



# The Effect of Visual, Auditory, and Kinesthetic (VAK) Learning Models on Science Learning Outcomes

Eka Margareta Sinaga<sup>1\*</sup>, Fahrur Rozi<sup>2</sup>, Eka Kartika Silalahi<sup>1</sup>, Erdiana Gultom<sup>3</sup>, Betty Agatha Sihombing<sup>1</sup>

<sup>1</sup> Elementary School Teacher Education Study Program, Faculty of Teacher Training and Education, Universitas Katolik Santo Thomas Medan, Indonesia

<sup>2</sup> Elementary School Teacher Education Study Program, Faculty of Education, Universitas Negeri Medan, Indonesia

<sup>3</sup> Department of Chemistry, Faculty of Science, Technology and Information, Universitas Sari Mutiara Medan, Indonesia

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Corresponding Author:

Eka Margareta Sinaga

[eka\\_margaret@yahoo.com](mailto:eka_margaret@yahoo.com)

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**Abstract:** Low learning outcomes in IPAS (Natural and Social Sciences) among elementary school students are often caused by limited student engagement and learning methods that do not accommodate diverse learning styles. This study aims to determine the effect of the VAK (Visual, Auditory, Kinesthetic) learning model on the learning outcomes of fourth-grade students in IPAS subjects at SD Negeri 067246 Medan Tuntungan. The research employed a quantitative approach with a one-group pretest-posttest design, involving 30 purposively selected students from class IVB. Instruments used were learning outcome tests and student response questionnaires. The test assessed students' knowledge before and after the implementation of the VAK model, while the questionnaire gathered students' responses toward the applied learning model. Data were analyzed using a paired sample t-test with SPSS version 22. Results showed an increase in the average score from 56.27 (pretest) to 85.33 (posttest). The t-test yielded a significant value of  $0.000 < 0.05$ , indicating a statistically significant improvement in learning outcomes after the use of the VAK model. Furthermore, 60% of students responded positively to the learning process. These results suggest that the VAK model supports student engagement and accommodates various learning styles in IPAS learning.

**Keywords:** IPAS; Learning Style; Science Learning; VAK Model

## Introduction

Education is a systematic and planned process aimed at creating a conducive learning environment so that students can develop their potential optimally (Rizki Amalia Sa'adah et al., 2025; Xu et al., 2022)). This potential includes spiritual, moral, intellectual, and life skills aspects that are relevant to personal development, society, and national progress (Setiawan & Alimah, 2019). The curriculum serves as the primary guideline that regulates the content, materials, and learning strategies effectively to achieve national education goals (Zuhaida Alania & Muhammad Afandi, 2025). Teachers play a strategic role in designing learning that is not only a transfer of knowledge but also motivates and facilitates active student engagement (Edy Mawardi et al., 2025; Putri et al., 2025).

Natural and Social Sciences (IPAS) is an essential subject in basic education because it integrates scientific and social perspectives, aiming to shape students' critical, creative, and contextual thinking towards real-world phenomena (Tanti et al., 2020; Tantowi, 2025). IPAS learning is designed to enable students to observe, investigate, and draw conclusions from various natural and social phenomena (Nur'ariyani et al., 2023; Penuel et al., 2022). Therefore, the learning strategy used must stimulate active physical and mental involvement. Unfortunately, field observations show that IPAS learning is still dominated by conventional teacher-centered approaches (Adu et al., 2024; Sandika & Heryadi, 2025). This condition negatively affects student participation and weakens their conceptual understanding, which ideally should be built through

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direct and interactive experiences (Asriani & Rahmadana, 2024; Lachebo et al., 2024).

