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Comparative Study of Water Based on Microsoft Mathematics With Traditional Learning

Masdelima Azizah Sormin*, Lisna Agustina, Benny Sofyan Samosir, Lili Herawati Parapat, Khairunnisa, Aisyah Karimah

Mathematics Education Study Program, Muhammadiyah University of South Tapanuli.
Road Sultan Mohd. Arief Number. 32 Padangsidimpuan City
Corresponding Email: masdelima@um-tapsel.ac.id*, lisna.agustina@um-tapsel.ac.id, bennysofyansamosir@um-tapsel.ac.id, lili.herawati@um-tapsel.ac.id, khairunnisah@um-tapse.ac.id, karimahaisyah047@gmail.com

Abstract

The aim of the study was to see differences in learning outcomes in mathematics using AIR learning based on Microsoft Mathematics and traditional learning in class XI MAS Pondok Pesantren Modern K.H. Ahmad Dahlan Sipirok. This type of quantitative research and using test instruments. The sample consisted of 2 classes, namely the experimental class (AIR learning based on Microsoft Mathematics) and the control class (Traditional learning). Analysis of the data used is a prerequisite test using the average similarity test and hypothesis testing by calculating the average. The research hypotheses: 1) Knowing the increase in students' mathematics learning outcomes by using Water-Based Microsoft Mathematics learning and Traditional learning, 2) Knowing the differences in increasing mathematics learning outcomes between Water-Based Microsoft Mathematics learning and Traditional learning. After the research was carried out, the results obtained that there were differences between learning Water-Based Microsoft Mathematics and Traditional learning. The average test of students' mathematics learning outcomes through AIR learning based on Microsoft Mathematics obtained 76.66% of the 30 students who took the test or met the minimum completeness criteria (KKM), namely 75%. And for the results of student activities to obtain an overall percentage value of 81%, so for the results of student activities to obtain an overall percentage value of 80%. Meanwhile, the average test score for students' mathematics learning outcomes through traditional learning reached 84.6% of the 25 students who took the test or met the minimum completeness criteria (KKM), namely 75%. And for the results of student activities to obtain an overall percentage value of 80%. Both learning are equally good to use in the learning learning process. However, it can be seen from the results obtained that traditional learning has higher results compared to AIR learning based on Microsoft Mathematics. One of the obstacles that causes this to happen is the lack of internet network and frequent power outages. And for today's students miss the process of learning while playing. And they get it during the traditional learning process (bombing games). Target Outcome of Scientific Publication in Sinta National Journal with ISSN.

Keywords:

AIR Learning Based on *Microsoft Mathematics*, Traditional Learning, Mathematics Learning Outcomes

A. INTRODUCTION

Along with the times marked by advances in internet-based information technology with the name industrial revolution 4.0, it is one of the challenges for the government, especially in the world of education. Where there has been no significant increase in human resources in the educational environment both on the part of educators and students. This is evidenced by Indonesia's low ranking based on the PISA assessment in achieving abilities in the fields

of Mathematics and Reading in 2018. In the field of mathematics Indonesia is ranked 73 out of 79 countries, while reading ability is ranked 74 out of 79 countries (Tohir, 2019) [1]. This fact proves that the learning process in Indonesia, especially in the field of mathematics, is still not successful. The low ability of students in the field of mathematics is also stated by several research results, including according to the results of research conducted by Fitra Surya (2017) which explains that students who have completed KKM 65 are 48%. This is in line with research conducted by Suarni (2019) which explains that students who have completed KKM 65 are 45%. The low results of student achievement in mathematics are partly due to teacher-centered learning. Learning that does not invite students to practice problem solving and the learning model used by the teacher is not suitable for being able to explore mathematical abilities on their own. According to Zulyadaini (2017) that the majority of teachers still tend to use conventional learning models or learning that does not provide students with direct experience in solving mathematical problems. One of them is on matrix material.

