The Effect of Somatic, Auditory, Visualization, Intellectual (SAVI) Learning Model on Mathematics Problem Solving Ability of Grade V Elementary School in Wonogiri Sub-District

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Abstract
Learning mathematics which is an obstacle for students is solving mathematical problems. This study aims to determine the effect of the application of somatic, auditory, visualization, intellectual (SAVI) learning models on the ability to solve mathematical problems in grade 5. This type of research is quantitative with the True Experiment Posttest-Only Control Design method. The study population was grade V students totaling 652 from 31 public elementary schools in Wonogiri sub-district. Sampling technique with *cluster random sampling*, 3 elementary schools for the experimental group with 64 students using SAVI learning model and 3 elementary schools for the control group with 61 students using conventional learning model. Data collection techniques with critical thinking skills description test, which has met the test of validity, reliability, level of size, and distinguishing power. The results showed that based on the calculation of the Independent Sample t-test hypothesis test, the posttest value obtained a significance value of 0.000 < α (α = 0.05) and the calculated t value of 2.490 > t table 1.670, meaning that it rejects the null hypothesis and accepts the alternative hypothesis. The conclusion of the research is that the SAVI learning model has a significant effect on mathematical problem solving skills in grade V elementary schools in Wonogiri sub-district.
Keywords: Learning model, SAVI, math problem solving

Abstrak
Pembelajaran matematika yang menjadi kendala untuk peserta didik adalah pemecahan masalah matematika. Penelitian ini bertujuan untuk mengetahui pengaruh penerapan model pembelajaran *somatic, auditory, visualization, intellectual* (SAVI) terhadap kemampuan pemecahan masalah matematika kelas V. Jenis penelitian adalah kuantitatif dengan metode True Eksperimen Posttest-Only Control Design. Populasi penelitian adalah peserta didik kelas V yang berjumlah 652 dari 31 SD Negeri di kecamatan Wonogiri. Teknik pengambilan sampel dengan *cluster random sampling*, 3 SD Negeri untuk kelompok eksperimen dengan 52 peserta didik menggunakan model pembelajaran SAVI dan 3 SD Negeri untuk kelompok kontrol dengan 61 peserta didik menggunakan model pembelajaran konvensional. Teknik pengambilan data dengan tes uraian kemampuan berpikir kritis, yang telah memenuhi uji validitas, reliabilitas, tingkat kesukuran, dan daya pembeda. Hasil penelitian menunjukkan bahwa berdasarkan perhitungan uji hipotesis Independent Sample t-test hasil nilai posttest diperoleh nilai signifikansi 0,000 < α (α = 0,05) dan nilai t hitung 2,490 > t tabel 1.670, artinya menolak hipotesis nol dan menerima hipotesis alternatif. Kesimpulan penelitian adalah model pembelajaran SAVI berpengaruh secara signifikan terhadap kemampuan pemecahan masalah matematika di kelas V sekolah dasar pada kecamatan Wonogiri.
Kata kunci: Model pembelajaran, SAVI, pemecahan masalah matematika

INTRODUCTION

Mathematical problem solving ability is an individual's capacity to identify, analyze, and solve problems in a mathematical context in an effective and efficient manner. (Ripai & Sutarna, 2019). This ability is considered essential in learning mathematics because it allows students to apply mathematical concepts and procedures in complex real situations. According to Lefudin (2017), learning models play an important role in determining the effectiveness of understanding the material, which can affect students' problem solving skills.

In the context of basic education, this ability is acquired through structured and interactive learning, where students are an active part of the teaching-learning process, as described by Khoerunnisa (2020). If a group of students can interact and exchange knowledge in the learning process, mathematical problem solving skills can be optimized (Ahdar and Wardana, 2019). So it is important for educators to develop lesson plans that support the improvement of this ability, so that students are ready to face mathematical challenges independently. Thus, mathematical problem solving skills become an important foundation in building solid mathematical competencies in students.

This ability requires not only theoretical understanding but also practical application supported by an effective learning model. According to Majid (2015), learning models must be implemented in such a way as to create a deep learning experience to achieve learning objectives. Learning models are also characterized by a systematic framework and serve as a guide in carrying out classroom learning (Trianto, 2015). The definition of learning models described above, researchers can conclude that learning models are patterns in designing systematic learning programs so that the achievement of goals can be carried out effectively and easily implemented.

With the right approach, as proposed by Irvy (2020), teachers can plan learning activities that allow students to develop problem-solving skills optimally. In this context, mathematical problem solving ability should be seen as an integral and constitutive ability, which not only helps students in understanding mathematical concepts but also in applying them to daily life problems. Through the right approach, teachers can create a learning environment that stimulates students to think independently and collaboratively, so that their problem-solving skills can be optimally honed. (Lestari, 2018).

