given the Reflective learning model. This shows that there is an increase in student learning outcomes after being given this treatment.

3. There is a significant effect of using the Reflective learning model on student learning outcomes in class VIII of Junior High School Bina Bersaudara Medan.

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AUTHOR CONTRIBUTION STATEMENT

In connection with the implementation of the research, there are several things that the researcher suggests, namely that the subject teacher should be pleased to use the Reflective model in science lessons as an alternative to improving student learning outcomes, and for readers, especially researchers, so that it is useful for teaching and research in the future.

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