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The Experimental-Based Visual Auditory Kinesthetic (Vak) Learning Model Improves Elementary School Science Learning Outcomes

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ABSTRAK

Pembelajaran IPA sulit dipahami siswa jika guru hanya menerapkan metode ceramah. Tujuan penelitian ini yaitu menganalisis pengaruh Model pembelajaran VAK berbasis eksperimen terhadap hasil belajar IPA pada siswa kelas V SD. Penelitian ini tergolong dalam penelitian eksperimen semu (Quasi Experiment). Desain penelitian yaitu Non-Equivalent Post-test Only Control Group Design. Populasi penelitian berjumlah 172 siswa. Penelitian ini akan menggunakan teknik random sampling. Sampel penelitian berjumlah 62 siswa. Metode pengumpulan data yang digunakan yaitu metode tes. Instrument penelitian ini yaitu lembar soal pilihan ganda. Teknik analisis data yang digunakan yaitu statistik deskriptif dan statistik inferensial. Hasil penelitian ini yaitu terdapat pengaruh yang signifikan model pembelajaran Visual Auditory Kinesthetic (VAK) berbasis Eksperimen terhadap hasil belajar IPA siswa kelas V SD. Disimpulkan bahwa model pembelajaran Visual Auditory Kinesthetic (VAK) berbasis Eksperimen dapat meningkatkan hasil belajar IPA siswa kelas V SD. Model pembelajaran VAK dapat membantu siswa dan menyenangkan suasana belajar IPA.

ABSTRACT

If the teacher only applies the lecture method, science learning is complex for students to understand. This study aimed to analyze the effect of the experimental-based VAK learning model on science learning outcomes in fifth-grade elementary school students. This research belongs to the quasi-experimental research (Quasi Experiment). The research design is the Non-Equivalent Post-test Only Control Group Design. The research population totaled 172 students. This research will use a random sampling technique. The research sample was 62 students. The data collection method used is the test method. The research instrument was a multiple-choice question sheet. The data analysis technique used is descriptive statistics and inferential statistics. The results of this study show a significant influence of the experimental-based Visual Auditory Kinesthetic (VAK) learning model on the science learning outcomes of fifth-grade elementary school students. It was concluded that the Experiment-based Visual Auditory Kinesthetic (VAK) learning model could improve the science learning outcomes of fifth-grade elementary school students. The VAK learning model can help students and make science learning fun.

1. INTRODUCTION

One component that determines the success of education is the quality of the teacher. It is because teachers are directly related to students learning (Kurniawan et al., 2020; Lestari et al., 2019; Nurwahidah et al., 2021). Teachers are not only required to be able to transform their knowledge but are expected to inspire them to increase their potential optimally. In addition, student success is also influenced by internal and external factors. The internal factors are in humans, including the readiness of students' interests or motivation (Iswardhany & Rahayu, 2020; Saputra et al., 2018). External factors come from outside the students themselves, such as using methods, facilities, associations, or the environment around students (Herdiana et al., 2021; Ikbal et al., 2019). In external factors, the teacher is one of the important factors determining learning success. Learning activities will work optimally, and optimally teachers are expected to be able to design learning activities by considering the objectives with the model to be achieved and adapted to student characteristics (Ningrum & Sungkawa, 2018; Wahyudi &

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Winanto, 2018). Selecting a model or method appropriate to this child's material or learning style greatly determines the success of learning (Maulida et al., 2020; Nurtanto et al., 2019). The teacher's success in developing competent human resources starts from the learning model used when teaching in class.

In learning activities or students' lives, they often face problems that require children to solve a problem well through their thinking skills (Aslan, 2021; Waite et al., 2020). It causes the cognitive aspects to be well developed so students can solve various problems. Moreover, in science learning, students must have good problem-solving skills (Subali et al., 2019; Zulherman et al., 2021). In science learning, students will face the stages of exploration, introduction, and application of a concept (Anif et al., 2020; Suryawati & Osman, 2017). It causes elementary science learning to require good cognitive skills regarding the basic concepts in each sub-material. Science learning has a very broad scope with learning material that is still abstract when given to elementary school students at the stage of concrete thinking (Meilani et al., 2020; Mustika & Ain, 2020). In learning science, students must be allowed to develop their curiosity with logical explanations. Science learning also brings closer to giving direct experience that develops competence in gaining understanding (Nurmalasari et al., 2022; Windiani et al., 2017). Science learning involves the role of students' real actions in the learning process. It must be done through real activities with practice and direct experience (Agustiana et al., 2020).