Knowledge of matrices is very useful for students to build spatial abilities, matrix reasoning abilities, and strengthen mathematical proof (Edward, 2014: 187) [2]. These abilities (Patterson, 2014: 90) can make students explore abstract mathematical concepts about the concepts of congruence, symmetry, congruence, and parallel lines, enrich students' experiences, thoughts and imaginations, and improve students' spatial abilities.

According to the description above, it is necessary to improve by replacing conventional learning concepts with learning models that directly invite students to practice solving mathematical problems. The learning in question is AIR learning based on Microsoft Mathematics. AIR learning based on Microsoft Mathematics is an educational program, created for the Microsoft Windows operating system, which helps users to solve math problems (Hernawati, 2019) [3]. The features of this application are as a graphing calculator and unit converter. The app also has a triangle, solver, and equation solver that provide step-by-step solutions for each problem, excellent features for learning to solve various math problems. Utilization of the Microsoft Mathematics program using a computer and Android can be done by downloading it on the Play Store with the Microsoft Mathematics keyword. The use of this program is free of charge (free) so that this program can be accessed easily by all parties, both teachers and students. Learning by using the Microsoft Mathematics application is expected to make learning interesting and more varied.

With the sophistication of technology in this era, we have also forgotten and even destroyed traditional learning, namely learning using traditional games. One alternative is traditional learning, namely traditional games. Traditional games have many potential roles in learning mathematics. Schaelling and Barta stated that games are one of six culturally universal mathematical activities because games are very rich in mathematical content. In addition, playing games that contain elements of mathematics is a vital human activity because games form communities and increase skills, intellectuality, and problem-solving abilities in a fun way (Schaelling & Barta, 2018).[4] One of the traditional games that can be used as context is the traditional game of bom-boman. The traditional bomb-boman game in question is a game with paper and pen as media, where students play by bombing their opponents with pen ink attached to the intended object. The student will win the game if he can bomb more opponents, where to bomb opponents he must have a strategy to hit the target. Right on target, the pen ink tracing must be right on target with the same shadow size. Bomb-boman game aims to create a fun learning atmosphere because it can minimize student boredom. A conducive learning atmosphere can make it easier for students to understand the material provided. Therefore, with the title "Comparative Study of Microsoft Mathematics-Based Water Learning with Traditional Learning". This is expected to improve students' mathematics learning outcomes in matrix material in class

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XI MA. Pondok Pesantren K.H. Ahmad Dahlan Sipirok.

B. METHOD

This type of quasi-experimental research is to look at differences in student learning outcomes that are treated in the form of learning using AIR learning based on Microsoft Mathematics as an experimental class and traditional learning as a control class. The research instrument is in the form of lesson plans lesson plans and matrix test instruments. [5] This research was conducted at the Modern K.H Ahmad Dahlan Sipirok Islamic Boarding School which consisted of 2 classes, namely class XI- 1 as the experimental class (AIR Learning Based on Microsoft Mathematics) which consisted of 30 students and class XI- 2 as the control class (Traditional Learning) which consisted of 25 students.

Before the test is given, validity, reliability, differentiability and index of difficulty are tested on the test instrument. Then a two-party test was carried out with a significance level of 0.05. This test aims to test the similarity of the two variances. If Lo< Llabel then Ho is rejected and if Lo> Llabel then Ho is accepted. Where Fα(v1,v2) is obtained from the frequency F with probability α, while dk quantifier = (n-1) and dk denominator = (n-1) for a significant level of 0.05.

Gain is the difference in the value of the results of learning mathematics with AIR learning based on Microsoft Mathematics and traditional learning, so the Gain Normality test (N-Gain) is used. The test technique used is in accordance with the results of the analysis requirements test. If the distribution of the average overall score of mathematics learning outcomes for both classes is normally distributed and has a homogeneous variance, then a parametric statistical test is used to test the hypothesis. The type of parametric statistical test used is the t-test.

The research hypothesis is to see differences in student mathematics learning outcomes through AIR learning based on Microsoft Mathematics and Traditional learning in MA. Pondok Pesantren K.H. Ahmad Dahlan Sipirok.

Ho : $\mu_1 = \mu_2$: There is no difference in student mathematics learning outcomes between AIR learning based on Microsoft Mathematics and traditional learning.