Mathematical problem solving ability is an essential skill that enables students to utilize their mathematical knowledge to find solutions to complex problems. This ability includes understanding basic concepts, identifying problems, applying solution strategies, and evaluating the results obtained. According to Nuha (2024), mathematical problem solving ability is a skill that students must have to solve math problems in various aspects of mathematical problem solving. This view is supported by Widodo and Sujadi (2015), who argued that problem solving in mathematics involves trying to find solutions to mathematical problems by utilizing the mathematical knowledge possessed. Traditionally, conventional learning methods do not support the development of this ability because they emphasize one-way communication and do not allow interaction and practical application (Asmedy, 2021; Salafy & Susanah, 2022).

Nowadays, there is an increasing need to develop mathematical problem solving skills through more innovative approaches. Several studies have shown that student-centered learning approaches can improve learning outcomes in problem solving (Jafar, 2021). This is in contrast to conventional learning which often neglects the in-depth development of students' competencies.

Nuha (2024) highlighted the importance of problem solving skills as a basic component of effective mathematics education. However, conventional methods that are still widely applied have not been able to provide optimal support for students to develop this ability effectively. Therefore, innovations in learning methods, such as more interactive and participatory strategies, are needed to facilitate students in achieving higher levels of problem solving skills. In conclusion, the transformation of approaches in the learning process is key to improving students' overall mathematical problem solving skills.

This research has searched for previous studies that discuss mathematical problem solving skills. The existing studies show that the application of various learning approaches, including SAVI (*Somatic, Auditory, Visual, Intellectual*), has the potential to improve this ability. According to Rahayu (2019), the SAVI model is designed to meet students' various learning styles by combining kinesthetic, auditory, visual and intellectual elements, which are closely related to mathematical problem solving. Further investigation found that the use of physical movement in learning, as stated by Firdany (2022), is able to stimulate better brain activity, so that students' focus and willingness to learn can increase significantly. The auditory and visual aspects of this approach help in strengthening students' understanding of the material, which ultimately leads to more effective application of problem-solving skills. In addition, the intellectual aspects of SAVI support efforts to improve students' critical and analytical thinking skills, two crucial components in mathematical problem solving.

In a further literature search, Lestari (2020) revealed that the SAVI model allows students to link learning with real life through stimulating activities. Thus, the learning experience becomes more meaningful and long-lasting in students' memories, so that it can support the development of holistic problem-solving skills. Previous studies do show that the SAVI approach has positive effects in educational contexts, but each study has a different focus and methodology. For example, while Rahayu focuses on individual learning styles, Lestari emphasizes the connection of learning with everyday experiences. These differences provide diverse perspectives that enrich our understanding of the effectiveness of applying the SAVI model in improving mathematical problem solving skills.

Further research on the effectiveness of the *Somatic, Auditory, Visualization, Intellectual* (SAVI) learning model found that a holistic and contextually rich learning experience can have a significant impact on the development of mathematical problem solving skills. A series of previous studies revealed the varied application of the SAVI model, where each study offered different nuances and approaches related to the same variable, namely mathematical problem solving ability. Research by Nainggolan (2021) outlines each stage in the SAVI syntax, which includes the stages of preparation, delivery, training, and performance of results, allowing for variations in the application of learning strategies in the classroom. The essential elements of these stages show that in the learning process, the use of visual media, concrete examples, and group interaction and collaboration play an important role in facilitating student understanding. This is also confirmed by the findings of Lestari (2020) who highlighted how learning experiences that link learning to everyday life can carve deeper and longer-lasting memories, thus strengthening overall problem-solving abilities. However, while the SAVI model is gaining attention for its potential benefits in educational contexts, challenges still arise as efforts are made to integrate the results of this research thoroughly and effectively in existing curricula.

In the relevant literature, methodological differences and the focus of previous studies provide very diverse insights into the application of the SAVI model. For example, while Rahayu's research explored the impact of individual learning styles on learning effectiveness, other studies such as the one conducted by Lestari (2020) highlighted the link between learning and real-life experiences. This search confirms that while all these studies recognize the positive effects of the SAVI model, the variation in research approaches enriches the discussion on how this learning strategy can be adapted to achieve optimal results in improving problem-solving skills.

As such, these studies place this research in a broader context, facilitating the identification of specific elements that make each approach unique. However, the differences in each study both in terms of the context of the learning environment and the research subjects indicate the scope to further explore certain aspects of the SAVI model that have not been fully utilized in advancing mathematical problem solving skills in certain populations. Another fact found is that students tend to be given a lot of summary formulas for practice questions and answers and students also imitate the answers given by the teacher. This causes a gap between the research that has been done and the facts in the field. This research will attempt to bridge the gap with a specific focus on the application of the SAVI model in developing mathematical competence of grade V students in Wonogiri sub-district, integrating previous findings to add new dimensions to our understanding of mathematics education.

