Students' Mathematical Communication Ability through Blended Learning Model for Elementary School Students in Banda Aceh

Indah Suryawati¹*, Rahmani², & Nur Ainun³

¹,²,³Universitas Serambi Mekkah
*Corresponding Author: indah.suryawati@serambimekkah.ac.id

Abstract
Mathematics is an exact science, mathematics is studied from elementary school to college level. One of the objectives of learning mathematics in the 2013 Ministry of Education and Culture is that students are able to have mathematical communication skills. Because with mathematical communication skills, students can convey their ideas both orally and in writing, so that in the learning process a good understanding can be formed. The purpose of this study is to determine whether using the station rotation type blended learning model can improve students' mathematical communication skills. This study uses a quantitative approach, while the design used in this study is a one group pretest-posttest control design. The sample in this study used purposive sampling technique. Thus, the research sample in this study is class Vc, because class Vc has less ability in mathematics than classes Va and Vb, based on observations from the three homeroom teachers. The data in the study were taken by giving pretest and posttest questions about mathematical communication skills about the material of building space. Furthermore, to determine the increase in mathematical communication skills in this study was carried out using the paired t test formula. The results show that the t-count is 17.02, while the t-table with a significant level of 5% or 0.05 is 2.04, so Ha is accepted and it can be concluded that there is an increase in students' mathematical communication skills who are taught using the learning model. Station rotation type blended learning.

Keywords: Mathematical Communication Skills, Blended Learning

1. Introduction
The objectives of learning mathematics according to the 2013 Ministry of Education and Culture are: (1) to improve intellectual abilities, especially students' high-level abilities, (2) to form students' abilities in solving a problem systematically, (3) to obtain high learning outcomes, (4) to train students in communicating ideas, especially in writing scientific papers, and (5) developing students' character. One of the objectives of learning mathematics, basically in the curriculum in Indonesia, clearly implies the goal to be achieved, namely the ability to communicate mathematically.

Students are said to already have mathematical communication skills if they can; (1) explain mathematical ideas logically and use spoken language, visuals, and written form in the form of pictures, graphs, calculations, algebraic forms; materials in concrete form, (2) communication for different audiences in the form of presentations showing data, justifying completion, and expressing opinions mathematically, and (3) using conventions, vocabulary, and terms from mathematics (e.g. terms, symbols) oral, visual, and written (Robiana & Handoko, 2020). To realize mathematical communication skills, it is necessary to have a learning model that can make students learn mathematics more fun and not boring. The model in question is the Blended Learning model. This model collaborates between online and offline learning. There are several kinds of Blended Learning models, one of which is the rotation model. The rotation model is divided into
several types. Researchers are interested in taking the Station Rotation model type. Because with this type of student communication will be more focused, students are asked to visit several stations repeatedly and not linearly during the specified time (Sundayana, 2015). Blended Learning Station Rotation Type is expected to improve students’ mathematical communication skills. In this type, students can rotate from individual work or small groups, then go to the teacher, and work using the media or laptop provided by the teacher. This model usually starts in a face-to-face session, where the teacher explains the concept of a material and the steps for its completion, followed by a collaborative activity station between students or small groups, where students are free to move between stations. The next process is online learning, students can dig up information. Additional resources from other supportive sources to improve or complement learning, and it ended with evaluation, assessment and discussion of high-level material.

The problem to be studied is: **whether there is an increase in students' mathematical communication skills through the Station Rotation Type Blended Learning model.**

2. Method

The research was conducted at SD Negeri 53 Banda Aceh, which is located on Jalan Tgk. Imuem Bata, Batoh Banda Aceh City. The reason for choosing the school was due to the lack of students' understanding of the learning model used by the teacher, therefore the researcher was interested in introducing the technology-based learning model to students at SD Negeri 53. The population in this study were all fifth grade students at SD Negeri 53 Banda Aceh, which consisted of classes VA, VB, and VC. The sample selection in this study used purposive sampling technique. The research sample is the VC class, because that class still lacks math values, therefore this researcher applies this model to the class. This study uses a quantitative approach, while the design used in this study is the One Group Pretest-Posttest Design.

<table>
<thead>
<tr>
<th>Class</th>
<th>Pretest</th>
<th>Treatment</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eksperimen</td>
<td>$O_1$</td>
<td>$X$</td>
<td>$O_2$</td>
</tr>
</tbody>
</table>

Source: Sundayana (2015)

The distribution of data must be tested for normality first, to ensure that the data is normally distributed, and will proceed to processing parametric data. Normality test using the formula:

$$\chi^2 = \frac{\sum (F_{-} - E_{-})^2}{E}$$  (Sundayana, 2015)

To find out whether there is an increase in students' mathematical communication skills through the blended learning model, the one-sample t-test formula is used:

$$t = \frac{\bar{X} - \mu}{\sigma/\sqrt{n}}$$  (Sundayana, 2015)

3. Results and Discussions

a. Results of Students' Mathematical Communication Ability Test Through Blended Learning Model

The data analyzed in this study were pretest and posttest data on mathematical communication skills of VC class students who were taught before and after using the
Station Rotation Type Blended Learning model.