H1 : $\mu_1 > \mu_2$: There are differences in student mathematics learning outcomes between AIR learning based on Microsoft Mathematics and traditional learning.

μ_1 : Student learning outcomes through AIR learning based on Microsoft Mathematics in MA. K.H. Ahmad Dahlan Sipirok Modern Islamic Boarding School.

μ_2 : The results of learning mathematics through traditional learning in MA. K.H. Ahmad Dahlan Sipirok Modern Islamic Boarding School.

C. RESULTS AND DISCUSSION

This study aims to determine the comparative study of AIR learning based on Microsoft Mathematics with traditional learning in the process of learning mathematics. The differences in question include differences in student mathematics learning outcomes. Based on students' math scores in answering tests.

Instrument Validation Results

Learning tools that have been prepared, namely test instruments, are tested for validity first. As Sugiyono (2011: 348) suggests that a valid instrument means that the measuring instrument used to obtain (measure) data is valid. Valid means that the instrument can be used to measure what should be measured. Following are the results of the validity test:

Table 1. Test Validity

Question Number	r_{count}	r_{table}	Information
1	0,624	0,36	Valid
2	0,544	0,36	Valid
3	0,553	0,36	Valid
4	0,597	0,36	Valid
5	0,425	0,36	Valid

Table 2. Test Reliability

r_{count}	r_{table}	Information
0,425	0,36	Reliabel

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Table 3. Difficulty Level

Question Number	Difficulty Level	Information
1	0,658	Currently
2	0,8	Easy
3	0,741	Easy
4	0,783	Easy
5	0,708	Easy

Table 4. Discriminating Power Table

Question Number	Discriminating Power	Information
1	0,218	Enough
2	0,187	Bad
3	0,125	Bad
4	0,281	Enough
5	0,125	Bad

Mathematical Test Results through AIR Learning Based on Micrososft Mathematisc

The results of the study of students' mathematics learning through AIR-Based Micrososft Mathematics learning with the subject matter of the matrix. Then the results obtained from the test can be seen in the following table:

Table 5. Math Learning Test Results Through AIR Learning Based on Micrososft Mathematisc

Number	Student Code	Score					Total Score	Mark	Information
		1	2	3	4	5			
1	A – 1	4	3	3	4	3	17	85	Complete
2	A – 2	3	4	3	3	3	16	80	Complete
3	A – 3	2	3	3	3	3	14	70	Not Complete
4	A – 4	3	4	4	3	3	17	85	Complete
5	A – 5	3	3	3	3	3	15	75	Complete
6	A – 6	4	3	3	3	3	16	80	Complete
7	A – 7	3	3	3	4	3	16	80	Complete
8	A – 8	3	3	2	3	4	15	75	Complete
9	A – 9	2	4	3	4	3	16	80	Complete
10	A – 10	2	3	3	3	2	13	65	Not Complete
11	A – 11	2	3	3	3	4	15	75	Complete
12	A – 12	3	3	4	3	3	16	80	Complete
13	A – 13	2	4	3	4	3	16	80	Complete
14	A – 14	3	4	4	3	2	16	80	Complete
15	A – 15	3	3	3	4	3	16	80	Complete
16	A – 16	3	4	3	3	3	16	80	Complete
17	A – 17	3	3	3	3	3	15	75	Complete
18	A – 18	3	3	3	3	3	15	75	Complete
19	A – 19	2	3	3	1	3	12	60	Not Complete
20	A – 20	2	3	2	2	2	11	55	Not Complete
21	A – 21	2	2	3	3	2	12	60	Not Complete
22	A – 22	2	3	2	2	2	11	55	Not Complete
23	A – 23	2	2	2	3	3	12	60	Not Complete
24	A – 24	3	4	3	3	2	15	75	Complete
25	A – 25	2	3	3	4	3	15	75	Complete
26	A – 26	3	3	3	4	2	15	75	Complete