One potential solution is to apply a learning model aligned with students' characteristics and learning styles, such as the Visual, Auditory, Kinesthetic (VAK) model. This model is based on the principle that individuals have dominant learning styles—visual (through observation and images), auditory (through listening and discussion), and kinesthetic (through physical activity and hands-on experiences) (Alabi, 2024; Pradana et al., 2025). Research by (Ida Ayu Km Candra et al., 2018) showed that applying the VAK model improved the science learning outcomes of fourth-grade elementary students in Badung, with the experimental group scoring an average of 25.14 compared to 19.91 in the control group, supported by significant t-test results. This is reinforced by (Syamsudin, 2019) who found that the VAK model significantly improved student learning outcomes, with a t-value of  $4.488 > 1.674$  ( $p < 0.05$ ).

The VAK model enables teachers to design more varied and enjoyable lessons that accommodate diverse learning preferences. (Musbaing, 2021) also demonstrated that the model increased active participation and learning outcomes in science-related subjects. By engaging students through seeing, hearing, and doing, concept internalization becomes stronger. This approach aligns well with IPAS learning, which often requires student involvement in observations, practical activities, and contextual discussions (Dahlia et al., 2023).

Observations at SD Negeri 067246 Medan Tuntungan revealed that the IPAS learning process in class IVB remains passive. Teachers predominantly use lectures without involving students in discussions or hands-on activities. Moreover, limited facilities and infrastructure hinder meaningful IPAS learning. A pre-survey found that 12 students (40%) had not yet achieved the minimum competency threshold (KKTP) of 70, while only 18 students (60%) met or exceeded it. This indicates that overall learning outcomes are still suboptimal and require intervention through more effective and engaging strategies.

The novelty of this study lies in its application of the VAK learning model within the integrated IPAS subject context—rather than in Natural Science or Social Science alone—which has been rarely explored in previous research. Given that IPAS requires an interdisciplinary understanding of both scientific and social phenomena, the VAK model's multisensory approach is expected to bridge diverse learning needs more effectively.

This research is important because it offers a concrete solution to the ongoing issue of low student engagement and achievement in IPAS. The findings are expected to contribute theoretically to the development of learning models based on student learning styles and

practically as a reference for improving IPAS teaching quality in elementary schools.

## Method

This research uses a quantitative method with an experimental approach (Hardani et al., 2020). The design applied is a one-group pretest-posttest design, which involves a single group of subjects receiving treatment without the use of a control group (Musbaing, 2021). Before the treatment, a pretest is administered to measure initial conditions. After the treatment, a posttest is administered to measure the effect of the intervention. The treatment used in this study is the implementation of the VAK (Visual, Auditory, Kinesthetic) learning model (Mustari, 2023). This design was chosen to examine the differences in student learning outcomes before and after the learning model is applied, allowing the measurement of changes attributable to the intervention though it should be noted that the absence of a control group limits stronger causal inferences.

This study was conducted at SD Negeri 067246 Medan Tuntungan, located on Jalan Flamboyan Raya, Medan Tuntungan Sub-district, Medan City. The research site was selected purposively, with considerations that the school has an adequate number of students for sampling, provides access for research activities, and that the learning conditions for Science and Social Sciences (IPAS) subjects remain suboptimal. The research was conducted during the even semester of the 2024/2025 academic year, in accordance with the scheduled activity plan.

The population in this study includes all fourth-grade students at SD Negeri 067246 Medan Tuntungan, consisting of two classes: IVA (28 students) and IVB (30 students). The sample was determined using purposive sampling, which selects samples based on specific criteria. In this case, Class IVB was chosen as the sample because it met the criteria as the class received the VAK learning model intervention. The number of students in Class IVB is 30, and all were used as research subjects.

Data collection was carried out using three techniques: observation, test, and questionnaire (Firdaus et al., 2023). Observation was used to monitor student engagement in Science and Social Sciences (IPAS) learning during the implementation of the VAK model. The test was used to measure student learning outcomes and consisted of 50 multiple-choice items covering cognitive indicators C2 (understanding), C3 (applying), and C4 (analyzing) (Sari et al., 2019). Questionnaires were used to assess student responses toward the implementation of the VAK model. The questionnaire included 30 statements based on a Likert scale with five

answer options. The indicators reflected the stages of the VAK model: preparation, delivery, training, and performance.