Based on Figure 1 above, it shows that there is an increase in the average value between students' mathematical communication skills before and after being taught with the Station Rotation Type Blended Learning learning model. The average value of the pretest is 25.09 and the average value of the posttest is 78.64. After an increase in the average value, it will then be seen whether the two data are normally distributed.

b. Normality Test of Students' Mathematical Communication Ability Test Through Blended Learning Model.

Based on the results of the pretest and posttest scores for class Vc SD Negeri 53 Banda Aceh using the Chi Square formula, the pretest data is data that is normally distributed in other words obtained $\chi^2_{hitung} = 7.27$ and $\chi^2_{tabel} = 16.7$. Because $\chi^2_{hitung} < \chi^2_{tabel}$ then the pretest data is said to be normally distributed. Likewise, the posttest data obtained $\chi^2_{hitung} = 7.4$ and $\chi^2_{tabel} = 16.7$. Because $\chi^2_{hitung} < \chi^2_{tabel}$ then the posttest data is also said to be normally distributed. If the two data are normally distributed, it will be continued with a parametric test, namely by using a one-sample t-test.

c. Hypothesis Testing Using t-test on Students' Mathematical Communication Ability Test Through Blended Learning Model.

The average difference test was carried out using the t test, with a significant level of 0.05. Test criteria accept $H_0$ if sig. 0.05. The hypothesis is formulated as follows:

$H_0$ : There is no increase in students' mathematical communication skills after being taught using the station rotation type blended learning model.

$H_a$ : There was an increase in students' mathematical communication skills after being taught using the station rotation type blended learning model.

<table>
<thead>
<tr>
<th>No</th>
<th>Student code</th>
<th>Pretest score</th>
<th>Posttest score</th>
<th>$D = X_2 - X_1$</th>
<th>$D^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AS</td>
<td>10</td>
<td>60</td>
<td>50</td>
<td>2500</td>
</tr>
<tr>
<td>2</td>
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<td>40</td>
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<td>CNM</td>
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<tr>
<td>4</td>
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<td>80</td>
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<td>2500</td>
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<td>900</td>
</tr>
</tbody>
</table>

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From table 2. Test the average difference obtained the average difference ($\bar{X}_d$) = 52.5 and standard deviation of difference (SD) = 16.06 and the value of n is 30, then we get $t_{\text{count}} = 17.02$. For a significant level of 0.05 obtained $t_{\text{table}} = t_{0.05} = 2.04$. Testing criteria: Accept $H_0$ if $-t_{\text{table}} < t_{\text{count}} < t_{\text{table}}$. reject $H_0$ for other values. Because the value of $t_{\text{count}} = 17.02$ and the value of $t_{\text{table}} = 2.04$, it can be concluded that reject $H_0$ and accept $H_a$, with the words another "There was an increase in students’ mathematical communication skills after being taught using the station rotation type blended learning model.

4. Conclusions

Based on the results of hypothesis testing, it shows that there is an increase in the mathematical communication skills of Vc class students at SD Negeri 53 Banda Aceh after being taught with the Station Rotation Type Blended Learning learning model. The findings are strengthened by the results of research proposed by Riasari, D (2018) which states that the mathematical communication skills of students who receive mathematics learning using e-learning are better than students who use conventional learning. the average normal gain are both in the medium category. Jaluzi, LOA; Anggo, M; Fahinu; & Samparadja, H (2022) which shows the ability of mathematical communication for students in blended learning are classified as good that (1) students are able to express mathematical ideas through oral and written coherently and clearly; (2) students are very able to describe mathematical ideas in visual form; (3) students are able to use terms, notation, and mathematical structure appropriately.

The results of the pretest and posttest obtained a normalized gain (N-Gain) with the formula in the Sundayana (2015) that the average gain normalized mathematical
communication skills taught through the Bleanded Learning Model Station Rotation Type with the reject criteria $H_0$ if $t_{\text{count}} \leq t_{\text{table}}$, from the results of this study obtained the value of $t$ arithmetic $= 17.02$ and the value of $t$ table $= 2.04$, therefore it can be concluded that $H_0$ is rejected and $H_a$ is accepted, in other words "There is an increase in students' mathematical communication skills after being taught using the learning model Station rotation type blended learning.

5. Acknowledgments

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References