Based on the description above, the researcher can formulate the problem, namely whether there is an effect of the application of the *somatic, auditory, visualization, intellectual* (SAVI) learning model on mathematical problem solving skills in class V? for that, the purpose of this study is to determine the effect of the application of the *somatic, auditory, visualization, intellectual* (SAVI) learning model on the ability to solve mathematical problems in class V.

METHODS

According to Punch (2013) and Sugiyono (2019), quantitative methods are research methods based on the philosophy of positivism where the data is in the form of something that can be calculated. Quantitative research pays attention to data collection and analysis in numerical form. Research data collection was conducted in April-November 2024. This study uses a type of quantitative research with a true experimental method and uses a research design in the form of a Posttest-Only Control Design as explained by Sugiyono (2019) is described as follows:

T_1	X	O_1
T_2	---	O_2

Description:
X = Treatment using CLIS Learning Model
T = Respondent
O_1 = Experimental class posttest
O_2 = Control class posttest

The population in this study were fifth grade students totaling 652 from 31 public schools in Wonogiri sub-district. The sampling technique used *cluster random sampling* technique. The results of sampling, then grouped into two, namely: control group and experimental group. The experimental group consisted of 3 elementary schools with 64 students using SAVI learning model, while the control group consisted of 3 elementary schools with 61 students using conventional learning model.

The technique of collecting research data using a description test that has been tested for validity, reliability, level of size, and distinguishing power. Analysis of research data using prerequisite tests, namely: normality test, homogeneity test, and balance test. Hypothesis testing with Independent Sample t-test to determine the effect of the application of *somatic, auditory, visualization, intellectual* (SAVI) learning model on mathematical problem solving ability. The descriptive test was developed through validation by experts, while the validity test used the icon formula and the rehabilitation test used the alphacrobch formula.

RESULTS AND DISCUSSION

Results

The results of the research on the effect of the application of the *somatic, auditory, visualization, intellectual* (SAVI) learning model on mathematical problem solving skills in class V, the data can be described below:

Validity Test

To test the validity of each item of description material in the questionnaire, it is done by comparing r count with r table. where if r count> r table then it can be said that a statement item is declared valid. vice versa if if r count < r table then a statement item is declared invalid. In this study, the number of respondents was 52 respondents. So to find r table, namely with the formula df = n - k = 52 - 5 = 47. Thus, the resulting number in r table to 52 is 0.2816.

Table 1. Validity Test Results of the Description Test Materials.

X	r count	r table	Sig.	N	Description
P1	0,691	0,2816	0,000	52	Valid
P2	0,694	0,2816	0,000	52	Valid
P3	0,692	0,2816	0,000	52	Valid
P4	0,573	0,2816	0,000	52	Valid
P5	0,347	0,2816	0,012	52	Valid

Descriptive test 1 (P1), from the results of calculations using SPSS, it can be seen that r count> r table or 0.691> 0.2816, therefore Descriptive test number 1 is declared valid.
Descriptive test 2 (P2), from the results of calculations using SPSS, it can be seen that r count> r table or 0.694> 0.2816, therefore Descriptive test 2 is declared valid.
Descriptive test 3 (P3), from the results of calculations using SPSS, it can be seen that r count> r table or 0.692> 0.2816, therefore Descriptive test 3 is declared valid.
Test description 4 (P4), from the results of calculations using SPSS, it can be seen that r count> r table or 0.573> 0.2816, therefore Test description 4 is declared valid.
Descriptive test 5 (P5), from the results of calculations using SPSS, it can be seen that r count> r table or 0.347> 0.2816, therefore Descriptive test 5 is declared valid.

Reliability Test

The reliability test is used to determine whether the description test material used is reliable or reliable as a variable measuring instrument. The credibility of a questionnaire can be seen from the *Cronbach's Alpha* value, where if the *Cronbach's Alpha* value> 0.60 then the questionnaire can be said to be reliable, but if the *Cronbach's Alpha* value <0.60 then the questionnaire is considered unreliable.

Table 2.
Reliability Test Results of Descriptive Test Materials

Cronbach's Alpha	N of Items
0,679	5

Based on the SPSS test results in Table 7. Shows the *Cronbach's* Alpha value of 0.679> 0.60. So that the description test is declared reliable.

Difficulty Level

The question material that has been prepared, in this study, is also tested for difficulty level. The purpose of the difficulty level test is to see the composition of the problem test. The results of measuring the level of difficulty of the question, compared to the table level of difficulty of the question.

