How to Manage Numerical Abilities in Algebra Material?

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Abstract

Numerical ability is very help students understand the material, analyze any problems, and apply math concepts in daily life so that numerical abilities of students is a factor that can affect learning outcomes. Determine the effect of learning model Scramble and learning model with SAVI (Somatic, Auditory, Visual, and Intelligence) on the ability of numerical be the purpose of this article. The design of the research used Quasy Experimental Design, with the instrument used for the study in the form of test numerical ability. Data analysis used the T-test. Based on the results of the research concluded that the learning model Scrambler and learning model SAVI has a significant influence on numerical ability. And both of them is a model of learning which is equally effective against numerical abilities in order to improve learning outcomes is more optimal. But model pembelajaran SAVI is more effective than learning models scramble.

Keywords: Scramble Learning Model; SAVI Learning Model; Numerical Ability;

INTRODUCTION

In general, the results of students' mathematics learning in Indonesia are still far from expectations, although for some students the learning achievements are able to achieve maximum results. Factors that influence the success of students in mastering mathematics include numerical ability (Indrawati, 2015). Mathematics learning in schools should be able to equip students with the ability to calculate math problems quickly, think logically, and like to ask questions that are analytical (Irawan & Kencanawaty, 2016). Because mathematics will be easier to learn by people who have numerical abilities. Numerical ability is a special ability in the science of arithmetic (Haliana, Kadir, Kodirun, & Saleh, 2018), resulting in the ability to calculate quickly accompanied by managing numbers by thinking logically it can easily understand the lesson, so that with understanding and mastery of the material possessed, students are able to get optimal results (Jayantika, Ardana, & Sudiarta, 2013).

The learning model should be able to provide the widest possible space for students in building knowledge. A suitable model used in the learning process to improve the ability to calculate fast and think logically is the Scramble learning model. (Manalu & Siregar, 2019). Scramble learning model is widely used in various studies (Diani, Yuberti, & Syafitri, 2016; Fitrianti, Abidin, & Alifiani, 2019; Jannah, Lisnawati, & Sutisna, 2019; Malasari, Rasiman, & Sutrisno, 2018; Manalu & Siregar, 2019; Oktavia, Fadhilaturrahmi, & Marleni, 2019; Shintia, Bahar, & Elvia, 2019). Scramble learning model is a learning model by distributing question cards and answer cards accompanied by alternative answers available but with a random arrangement and students are tasked with correcting the answers so that they become the right answers (Diani et al., 2016). Learning models that can also improve student learning activities
and outcomes through numerical ability by being able to work on solving problems, finding things for themselves and discussing problems with one another, namely the SAVI learning model (Somatic, Auditory, Visual, and Intellectual) (Sarwasti & Maulana, 2019). The SAVI learning model is a way of learning that involves all the senses, learning by moving physically active, by utilizing as many senses as possible, and getting the whole body or mind involved in the learning process (Sundari, 2016). The SAVI learning model is widely used in various studies (Anas & Syafitri, 2019; Milawati, 2011; Rahmadan, Mulyono, & Isnarto, 2019; Sugesti, Simamora, & Yarmayani, 2018; Ulvah & Afriansyah, 2016; Yulianti, Haris, & Chandra, 2018). SAVI learning is learning by combining physical movements and intellectual activities and involving all the senses that have a great influence in learning. This learning is designed naturally to harmonize the learning atmosphere with special instructions based on the needs of the learning process without compromising aspects of student privacy (Kusumaningsih, Sutrisno, & Hidayah, 2019).

In previous studies conducted by several previous studies they used a lot of SAVI learning models to improve description writing skills (Rakhmawati, Koeshandayanto, & Gipayana, 2019). While SAVI learning models are still rarely used to improve student learning outcomes with their students' numerical abilities. The main objective of the SAVI learning model is students who are active in physical activities and intellectual activities in the learning process. Meire (Khusna & Heryaningsih, 2018) states that students can improve their ability to express their ideas (Intellectual) if they move something (Somatic) to produce images, diagrams, graphs etc. (Visual) while discussing what they are doing (Auditory) (Rahmadian et al., 2019). This requires students to develop numerical abilities so that it is easy to find solutions to mathematical problems.

