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Comparative study on using SAVI versus VAK to improve students' mathematical concepts ability

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Abstract. In this research, the researchers compared mathematical concept comprehension ability between the students who were taught using SAVI (Somatic Auditory Visually Intellectually) models, VAK (Visualization Auditory Kinesthetic) models and Expository models. This quasi-experimental research was carried out for seventh-grade students of SMP N 28 Padang, Indonesia. The data were collected through questionnaires and test. The results showed that the students' mathematical concept ability using SAVI models is higher than they were taught using expository models and the students' mathematical concept ability using VAK models is higher than they were taught using expository models. In the end, it can be concluded SAVI models and VAK models contributed to the improvement of students 'mathematical concept ability. There is a difference in the students' mathematical concept ability using SAVI models and VAK models.

1. Introduction

Five reasons for the need to learn mathematics: (1) a means of thinking clearly and logically, (2) a means to solve problems of daily life, (3) a means of recognizing patterns of relationships and generalizing experiences, (4) a means to develop creativity and (5) means to increase awareness of cultural development [1,2]. Given the importance of the role of mathematics, the government always tries to improve the quality of mathematics lessons at every level of education, to be better than before. Improving the quality of mathematics lessons is not only obligation of the government but also the obligations of the teachers. One effort made by teachers is to improve the quality of the learning process by using appropriate learning methods, models and strategies.

Mathematics is taught not only to know and understand what is contained in mathematics itself, but mathematics is taught basically aims to help train the mindset of students in order to solve problems critically, logically, and precisely. Besides that mathematics is also the main key of other knowledge learned in school. Thus mathematics becomes a very important subject in education and must be studied at every level of education [3, 4].

Based on the results of the interviews in March 2018 with one of the mathematics teachers in grade VIII of SMP N 28 Padang, Indonesia, there were several obstacles that led to a lack of understanding of the students' concepts. Teachers in the learning process still use lecturing method and the lack of variety of learning models applied by the teachers which cause a lack of exploration that students can do. Students tend to be less active during the learning process. In the learning process, teachers do not require students to be involved in the learning process so that students' conceptual understanding is considered lacking and it is proven by looking at the willingness of the students to be involved in answering questions.

Based on the problems above, it is necessary to have a suitable learning model in the mathematics learning process that can improve students' learning achievement as well as be able to engage students actively, both in groups and individually in the implementation of the subject [5,6]. One of the learning models in question is Somatic Auditory Visually Intellectually (SAVI) type cooperative learning model and Visualization Auditory Kinesthetic (VAK) type quantum learning model [7].

The conditions that occur in mathematics classes are that students are rarely asked to communicate their ideas. The learning model used is conventional, the problem that arises in conventional learning is that when the teachers questioned about a concept, students do not answer them confidently. Some students remain silent [8]. It can be interpreted that conventional learning tends to make students become passive so that their ability in understanding mathematical concepts is low [9].

Another factor that causes students to dislike mathematics is the lack of students' knowledge about the benefits of mathematics in everyday life (the real world), unfavorable attitudes toward mathematics can grow due to learning strategies that are not relevant to the stage of students'way of thinking and not linked with the students' daily lives [10,11]. Such conditions lead to degradation in students' learning motivation [12].

The way the teachers of presenting learning material certainly needs more attention by the teachers so they are able to overcome the students' problems during the learning process. According to the instructions for the implementation of teaching and learning activities in schools [13], the application of selected learning strategies in mathematics learning must rely on two things i.e. the optimization of the interaction of all elements of learning, and the optimization of the involvement of all senses of students. These two things can be used as references to determine the correct and effective learning methods and models.

The concept that must be developed in the learning process is not only what the students learn, but also how the students learn it. In other words, students learn how to learn. Learning models that are considered able to overcome learning difficulties of the students and have the ability to develop the potential of the students in learning are learning models include SAVI and VAK [14]. SAVI learning model is a learning model that emphasizes that learning must utilize all the sensory tools that students have. Somatic is learning by moving to practice, auditory is learning by speaking and listening, visually is learning by observing and describing, and intellectually is learning by solving problems and pondering. While the VAK learning model is a learning model that combines the three learning styles (seeing, listening and moving), each individual by utilizing the potential that has been possessed by training and developing it so that all learning habits of the students are fulfilled.

2. Research Method

This research is a quasi-experimental research. It was conducted in three classrooms: experimental class I, experimental class II and control class. The experimental class I was treated with SAVI model, experimental class II was treated with VAK model, while the control class was treated with Expository learning. The design of this research belongs to the Posttest-Only Control Group Design [10,11].

