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Utilization of Microsoft Mathematics Applications as Learning Tool in Improving Student Learning Outcomes

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Abstract:
This research is quasi-experimental. Which aims to determine the differences in student learning outcomes taught by learning by using Microsoft Mathematics and Conventional Learning applications on the subject of Two Variable Linear Equation Systems in class VIII SMP Kemala Bhayangkari 1 Medan. The sample in this study was carried out by random sampling from 2 existing classes, namely class VIIIA and VIIIB. In the homogeneity test, the test data obtained was F_{count} = 1.605. After comparing the price of F_{count} with F_{table}, with n = 54 and the real level α = 0.05, the price of F_{table} = 2.48 is obtained. It turns out that F_{count} <F_{table} (1.605 < 2.48), then the student learning outcomes for both classes have the same variance in other words the two classes are homogeneous. In testing the hypothesis, it is obtained t_{count} = 4.064 and the value of t_{table} at dk = 52 and the real level α = 0.05 is t table = 1.675. Then t_{count}> t_{table} (4.064 > 1.675). So that the average student learning outcomes in the experimental class are higher than the control class and from the results of hypothesis testing are significantly fulfilled, it can be concluded that the learning outcomes of students using Microsoft Mathematics assisted learning are higher than conventional learning.

Keyword: Microsoft Mathematics, Learning Outcomes, SPLDV

INTRODUCTION

Increasing human resources plays an important role in dealing with advances in technology and information that have spread in almost all aspects of life. Education is one of the government's efforts to produce quality human resources.

Education is a learning process that is carried out consciously in order to have an understanding and be able to develop the potential that exists in itself so that it becomes a critical human being in thinking. In line with Law no. 20 of 2003, the meaning of education is a conscious and planned effort to create an atmosphere of learning and the 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, the community, the nation. , and country.

Mathematics is one of the basic sciences that can foster the reasoning abilities of students and is very much needed in the development of science and technology. As stated by Heri Wahyudi, S.Pd. (2019) that: “Mathematics is a very important subject, because it is very dominant in developing science and technology.

Students still consider mathematics to be difficult and less desirable. In delivering the material used by the teacher by using conventional methods such as lectures, questions and answers, discussions so that students often have difficulty understanding the material that has been delivered. From the results of interviews conducted on November 21, 2019 to teachers in the field of mathematics studies, in the teaching and learning process, the teacher only provides material with conventional methods, in other words, the teacher never conducts learning using mathematics learning software as a medium such as GeoGebra, Microsoft Mathematics and others. -other. This requires other media that can help students understand mathematics. According to Kustandi (2011), states that: "in education, the media is functioned as a means to achieve learning goals. Because the information contained in the media must be able to involve students, either in mind or mentally or in the form of real activities, so that learning can occur ".

In the face of the era of the industrial revolution 4.0, where information and communication technology is developing very rapidly and is prioritized in everyday life. With the development of technology, educators must now use digital-based mathematics learning media such as GeoGebra, Microsoft Mathematics and others.

According to Kusumah (2003), computer programs are ideal for use in learning mathematical concepts that require high accuracy, repetitive concepts or principles, precise, fast, and accurate graphic completion. Furthermore, Kusumah (2003) also argues that computer-assisted learning innovations are very good to be integrated in learning mathematical concepts, especially those concerning geometric transformations, calculus, statistics, and function graphics. From the quote above, it can be concluded that mathematics learning must be innovative and creative so that students are happy and motivated in learning. Besides being fun, learning media must be able to provide experience and meet the needs of individual students, because each student has different abilities. Alternative learning media that are in accordance with current developments and can help teachers in delivering abstract material is computer media. One of the computer programs (software) that can be used in mathematics learning, especially the Two Variable Linear Equation System is Microsoft Mathematics. This program can be used to improve students' understanding of the concepts that have been learned and as a means to introduce or construct new concepts.

Microsoft Mathematics is a kind of calculator software but has very perfect characteristics and has the capacity to describe specifically step by step to solve a problem in an exact science discipline, not just mathematics but for skills in the fields of physics and chemistry. However, very detailed descriptions can only be found in mathematical problems. Part of the features of this program is that it is freely provided free of charge by Microsoft Mathematics and supports 32-bit and 64-bit operating system interfaces. According to Hernawati, (2012) states that Microsoft Math can be used for students as a learning medium to understand mathematics. The features of Microsoft Math are:

1. Guide in completing calculations in a step-by-step and interactive manner.
2. Graphing calculator can adjust the display of the data in 2 dimensions as well as 3 dimensional color.
3. Equipped with a database of important formulas up to more than 100 formulas that are often used in calculations.
4. Has many solving methods that help complete calculations quickly.

5. Has a complete Conversion Tool unit including length, area, volume, weight, temperature, pressure, energy, power, speed, time, and much more.