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Number	Student Code	Score					Total Score	Mark	Information
		1	2	3	4	5			
27	A – 27	2	3	3	4	3	15	75	Complete
28	A – 28	3	4	2	3	3	15	75	Complete
29	A – 29	2	3	3	4	3	15	75	Complete
30	A – 30	3	3	4	2	3	15	75	Complete
Total								2215	
Average								73,8333333	
Number of students who completed								23	
Completion Percentage								76,66%	

From the test table on students' mathematics learning results, it was found that 23 people completed it or 76.66% and 7 people or 30% did not complete it. From the data above we can classify students' mathematics learning test scores as follows:

Table 6. Result Tes Score

No	Interval	Frekuensi	Percentace
1	55 – 60	5	16,6%
2	61 – 66	1	3,3%
3	67 – 72	1	3,3%
4	73 – 78	12	40%
5	79 – 84	9	30%
6	85 - 89	2	6,6%
Total		30	100%

From the test table on students' mathematics learning results, it was found that 23 people completed it or 76.66% and 7 people or 30% did not complete it. And it can be seen that the success rate has been met according to the criteria that have been set at 75%. For more details, see the diagram below:

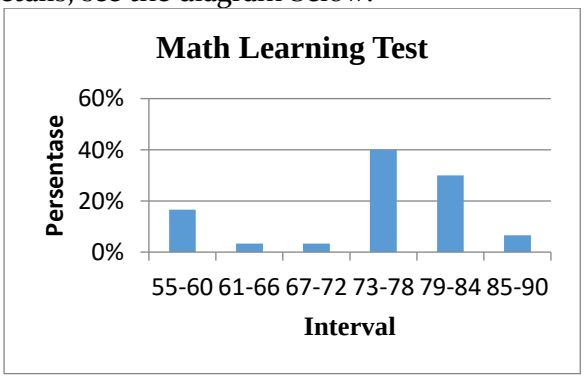

Figure 1. Diagram Mathematics Learning

Results of Observation of Student Activities

Observation or observation is part of the process of collecting data required in research. The results of observations of student activities can be seen in the following picture:

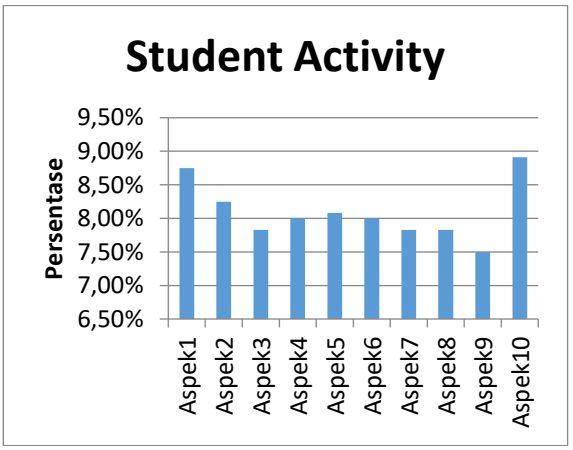

Figure 2. Diagram Student Activity

From the graph it can be seen that the results of observing student activities have indicators that are observed: student activity in the aspect "Students' enthusiasm during learning" received a total score of 105. "Students' attention to the teacher when delivering material" received a total score of 99. "Students' activeness in asking questions" got a total score of 94. "Students' activeness in answering questions" got a total score of 96. "Students' skills in arguing or criticizing" got a total score of 97. "Students' interaction when discussing in groups" got a total score of 96. "Students' order during activities "teaching and learning in progress" received a total score of 94. "Display of students' work in groups (percentage)" received a total score of 94. "Learning evaluation work" received a total score of 90. "Student responses to learning" received a total score of 107. The value of the overall percentage of student activity is 81% with the

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qualification "Good", thus meeting the expected criteria of ≥ 80%.

Traditional Learning Student Mathematics Test Results

Research by applying traditional learning can also improve students' mathematics learning outcomes in matrix material.