Research on ability analysis and numerical ability improvement is mostly done by previous studies (Achdiyat & Utomo, 2018; Ayu & Lestari, 2019; Darmawan, Candiasa, & Widiartini, 2018; Gunarti, 2017; Indrawati, 2015; Irawan & Kencanawaty, 2016; Malenda, Kadir, & Suhar, 2018; Melani, Candiasa, & Hartawan, 2019) But research on numerical abilities of students using the Scramble learning model and the SAVI learning model (Somatic, Auditory, Visual, and Intellectual) has never been done. Based on previous research, this research is updated in terms of looking at the effect of the Scramble learning model and the SAVI learning model (Somatic, Auditory, Visual, and Intellectual) on the numerical abilities of students. So this study aims to determine the effect of the Scramble learning model and the SAVI learning model (Somatic, Auditory, Visual, and Intellectual) on the numerical abilities of students.

THE RESEARCH METHODS

This research uses the Quasi Experiment method. This study compares the experimental class with the scramble model and the experimental class with the SAVI model. The independent variable in this study is the application of the model, the Scramble Model and the SAVI Model. Valiable bound in this study is Numerical ability. The data collection technique is to use observation, tests and documentation. While the data analysis technique used is the T
test. The following table lists the interpretation of the effectiveness of the N-gain to measure the effectiveness of the learning model on numerical ability.

Table 1. Category of interpretation of the effectiveness of the N-gain score

| Limitation | Category |
|------------|----------|
| g>0.7      | High     |
| 0.3≤g≤0.7  | Medium   |
| g>0.3      | Low      |

(Meltzer, 2002)

To measure the effectiveness of learning models using the effect size formula (Hake) (Becker, 2000). Effect size is a scale of the magnitude of the effect or effect of a variable to another variable, the magnitude of the difference or relationship, which is free from the influence of the sample size of a population. The formula for calculating the effect size test is:

\[
d = \frac{\bar{X}_1 - \bar{X}_2}{S_{gab}}
\]

\[
S_{gab} = \sqrt{\frac{(N1-1)S1^2 + (N2-2)S2^2}{N1+N2-2}}
\]

Informations:
\(\bar{X}_1\): Average Scramble experimental group
\(\bar{X}_2\): Average of the SAVI experimental group
N1: Number of Scramble experimental group samples
N2: The number of SAVI experimental group samples
S1: Variant of the Scramble experimental group
S2: SAVI experimental group variant

Table 2. (Interpretation of effect size)

| Effect Size | Percentage of control group who would be below average person in experimental group | Rank of person in a control group of 25 who would be equivalent to the average person in experimental group | Probability that you could guess which group a person was in from knowledge of their 'score' | Equivalent correlation, \(r\) (=Difference in percentage 'successful' in each of the two groups, BESD) | Probability that person from experimental group will be higher than person from control, if both chosen at random (=CLES) |
|-------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| 0.0         | 50%                                                                               | 13\textsuperscript{th}                                                                                             | 0.50                                                                                         | 0.00                                                                                             | 0.50                                                                                             |
| 0.1         | 54%                                                                               | 12\textsuperscript{th}                                                                                             | 0.52                                                                                         | 0.05                                                                                             | 0.53                                                                                             |
| 0.2         | 58%                                                                               | 11\textsuperscript{th}                                                                                             | 0.54                                                                                         | 0.10                                                                                             | 0.56                                                                                             |
| 0.3         | 62%                                                                               | 10\textsuperscript{th}                                                                                             | 0.56                                                                                         | 0.15                                                                                             | 0.58                                                                                             |
| 0.4         | 66%                                                                               | 9\textsuperscript{th}                                                                                               | 0.58                                                                                         | 0.20                                                                                             | 0.61                                                                                             |
| 0.5         | 69%                                                                               | 8\textsuperscript{th}                                                                                               | 0.60                                                                                         | 0.24                                                                                             | 0.64                                                                                             |
| 0.6         | 73%                                                                               | 7\textsuperscript{th}                                                                                               | 0.62                                                                                         | 0.29                                                                                             | 0.66                                                                                             |
| 0.7         | 76%                                                                               | 6\textsuperscript{th}                                                                                               | 0.64                                                                                         | 0.33                                                                                             | 0.69                                                                                             |
| 0.8         | 79%                                                                               | 6\textsuperscript{th}                                                                                               | 0.66                                                                                         | 0.37                                                                                             | 0.71                                                                                             |
| 0.9         | 82%                                                                               | 5\textsuperscript{th}                                                                                               | 0.67                                                                                         | 0.41                                                                                             | 0.74                                                                                             |
The steps of the model applied are:

Figure 1 to the left is the steps of the Scramble learning model. With the first step, the teacher forms students into several groups, after the group has been formed, given a question...
card and answer card along with the answer sheet to each group, then students pair the saol card with an answer card that has been randomized, at the time of installation of the card then students must can analyze the answers requested from the problem and solve problems related to the answer sheets that have been given. The second step is that other group members check the answer card while pairing the saol card and the answer card. If there are questions that they do not understand then the other members ask the teacher the question. The final step is that the teacher asks each group to appoint one of their members to present the results of their discussion. After completing the presentation the time is given to ask questions and be given the opportunity to give a response.