RESEARCH METHOD

The specific objectives of this study are: To find out whether learning using the Microsoft Mathematics application can improve student learning outcomes on the subject of Two Variable Linear Equation Systems in class VIII SMP Kemala Bhayangkari 1 Medan.

This research was conducted at SMP Kemala Bhayangkari 1 Medan. Jalan K.H. Wahid Hasyim no. 1 Medan.

Researcher's sampling was carried out randomly, meaning that each class had the same opportunity to be sampled. The sample in this research consisted of two classes, one class was taken as the experimental class, namely class VIIIA and the other class as the control class, namely class VIIIB.

This research method is a quasi-experimental. The study was conducted to determine differences in student learning outcomes in the experimental class and the control class by collecting the results of the tests carried out and then calculating the average, standard deviation, data normality test, homogeneity test and hypothesis testing.

RESEARCH RESULTS AND DISCUSSION

Presentation of mean and standard deviation

This research was conducted at SMP Kemala Bhayangkari 1 Medan, totaling 54 students, consisting of 27 students in class VIII-A and 27 students in VIII-B. This study involved two research groups, namely the experimental class in class VIII-A and the control class in class VIII-B. In the experimental class using a learning model with Microsoft Mathematics and in the control class using a conventional learning model.

In this study, researchers obtained data from the results of the pre-test and post-test conducted on the experimental class and the control class. The results data obtained can be seen in the following table:

Table 1 Average Value of Student Learning Outcomes and Standard Deviation in the Experimental Class

	Tes Awal	**Tes Akhir**
$\sum X$	1320	2165
$\sum X^2$	71900	177075
$\bar{X}$	48.89	80.19
SD	10.13	9.95

Table 2 Average Value of Student Learning Outcomes and Standard Deviation in Control Class

	Tes Awal	**Tes Akhir**
$\sum X$	1280	1855
$\sum X^2$	73200	128925
$\bar{X}$	47.41	68.70
SD	13.18	10.79

From the results obtained from the initial test and the final test carried out in both classes, it can be concluded that the average and standard deviation in table 1 and table 2 states that learning assisted by Microsoft Mathematics in the pre-test results in a class average score

of 48.89, and deviation the default is 10.13. And in the final test, the average value is 80.19, and the standard deviation is 9.95.

In conventional learning the mean value of the initial test was 47.41, the standard deviation was 13.18. And in the final test with an average of 68.70, and the standard deviation is 10.79.

From the results obtained, it can be concluded that the increase in the initial test and final test in the experimental class with Microsoft Mathematics based learning is 31.3. While in the control class with conventional learning it was 21.29. So the learning outcomes assisted by Microsoft Mathematics are higher than conventional learning.

Data normality test presentation

Table 3 The final test normality test (post-test) experimental class

Xi	Fi	Fk	Zi	F(Zi)	S(Zi)	F(Zi)-S(Zi)	|F(Zi)-S(Zi)|
55	1	1	-2.5312	0.0057	0.0370	-0.0314	0.0314
60	1	2	-2.0287	0.0212	0.074074	-0.0528	0.0528
70	3	5	-1.0236	0.1530	0.185185	-0.0322	0.0322
75	5	10	-0.5211	0.3011	0.3704	-0.0692	0.0692
80	6	16	-0.0186	0.4926	0.592593	-0.1000	0.1000
85	3	19	0.4839	0.6858	0.7037	-0.0179	0.0179
90	6	25	0.9864	0.8380	0.925926	-0.0879	0.0879
95	2	27	1.4889	0.9317	1	-0.0683	0.0683

The results of the calculations for the final test on the data of learning treatment assisted by Microsoft Mathematics with a sample size of 27 students, the class average was 80.2 and the standard deviation was 9.95. From the critical value table L for the Liliefors test for n = 27 and the real level $\alpha = 0.05$, it is obtained that $L_{table} = 0.161$, from the table above it is obtained that L count = 0.100 and the variance group is 12.41, then $L_{count} < L_{table}$ (0.100 < 0.161). Then the data above comes from a group of normally distributed samples

Table 4 control class final test normality test

Xi	Fi	Fk	Zi	F(Zi)	S(Zi)	F(Zi)-S(Zi)	|F(Zi)-S(Zi)|
45	1	1	-2.0628	0.0196	0.0370	-0.0175	0.0175
50	1	2	-1.6168	0.0530	0.0741	-0.0211	0.0211
55	1	3	-1.1708	0.1208	0.1111	0.0097	0.0097
60	5	8	-0.7248	0.2343	0.2963	-0.0620	0.0620
65	5	13	-0.2788	0.3902	0.4815	-0.0913	0.0913
70	3	16	0.1673	0.5664	0.5926	-0.0262	0.0262
75	6	22	0.6133	0.7301	0.8148	-0.0847	0.0847
80	2	24	1.0593	0.8553	0.8889	-0.0336	0.0336
85	2	26	1.5053	0.9339	0.9630	-0.0291	0.0291
90	1	27	1.9513	0.9745	1	-0.0255	0.0255

The calculation results for the final test on conventional learning treatment data with a sample size of 27 students, the class average is 68.13 and the standard deviation is 11.21. From the critical value table L for the Liliefors test for n = 27 and the real level $\alpha = 0.05$, it is obtained $L_{table} = 0.161$, from the table above it is obtained that $L_{count} = 0.091$ and the variance group is

16.46, then $L_{count} < L_{table}$ (0.091 < 0.161). Then the data above comes from a group of normally distributed samples.