The research instruments underwent both validity and reliability testing (Yusup, 2018). The validity test was conducted using the Product Moment correlation formula with SPSS version 22 (Aditya Wardhana, 2024). Out of 50 test questions, 25 were declared valid and used for data collection. Similarly, from 50 questionnaire items, 25 were declared valid and used in this study. While this number represents a 50% validity rate, it reflects a selection process ensuring the items effectively measure the intended constructs. The reliability test used the Cronbach's Alpha formula, and results showed that the test instrument had a reliability coefficient of 0.877, while the questionnaire had 0.856 both categorized as very high (Anggraini et al., 2022).

Data analysis in this study was carried out quantitatively (Md. Mahsin, 2022). Prior to hypothesis testing, a prerequisite test was conducted to assess normality using the Liliefors test, ensuring that the data were normally distributed (Usmadi, 2020) to determine the effect of the VAK learning model on student learning outcomes, a paired sample t-test was used with the assistance of SPSS version 22. The hypothesis is considered accepted if the significance value (Sig. or p-value) is less than 0.05, indicating a statistically significant difference in learning outcomes before and after the implementation of the VAK model (Safruddin et al., 2020).

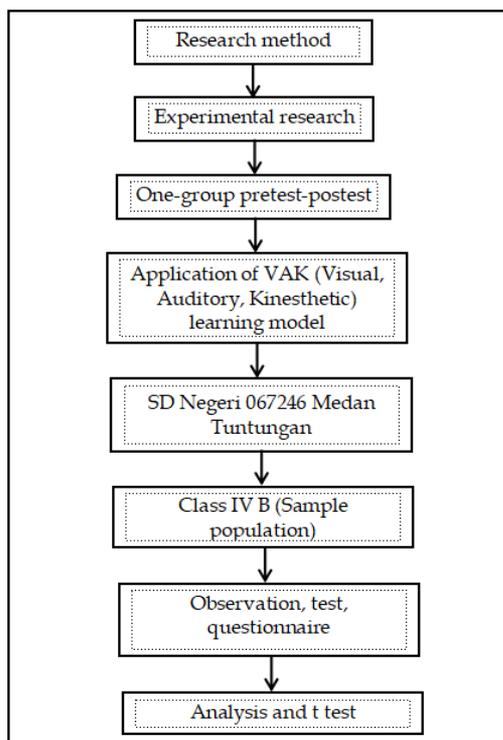


Figure 1. Research Flow Diagram

## Result and Discussion

This study aims to determine the effect of the VAK (Visual, Auditory, Kinesthetic) learning model on the learning outcomes of fourth grade students of SD Negeri 067246 Medan Tuntungan in IPAS subjects. The research design used was a one-group pretest-posttest involving one group of students who were tested before and after treatment.

Before the implementation of the VAK learning model, students were given a pretest to determine their initial abilities. The pretest results showed that the average student score was 56.27, the highest score was 84, and the lowest score was 32. Most students had not reached the Learning Objective Completeness Criteria (KKTP) score of 70.

Table 1. Distribution of Pretest Score of Class IV Students (n = 30)

Value interval	Frequency	Persentase (%)	Category
≤ 40	8	26.70%	Very low
41-55	8	26.70%	Low
56-65	7	23.30%	Medium
66-79	4	13.30%	High
80-100	3	10.00%	Very high
Quantity	30	100%	

This study aimed to determine the effect of the VAK (Visual, Auditory, Kinesthetic) learning model on student learning outcomes in IPAS. Before the implementation of the model, students were given a pretest. The results showed an average score of 56.27, with the highest score at 84 and the lowest at 32. Based on Table 1, 16 students (53.40%) were in the very low and low categories, indicating that the majority had not yet mastered the material. These findings are supported by (Mohamad et al., 2024; Sullamuddiyannah et al., 2024) who found that conventional, teacher-centered learning tends to result in suboptimal student outcomes.