Figure 1 to the right is the steps of the SAVI learning model. With the first step, preparation. The purpose of this preparation stage is to arouse the interests of the learners. At this stage what is done is to explain the learning objectives (auditory), divide the class into several groups (somatic), build interest, motivation and curiosity of students to learn (auditory). Furthermore, the delivery phase aims to help students find good material to learn in an interesting and fun way. At this stage what is done is delivering the material by giving a real example (auditory). From this example the teacher explains in detail (auditory). The second step is the training phase, to help students integrate new knowledge or skills by getting students to think. The steps taken are given a question sheet then discussed according to each group (visual and intellectual), asking students to present the results of the discussion and giving responses (somatic, auditory, visual, intellectual), assessing the results of student work (auditory). The final step is the performance stage, the purpose of which is to help students apply and develop knowledge so that learning achievement continues to increase. The stage taken is giving an evaluation in the form of a question sheet to find out students’ understanding of the learning that has been done (somatic and intellectual), then reaffirming the material that has been taught and concluding then giving the assignment.

Knowing Scramble learning and SAVI learning models on numerical ability according to the numerical ability hypothesis test reference that can be seen that $\text{sig} \leq \alpha$ this means to a significant degree $\alpha = 0.05 H_0$ rejected. It can be concluded that there is a significant difference between the Scramble learning model and the SAVI learning model, and both are equally effective.

THE RESULTS OF THE RESEARCH AND THE DISCUSSION

Based on the results of research on the numerical abilities of students obtained from the pre-test and post-test given to the Scramble model experimental group and the SAVI model experiment can be seen in the following data convergence table:

|       | N  | Mean | Median | Std. deviation | Varian  |
|-------|----|------|--------|----------------|---------|
| pre test |    |      |        |                |         |
| Scramble | 30 | 34.27| 32.00  | 12.326         | 151.926 |
| SAVI    | 30 | 52.53| 56.00  | 11.685         | 136.533 |
| post test |   |      |        |                |         |
| Scramble | 30 | 82.33| 80.00  | 8.104          | 65.678  |
| SAVI    | 30 | 86.53| 88.00  | 7.006          | 49.085  |
Based on Table 3 it is known that the amount of pre-test and post-test data for the Scramble model and SAVI model is 30 students. The mean scores of students' pre-test and post-test or mean for scramble are 34.27 and 82.33, while for SAVI the mean scores of students' pre-test and post-test or mean are 52.53 and 86.53. Thus statistically descriptive it can be concluded that there are differences in the average pre-test and post-test of students between the Scramble learning model and the SAVI learning model. After the data description is obtained, the data is strengthened by the statistical inference (T-Test) in Table 4.

Table 4. T Test

|                      | Levene's Test for Equality of Variances | t-test for Equality of Means |
|----------------------|----------------------------------------|-------------------------------|
|                      | F | Sig. | T  | Df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference |
| Pre                  |   |      |    |    |               |                 |                     |                                |
| Equal variances      | -.000 | .996 | -5.891 | 58 | .000            | -18.267          | 3.101                | -24.474 to -12.060          |
| assumed              |   |      |    |    |               |                 |                     |                                |
| Equal variances      | -5.891 | .935  | 57.835 | 58 | .000            | -18.267          | 3.101                | -24.474 to -12.059          |
| not assumed          |   |      |    |    |               |                 |                     |                                |
| post                 |   |      |    |    |               |                 |                     |                                |
| Equal variances      | .270 | .605 | -2.147 | 58 | .036           | -4.200           | 1.956                | -8.115 to -.285            |
| assumed              |   |      |    |    |               |                 |                     |                                |
| Equal variances      | -2.147 | .178  | 56.812 | 58 | .036           | -4.200           | 1.956                | -8.115 to -.283            |
| not assumed          |   |      |    |    |               |                 |                     |                                |