Data homogeneity test presentation

Table 5 MSB Homogeneity Test

No	Pre Tes	Post Tes	**(ai+bi)**	**[(ai+bi)-x(ai+bi)]**	**[(ai+bi)-x(ai+bi)]^2**
1	50	70	120	-2.593	6.722
2	40	95	135	12.407	153.944
3	50	55	105	-17.593	309.499
4	40	75	115	-7.593	57.647
5	40	75	115	-7.593	57.647
6	30	90	120	-2.593	6.722
7	40	85	125	2.407	5.796
8	50	75	125	2.407	5.796
9	50	85	135	12.407	153.944
10	50	80	130	7.407	54.870
11	60	80	140	17.407	303.018
12	30	70	100	-22.593	510.425
13	40	75	115	-7.593	57.647
14	70	80	150	27.407	751.166
15	50	60	110	-12.593	158.573
16	50	90	140	17.407	303.018
17	60	80	140	17.407	303.018
18	60	95	155	32.407	1050.240
19	50	80	130	7.407	54.870
20	70	90	160	37.407	1399.314
21	50	75	125	2.407	5.796
22	50	90	140	17.407	303.018
23	60	85	145	22.407	502.092
24	40	70	110	-12.593	158.573
25	50	80	130	7.407	54.870
26	40	90	130	7.407	54.870
27	50	90	140	17.407	303.018
28	30	70	100	-22.593	510.425
29	40	85	125	2.407	5.796
30	30	75	105	-17.593	309.499
31	50	85	135	12.407	153.944
32	50	80	130	7.407	54.870
33	40	65	105	-17.593	309.499
34	40	55	95	-27.593	761.351
35	50	60	110	-12.593	158.573
36	60	60	120	-2.593	6.722
37	50	75	125	2.407	5.796
38	40	50	90	-32.593	1062.277

39	40	60	100	-22.593	510.425
40	30	65	95	-27.593	761.351
41	70	75	145	22.407	502.092
42	40	65	105	-17.593	309.499
43	50	75	125	2.407	5.796
44	40	90	130	7.407	54.870
45	30	45	75	-47.593	2265.055
46	50	65	115	-7.593	57.647
47	60	75	135	12.407	153.944
48	70	75	145	22.407	502.092
49	50	60	110	-12.593	158.573
50	30	60	90	-32.593	1062.277
51	60	65	125	2.407	5.796
52	70	70	140	17.407	303.018
53	40	70	110	-12.593	158.573
54	70	80	150	27.407	751.166
	Jumlah		6620		17987.037
	Mean		122.5926		

n = 54

MSB = $\frac{\sum[(a_i+b_i)-x(a_i+b_i)]^2}{2\cdot(n-1)} = \frac{17987.03704}{2\cdot(54-1)}$ = 169,689

Table 7 MSW Homogeneity Test

No	Pre Tes	Post Tes	**(ai-bi)**	**[(ai+bi)-x(ai+bi)]**	**[(ai+bi)-x(ai+bi)]^2**
1	50	70	-20	6.296	39.643
2	40	95	-55	-28.704	823.903
3	50	55	-5	21.296	453.532
4	40	75	-35	-8.704	75.754
5	40	75	-35	-8.704	75.754
6	30	90	-60	-33.704	1135.940
7	40	85	-45	-18.704	349.829
8	50	75	-25	1.296	1.680
9	50	85	-35	-8.704	75.754
10	50	80	-30	-3.704	13.717
11	60	80	-20	6.296	39.643
12	30	70	-40	-13.704	187.791
13	40	75	-35	-8.704	75.754
14	70	80	-10	16.296	265.569
15	50	60	-10	16.296	265.569
16	50	90	-40	-13.704	187.791
17	60	80	-20	6.296	39.643
18	60	95	-35	-8.704	75.754
19	50	80	-30	-3.704	13.717
20	70	90	-20	6.296	39.643