Table 3. Level of Difficulty

Interval	Interpretation
0,00 - 0,30	Difficult Problem
0,31 - 0,70	Medium Problem
0,71 - 1,00	Easy Problem

$$\text{Problem } p = \frac{jumlah\ jawaban\ benar}{banyak\ siswa}$$

	Index	Criteria
Problem 1	0,55	Medium Problem
Problem 2	0,72	Easy Problem
Problem 3	0,25	Difficult Problem
Problem 4	0,58	Medium Problem
Problem 5	0,46	Medium Problem

The researcher concluded from the results of the formula calculation of 5 items of learning outcome items there were 3 items (60%) in the medium category, 1 item (20%) in the easy category, and 1 item (20%) in the difficult category.

Distinguishing Power

Differentiating power is the ability of a question item to be able to distinguish between participants who have mastered the material in question and participants who are less or have not mastered the material in question. In this study, the composition of the question material was 1 easy, 3 medium, and 1 difficult.

Normality Test

Table 4. Normality Test Results

		Unstandardized Residual
N		52
Normal Parameters[a]	Mean	.0000000
	Std. Deviation	1.58937713
Most Extreme Differences	Absolute	.172
	Positive	.172
	Negative	-.080
Kolmogorov-Smirnov Z		1.241
Asymp. Sig. (2-tailed)		.092

Based on the results of the normality test in Table 9. Using SPSS, it is known that the significance value is 0.092> 0.05, it can be concluded that the residual value is normally distributed.

Hypothesis Test (t Test)

The t test statistical test is used to determine how much influence the independent variable of digital technology (X) has on the dependent variable of the effectiveness of promotion services (Y). This study uses partial testing where to find out variable X on variable Y. In this study the sample used was 52 samples. t table = t (a/2; n-k-1) = (0.025; 50) = 2.008, so the t table used in this study based on the formula from the sample is 2.008. The basis for decision making is as follows: $_0$First, if the significance value> 0.05 or t count < t table, it can be concluded that H0 is accepted, and Ha is rejected or there is no influence of variable X on variable Y. Second, if the significance value < 0.05 or t count > t table, it can be concluded that H0 is rejected, and Ha is accepted or there is an influence of variable X on variable Y.

Table 5. Results of the t-test

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	10.604	1.899	.355	5.584	.000
	SAVI	.317	.118		2.688	.010

Based on Table 4, it is known that the significant value for the effect of variable X on variable Y is 0.010 <0.05 and the calculated t value is 2.688> t table 2.008 so it can be concluded that Ha is accepted and H_0 is rejected, which means that there is an influence of the independent variable of the application of the *somatic, auditory, visualization, intellectual* (SAVI) learning model as an independent variable (X) on problem solving ability, as the dependent variable (Y).

Discussion

Based on the data above, it is proven that the *somatic, auditory, visualization, intellectual* (SAVI) learning model has an effect on mathematical problem solving skills in class V, as evidenced by the calculation of the t test, namely the value of t count 2.688> t table 2.008. This is because the *somatic, auditory, visualization, intellectual* (SAVI) learning model has a role in helping students in solving story problem material. Aprilia, et al, (2019) explained that through the SAVI learning model the teacher can put students in a position that is always ready to use all the senses they have during the learning process. Optimization of all senses is what makes it possible for students to optimally build their knowledge. The process of optimizing all senses in learning is because the SAVI learning stages allow this. Shoimin (2014: 68) explains that the SAVI stages, namely: 1) The preparatory stage *(Vizualization*), the teacher arouses the interest of students by telling stories of pleasant learning experiences; 2) Delivery (*Auditory*), the teacher uses learning variations so that learning is more interesting, fun, relevant, involving all five senses; 3) The training stage (*Intellectual*); the teacher helps integrate various knowledge; 4) (*Somatic*), the teacher assists in understanding, learning, and applying knowledge.

Based on the results of the study, it is found that the SAVI learning model has helped activate students in learning. This provides space for learners to be able to explore knowledge to support mathematical modeling of story problems. The ability to model mathematics is what participants show during mathematics learning. This is in line with the statement from Sumarni, et al (2017) that the SAVI learning model has the advantage of being able to increase students in learning activeness, creating a better, interesting, effective learning atmosphere, and maximizing the sharpness of their intellectual concentration. This statement confirms that the SAVI learning model has actually helped students in the process of modeling mathematics from story problems.

CONCLUSION

Based on the results of the research and discussion that has been carried out, it can be seen that the application of the SAVI learning model has a significant effect on improving students' abilities in solving mathematical problems. This is evidenced by the results of the variable validity and reliability tests and the normality test which shows that the research instruments used are valid and reliable with normal data distribution. Furthermore, the t-test results show that there is a significant effect of the independent variable on the dependent variable with a significant value smaller than 0.05. Therefore, the alternative hypothesis is accepted which confirms that the SAVI learning model is effective in improving mathematical problem solving skills. The conclusion reinforces the importance of applying the SAVI learning model as a strategy that can help students understand and solve math problems better.

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