Based on Table 4 it is known the value of Sig. Levene's Test for Equality of Variance pre-test and post-test is 0.996 > 0.05 and 0.605 > 0.05, it can be interpreted that the data variance between Scramble and SAVI is homogeneous or the same. In the Equal variances assumed pre-test and post-test are 0,000 < 0.05 and 0.036 < 0.05, so as a basis for decision making in the Independent Sample Test, it can be concluded that H_0 is rejected and H_a is accepted. Thus it can be concluded that there are significant (real) differences between the average pre-test and post-test of students in the Scramble learning model and the SAVI learning model. Furthermore, from table 3 above, the known "Mean Difference" pre-test and post-test values are -18.267 and -4.200. This value shows the difference between the average pre-test and post-test of students on Scramble and SAVI is 34.27 - 82.33 = -18.267 and 52.53 - 86.53 = -4.200. The difference between the differences is -24.474 to -12.060 and -8.115 to -0.285. to see the effectiveness of the learning model is strengthened by interpreting the N-gain score table below.

Table 5. N-gain Score

|                      | N-gain Score Test Calculation Results | N-gain Score Test Calculation Results |
|----------------------|---------------------------------------|---------------------------------------|
| Model Scramble       | Average 0.7118                        | Average 0.7074                        |
|                      | Minimum 0.13                          | Minimum 0.40                          |
|                      | Maximum 1.00                          | Maximum 0.94                          |
Based on the results of the N-gain score test in Table 5, it shows that the average N-gain score for the Scramble model is 0.7118 included in the high category seen in Table 1. With a minimum N-gain score of 0.13 and a maximum of 1.00. While the average N-gain score for the SAVI model is 0.7074 included in the high category seen in Table 1. With a minimum N-gain value of 0.40 and a maximum of 0.94. Then it can be seen from Table 5 that it can be concluded that the use of the scramble model and the SAVI model are effective enough to improve students' numerical abilities.

Based on the N-gain test results obtained. Then the effect size test is done. The results obtained are $d = 0.011$. These results are then interpreted by using Table 1 found that the Scramble model and the SAVI model affect the numerical ability to improve student learning outcomes by 50%. The following calculation of the effect size test.

\[ d = \frac{\bar{x}_1 - \bar{x}_2}{S_{gab}} = \frac{(0.7118 - 0.7074)}{0.40} = 0.011 \]

Based on the results obtained that the SAVI learning model is more effective than the Scramble learning model, this is reinforced by seeing the steps of the SAVI learning model more systematic and complete than the Scramble learning model. One of the advantages of the SAVI model is that the steps of this model are divided into three stages so that each stage can be used more efficiently than the Scramble learning model. Another advantage of the SAVI model is that it emphasizes that learning utilizes all the sensory tools possessed by students, namely Somatic, Auditory, Visual, and Intellectual.

Based on previous research on Scramble learning models, the model has been effective against cognitive learning outcomes and cognitive skills (Zainuddin & Wilujeng, 2018) and increase the interest in learning of elementary school students (Oktavia et al., 2019). In this study, it turns out Scramble learning model also has a significant effect on numerical ability. The previous SAVI learning model was also effective on learning outcomes (Anas & Syafitri, 2019) and to problem solving abilities (Ulvah & Afriansyah, 2016). In this study, it turns out the SAVI learning model has a significant effect on numerical ability. But in this study, the two models are compared to numerical ability, both of which support the effectiveness of learning to obtain optimal learning outcomes. However, SAVI learning models are more effective on numerical abilities than Scramble learning models.

**CONCLUSION AND SUGGESTION**

Based on the results of research that has been carried out, it can be concluded that there is a significant influence between the Scramble learning model and the SAVI learning model on numerical ability. There is a significant influence between the Scramble learning model on numerical ability, on the significant effect between SAVI learning models on numerical ability. So it is hoped that educators and students can know that the Scramble learning model and the SAVI learning model can both support the improvement of numerical abilities. Both are effective learning models for use in the learning process. But SAVI learning models are more effective than Scramble learning models in order to improve learning outcomes that are more optimal on numerical abilities.
Researcher's suggestion is that educators and students are expected to be able to work together to be able to know numerical abilities and to know and explore the factors that can influence to improve it, it is necessary to know Scramble learning models and SAVI learning models, both of which are effective learning models of numerical abilities. Therefore, there is a need for good communication between the school and educative parents. Parents are expected to further increase higher awareness of the importance of children's education. And students are expected to be more active in learning and have a high curiosity about learning.

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