Table 7. Student Mathematics Learning Outcomes Test through Traditional Learning

Student Code	Score	Information
A-1	80	Complete
A-2	85	Complete
A-3	80	Complete
A-4	90	Complete
A-5	90	Complete
A-6	85	Complete
A-7	90	Complete
A-8	85	Complete
A-9	90	Complete
A-10	80	Complete
A-11	60	Not Complete
A-12	95	Complete
A-13	85	Complete
A-14	70	Not Complete
A-15	90	Complete
A-16	85	Complete
A-17	85	Complete
A-18	90	Complete
A-19	90	Complete
A-20	90	Complete
A-21	90	Complete
A-22	70	Not Complete
A-23	85	Complete
A-24	85	Complete
A-25	90	Complete
Total		2115
Average		84,6
Number of students who completed		22
Percentace		88%

From the table of students' mathematics learning achievement test it is known that 88% of students or 22 students complete and 12% of students do not complete or as many as 3 students. From the data can be classified as follows:

Table 8. Description of Learning Outcomes Test ScorescMathematics through Traditional Learning

Interval	The number of students	Persentase	Category
90-100	0	0%	Very good
80-89	22	84,6%	Good
65-79	3	12%	Pretty good
55-64	0	0	Not enough
0-54	0	0	Very less
Total	**25**	**100%**	

From the student mathematics learning achievement test table, it was found that 22 people completed or 84.6% and 3 people or 20% did not complete. And it can be seen that it has fulfilled the success rate in accordance with the predetermined criteria of 75%. For more details, it can be seen in the diagram below:

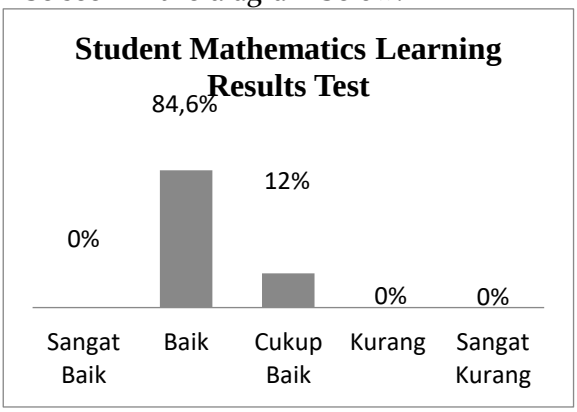

Figure 3. Result test Mathematics Learning

From the picture it can be concluded that the student mathematics learning outcomes test using traditional learning has met the minimum completeness criteria (KKM), namely 75 and has met the specified indicators, namely 80%.

Results of Observation of Student Activities

Results of observations of student activities applying traditional learning in class XI MA K.H.Ahmad Dahlan Sipirok Islamic Boarding School, the subject of the matrix can be seen in the following picture:

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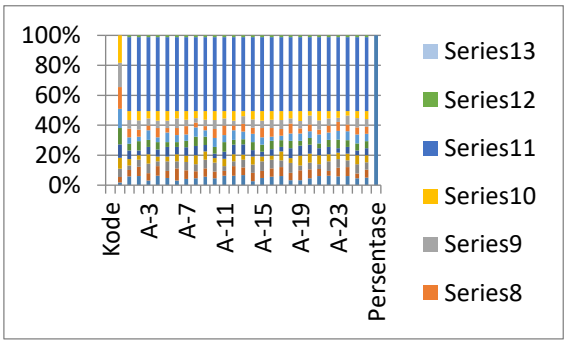

Figure 4. Matrix results of Observation

From the results of observing student activities above, it can be seen that the percentage of student activity observations using traditional learning reached 80.60%, while the student activities planned in this research were ≥ 80%.

Table 9. Description of Learning Outcomes Test Scores Mathematics through Traditional Learning

Interval	The number of students	Persentase	Category
90-100	0	0%	Very good
80-89	22	84,6%	Good
65-79	3	12%	Pretty good
55-64	0	0	Not enough
0-54	0	0	Very less
Total	**25**	**100%**	

From the test table on students' mathematics learning results, it was found that 22 people completed it or 84.6% and 3 people or 20% did not complete it. And it can be seen that the success rate has been met according to the criteria that have been set at 75%. For more details, see the diagram below:

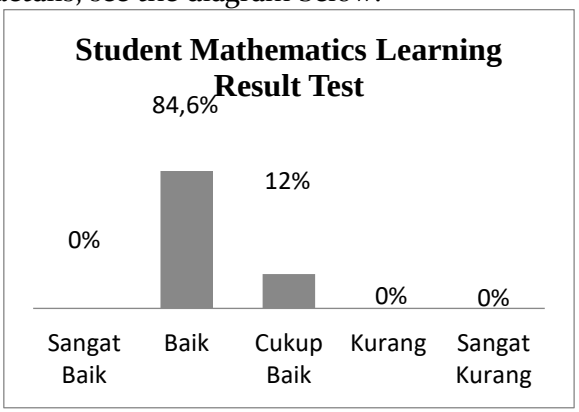

Figure 5. Diagram Result Test Mathematics Learning

From the figure it can be concluded that the students' mathematics learning outcomes test using traditional learning has fulfilled the minimum completeness criteria (KKM), namely 75 and has fulfilled the set indicator of 80%.

No	Interval	Frekuensi	Persentase
1	55 – 60	5	16,6%
2	61 – 66	1	3,3%
3	67 – 72	1	3,3%
4	73 – 78	12	40%
5	79 – 84	9	30%
6	85 - 89	2	6,6%
Total		**30**	**100%**

Observation Results of Student Activities

The results of observations of student activities by applying traditional learning in class XI MA Pondok Pesantren K.H. Ahmad Dahlan Sipirok subject matrix are seen in the following figure:

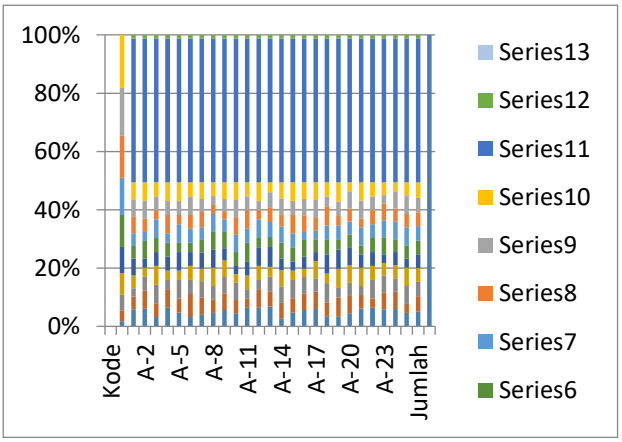

Figure 6. Matrix results of observations of student activities

From the results of observing student activities above, it can be seen that the percentage of student activity observations using traditional learning reached 80.60%, while the student activities planned in this research were ≥ 80%.

Differences in Student Mathematics Learning Results between Microsoft Mathematics-based AIR Learning

The mathematics learning outcomes obtained from the two studies have differences, including:

1. The average result of students' mathematics

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learning results through Microsoft Mathematical-based AIR learning was 23 people who completed it or 76.66% and 7 people or 30% who did not complete it. From the data above we can classify students' mathematics learning test scores as follows:

2. Average test scores for students' mathematics learning outcomes through traditional learning in class XI MA. K.H. Islamic Boarding School Ahmad Dahlan Sipirok achieved 84.6% or the "Good" criteria or has met the minimum completeness criteria (KKM), namely 75 and has met the specified indicators, namely 80%. From the results of observations of student activities above, it can be seen that the percentage of observations of student activities with traditional learning reached 80.60%, while the student activities planned in this research were ≥ 80%.

D. CONCLUSION

From the results of the research that has been carried out, the conclusions that can be outlined in this research are:

1. The average result of students' mathematics learning results through Microsoft Mathematical-based AIR learning was 23 people who completed it or 76.66% and 7 people or 30% who did not complete it. It can be seen that students' mastery of the learning material has met the level of success because the number of students who obtained the KKM completion criteria of 75 was 23 students or 76.66% of the 30 students who took the test, so it was in accordance with the criteria that had been set at 75%, and
2. For the results of the activity, students obtained an overall percentage score of 81%, so that they met the expected criteria, namely ≥ 80%.

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