21	50	75	-25	1.296	1.680
22	50	90	-40	-13.704	187.791
23	60	85	-25	1.296	1.680
24	40	70	-30	-3.704	13.717
25	50	80	-30	-3.704	13.717
26	40	90	-50	-23.704	561.866
27	50	90	-40	-13.704	187.791
28	30	70	-40	-13.704	187.791
29	40	85	-45	-18.704	349.829
30	30	75	-45	-18.704	349.829
31	50	85	-35	-8.704	75.754
32	50	80	-30	-3.704	13.717
33	40	65	-25	1.296	1.680
34	40	55	-15	11.296	127.606
35	50	60	-10	16.296	265.569
36	60	60	0	26.296	691.495
37	50	75	-25	1.296	1.680
38	40	50	-10	16.296	265.569
39	40	60	-20	6.296	39.643
40	30	65	-35	-8.704	75.754
41	70	75	-5	21.296	453.532
42	40	65	-25	1.296	1.680
43	50	75	-25	1.296	1.680
44	40	90	-50	-23.704	561.866
45	30	45	-15	11.296	127.606
46	50	65	-15	11.296	127.606
47	60	75	-15	11.296	127.606
48	70	75	-5	21.296	453.532
49	50	60	-10	16.296	265.569
50	30	60	-30	-3.704	13.717
51	60	65	-5	21.296	453.532
52	70	70	0	26.296	691.495
53	40	70	-30	-3.704	13.717
54	70	80	-10	16.296	265.569
	Jumlah		-1420		11209.25926
	Mean		-26.2963		

n = 54

MSW = $\frac{\sum[(a_i+b_i)-x(a_i+b_i)]^2}{2\cdot(n-1)} = \frac{11209,25926}{2\cdot(54-1)}$ = 105,7477

$F_{count} = \frac{MSB}{MSW} = \frac{169,689}{105,7477}$ = 1,604659

F_{table} = 2.48

From the calculation results obtained test data Fcount = 1.605. After comparing the price of F_{count} with F_{table} with n = 54 and the real level α = 0.05, the price of Ftable = 2.48 is

obtained. It turns out that $F_{count} < F_{table}$ (1.605 < 2.48), then the student learning outcomes for both classes have the same variance in other words the two classes are homogeneous.

Hypothesis testing

It is known that both the experimental class and the control class are normally distributed and have the same or homogeneous variance, so hypothesis testing is used t-test statistics.

Table 8 t-Test: Two-Sample Assuming Equal Variances

	Geogebra	*Konvensional*
Mean	80.18518519	68.7037037
Variance	99.002849	116.5242165
Observations	27	27
Pooled Variance	107.7635328	
Hypothesized Mean Difference	0	
Df	52	<= df/derajat kebebasan
t Stat	4.063767978	<= Nilai T Hitung
P(T<=t) one-tail	8.18625E-05	
t Critical one-tail	1.674689154	<= Nilai T Tabel
P(T<=t) two-tail	0.000163725	
t Critical two-tail	2.006646805	

From the data obtained tcount = 4.064 and the value of t table at dk = 52 and the real level α = 0.05 is t_{table} = 1.675. In accordance with the criteria for testing the hypothesis, accept H_0 if $-t_{\left(1-\frac{1}{2}\alpha\right)} < t_{hitung} < t_{\left(1-\frac{1}{2}\alpha\right)}$, it turns out that t_{count} is not in that interval, H_0 is rejected and H_a is accepted, which means there are differences in student learning outcomes using Microsoft Mathematics assisted learning with conventional learning.

CONCLUSION

After learning assisted with Microsoft Mathematics in the experimental class and conventional learning in the control class, the difference between the initial test and the final test in the experimental class is 31.3. Whereas in the control class, the difference between the pre-test and the final test is 21.29. This shows that the increase in student learning outcomes in the experimental class is higher than the control class. From the data obtained, it can be seen that the increase in learning outcomes in the experimental class is higher than the control class. Therefore, it can be concluded that the computer assisted learning model can improve student learning outcomes. The results of this study are supported by previous research by Awaludin Fitra and M. Romi S. (2018) which states that learning mathematics should be directed at activities that encourage students to be mentally, physically and socially active to understand concepts and procedures. mathematics.

In the homogeneity test, the test data obtained was Fcount = 1.605. After comparing the price of Fcount¬ with Ftable with n = 54 and the real level α = 0.05, the price of Ftable = 2.48 is obtained. It turns out that $F_{count} < F_{table}$ (1.605 < 2.48), then the student learning outcomes for both classes have the same variance in other words the two classes are homogeneous.
In testing the hypothesis it was obtained thiutng = 4.064 and the value of t table at dk = 52 and the real level α = 0.05 was t table = 1.675. Then $t_{count} > t_{table}$ (4.064 > 1.675). Because the average

student learning outcomes in the experimental class are higher than the control class and the results of hypothesis testing are significantly fulfilled, it can be concluded that the learning outcomes of students using Microsoft Mathematics assisted learning are better than conventional learning.

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