Research by (Razaq et al., 2025) emphasizes the importance of learning style-based learning-visual, auditory, kinesthetic-to increase student engagement and understanding. In addition, (Riva Komala Sari et al., 2021) in the Journal of Basic Education Research revealed that a differentiated approach tailored to learning styles can make learning more personalized and effective, and significantly improve student learning outcomes.

After learning using the VAK model, students were given a posttest to measure the improvement of learning outcomes. The average post-test score was 85.33, the highest score was 96, and the lowest score was 60. 25 students (83.30%) had reached the KKTP score.

**Table 2.** Distribution of Posttest Values of Class IV Students (n = 30)

Value interval	Frequency	Persentase (%)	Category
≤ 60	2	6.70%	Very low
61-70	3	10.00%	Low
71-80	7	23.30%	Medium
81-90	5	16.70%	High
91-100	13	43.30%	Very high
Quantity	30	100%	

After the VAK model was applied, the posttest showed an increase in the average score to 85.33, with the highest at 96 and the lowest at 60. Table 2 shows that 25 students (83.30%) reached KKTP. There was a significant shift from low to high/very high categories. According to (Mulyani et al., 2021), , this improvement is due to the multisensory approach of VAK that facilitates conceptual understanding. However, research by (Rukmana et al., 2018) emphasized the need for adequate facilities and time management for its effectiveness.

**Table 3.** Paired Sample t-Test Results

Variables	Average	T-count	Sig. (2-tailed)
Pretest-posttest	-29.07	-11.46	0.00

The paired sample t-test (Table 3) showed a t-count of -11.46 and a significant value of 0.00 ( $p < 0.05$ ), indicating a statistically significant improvement in learning outcomes. This supports (Iim et al., 2025; Sary et al., 2020), who reported significant gains when learning styles were integrated into instruction.

**Table 4.** Categories of Student Response to the VAK Model

Category	Frequency	Persentase (%)
Low	6	20%
Medium	6	20%
High	18	60%
Quantity	30	100%

In addition to learning outcomes, student responses (Table 4) showed that 60% gave a high response to the VAK model, 20% gave medium responses, and 20% gave low responses. Students felt more engaged and motivated, aligning with (Rahmah & Supriadi, 2024), who stated that VAK improves activeness and motivation. The 20% with low response, as explained by (Sary et al., 2020), , may be due to inflexible instruction or insufficient practice time.

The normality test using the Kolmogorov-Smirnov method in SPSS showed a p-value  $> 0.05$ , confirming the data were normally distributed and validating the use of the paired t-test. The Lilliefors test also confirmed normal distribution with L-count  $< L$ -table.

Overall, the VAK learning model significantly improves student learning outcomes and motivation in IPAS. It encourages active participation through a variety of learning styles. However, its success is influenced by teacher preparedness, infrastructure, and student diversity.

## Conclusion

The VAK (Visual, Auditory, Kinesthetic) learning model has a significant effect on improving student learning outcomes in class IV IPAS subjects at SD Negeri 067246 Medan Tuntungan. This is indicated by an increase in the average score from the pretest of 56.27 to 85.33 in the posttest, as well as the results of the paired sample t-test which shows a significance value of  $0.000 < 0.05$ . Most students also gave positive responses to learning with the VAK model, where 60% were in the high response category. This model is able to accommodate the diversity of students' learning styles so that learning becomes more interesting, active, and meaningful. The VAK learning model is proven effective in improving science learning outcomes, but its success still depends on teacher readiness, supporting facilities, and adjustments to student characteristics.

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## Author Contributions

Conceptualization and methodology, E.M.S, B.A.S and F.R; formal analysis, E.K.S and E.G; investigation, E.M.S, and B.A.S; writing-preparation of initial draft, E.M.S; writing-review and editing, E.M.S, B.A.S and F.R; visualization, B.A.S and E.M.S. All authors have approved the published manuscript.

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## Conflicts of Interest

The authors declare no conflict of interest.

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