The population in this research is all seventh-grade students of SMP N 28 Padang, academic year 2017/2018 consisting of eight classrooms. The sample in this research is determined by collecting the scores of the midterm test II. After the population is normally distributed, homogeneous and has an equivalent average, three classrooms are chosen randomly from the entire population: the experimental class I (VIII4), the experimental class II (VII3) and the control class (VIII2).

The instrument of this study is the final test. Prior to the final test, the instrument is validated by validators who are experts in their field to test the validity and accuracy of its use [12,13]. Data collection techniques on concept comprehension tests use a 5-item essay test at the fifth meeting. Data processing techniques test the students' concept in understanding the subject. It is obtained by giving a score on each question that is done, and then the normality and homogeneity tests of the three sample classrooms are held.

Data analysis technique conducted for the final test was a test of students' conceptual understanding. Data analysis was performed by using SPSS 20 application. Before testing the hypothesis, first, testing for normality by using Lilifors, Kolmogorov-Smirnov and Shapiro-Wilk tests, and testing the homogeneity of the sample using the Bartlett test should be done [19].To see if there are differences

between the three sample classrooms then hypothesis testing using the t-test to determine which learning model is the best.

3. Result and discussion

The results of the research obtained are in table 1 and the following diagram is an average of the final sample class test results:

Table 1 Final test description

Subject	N	$\bar{x}$	x_{maks}	x_{min}	S	S^2
Exp I	30	82,76	100	71	7,73	59,84
Exp II	30	77,26	98	60	9,70	83,44
Control	30	69,53	85	57	8,64	74,74

In addition, the average value of each indicator of the ability to understand concepts in the sample class can be seen in table 2 below:

Table 2 Data on the results of understanding concepts of students per indicator

	Exp 1	Exp 2	Control
Indicator 1	42,6	40,5	40,5
Indicator 2	12,6	12,5	8,4
Indicator 3	21,3	18,0	15,6

Based on Table 1, it can be seen that the understanding of students' mathematical concepts in the experimental class I learning model (SAVI) has a higher average test value than the control class (Expository). The experimental class I also obtained the highest score and the lowest score that was higher than the control class. The standard deviation of the experimental class I was lower than the control class. It means that the understanding of the concept of the experimental class students had a smaller diversity than the control class learning outcomes. The experimental class II (VAK) has an average value of understanding mathematical concepts higher than the control class (Expository). The experimental class II also obtained the highest score and the lowest score that was higher than the control class. The standard deviation of experimental class II is lower than the control class. It means that the understanding of the concept of the experimental class students has a smaller diversity than the control class learning outcomes. Furthermore, the experimental class I (SAVI) had a higher average test score than the experimental class II (VAK). The experimental class I also obtained the highest score and the lowest score that was higher than the experimental class II. The standard deviation of the experimental class I was lower than the experimental class II. It means that the understanding of the concept of the experimental class students had a smaller diversity than the understanding of the experimental class II concept.

Based on the final data on understanding the concept of one-way, two-way Anava tests and t-test, the students' scores who studied through the SAVI model are higher than students who studied through expository learning. The result of t-test is $t_{count} = 6.25$ and $t_{table} = 1.67$ with 95% confidence level. It means that $t_{count} > t_{table}$. It also means that the hypothesis is accepted. For understanding the concept, the scores of students who used the VAK model are higher than students who used expository learning. The result of t-test is $t_{count} = 3.37$ and $t_{table} = 1.67$ with a 95% confidence level. It means that $t_{count} > t_{table}$. It also means that the hypothesis is accepted. However, there is a significant difference between students' understanding of concepts by using SAVI model with the students who were using the VAK learning model. It can be seen in the acquisition of $t_{count} = 2.52$ and $t_{table} = 1.67$ with a 95% confidence level and dan $\propto = 0.05$. It means that $t_{count} > t_{table}$. It also means that the hypothesis is accepted.

The results of the research above arose two important points. Firstly, the SAVI models and VAK models could be implemented at schools in order to improve students' mathematical concept comprehension ability. This finding has complemented the previous findings which concluded that SAVI and VAK models are suitable for mathematics teaching and learning. Secondly, the SAVI models and VAK models give the same opportunity for all the students to develop their mathematical concept comprehension ability so that they could perform better than the students in the expository models. Because SAVI and VAK models are utilizing the potential that has been possessed by training and developing it so that all learning habits of the students are fulfilled and students learn how to learn.

4. Conclusion

Based on the results of data analysis and discussion, it can be concluded that the students' mathematical concept ability using SAVI models is higher than they were taught by using expository models and the students' mathematical concept ability using VAK models is higher than they were taught using expository models. In the end, it can be concluded SAVI models and VAK models contributed to the improvement of students' mathematical concept ability. There is a significant difference in the students' mathematical concept ability who learn by using SAVI model with the ones with the VAK model of the grade VIII students of SMP N 28 Padang, Indonesia.

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