But the reality in the science learning field is that many students still need help understanding it. Previous research findings also revealed that science learning is easier for students to understand if the teacher only applies the lecture method (Kusumah et al., 2020; Maulidati et al., 2019). Other findings also revealed that students' low knowledge of science was caused by needing to be more focused while studying (Juniari & Putra, 2021; Permatasari, 2017). The observations made in the fifth grade of SDN Gugus VI Sawan District showed a lack of application of a learning model that actively involved full students. In addition, learning capital tends to focus only on one direction, the teacher, so 75% of students feel bored when studying and choose to talk to their peers. Such a situation will make classroom conditions less conducive so that students cannot understand learning properly. Learning activities also emphasize students only hearing the teacher's explanation from learning resources. In addition, dominant students only study material by rote without being encouraged to be fully involved in exploring their knowledge so that the child's understanding of concepts matures. It can certainly be seen when the teacher only assigns students to record material and answer the questions.

The solution to this problem is applying the right learning model to science. The Visual Auditory Kinesthetic (VAK) learning model is an alternative model that can be used to address and improve students' natural science learning outcomes. In applying the VAK model, students must optimize their experience (Ikawati & Kowiyah, 2021; Mayarnimar & Taufina, 2017). Learning focuses on using three modalities: sight, hearing, and body movements, so students feel comfortable (Ikawati & Kowiyah, 2021; Mayarnimar & Taufina, 2017; Rukmana et al., 2018). In addition, at the end of the activity, students get an award if they have completed their task, which can trigger student motivation when learning. The VAK model will certainly develop students' potential because it is adapted to their learning styles.

Moreover, learning activities with the experimental-based VAK model will help increase student understanding. Learning activities will be more meaningful if students discover the concepts they learn scientifically for themselves. This experiment is one of the learning methods implementing experiments, so students will become more interactive and discover learning concepts (Restyani, 2018; Rismaningsih, 2016). Moreover, students also do not understand abstract things, so by finding their understanding, it will be easier for children to understand learning (Devi & Bayu, 2020; Diyantari et al., 2020). This experiment-based science learning will allow students to solve problems through direct experience and prove a concept to be very suitable to be applied.

The findings of previous research also revealed that experimental-based science learning would have a significant learning impact because students could understand concepts independently (Rismaningsih, 2016; Subekti & Ariswan, 2016). Other research findings also reveal that the VAK model is appropriate in science learning because it maximizes three modalities (Nurmayani et al., 2017; Rahmadani et al., 2021). Based on this, it can be concluded that the VAK learning model can improve science learning outcomes. This study aimed to analyze the effect of the experimental-based VAK learning model on science learning outcomes in fifth-grade elementary school students. Hopefully, this model can add insight to students and increase a pleasant learning atmosphere.

2. METHOD

This type of research is quantitative research. This research belongs to the quasi-experimental research (Quasi Experiment). The research design is the Non-Equivalent Post-test Only Control Group Design. The location of this research is SD Gugus VI, Sawan District, Buleleng Regency. In SD Gugus VI Sawan District, there were 4 SD, SD Negeri 1 Kerobokan, SD Negeri 1 Sangsit, SD Negeri 4 Sangsit, and SD

Negeri 7 Sangsit. The research procedure includes three stages: preparation, implementation, and experimentation. The population of this study were all fifth-grade students in SD Gugus VI, Sawan District, Buleleng Regency, consisting of 6 groups from 4 schools, totaling 172 students. This study will use a random sampling technique, and the class as an intact group will be randomized. The results of the first draw were the fifth grade at SDN 1 Kerobokan, designated as the experimental group (32 students), and class VB at SDN 4 Sangsit, designated as the control class (30 students).

The data collection method used is the test method. The test method is a multiple choice (objective) of 30 questions. The research instrument was a multiple-choice question sheet. The test results of the instrument were tested for the level of content validity, test item validity, reliability, level of difficulty, and differential power of the test. The results of the content validity test using the Gregory formula, the results of the instrument content validity were 1.00 (very high). Test the validity of the items using the biserial point correlation formula, the results of which are 30 items are declared valid. The reliability test used the Kuder Richardson 20 (KR-20) formula. The result was 0.79 (very high). The discriminating power test was obtained at 0.27 (good enough). The difficulty level of the test items is 0.63 (moderate). The instrument grid is presented in Table 1.

Table 1. Research Instruments Grid

Basic competencies	Indicator	The number of questions
3.6 Applying the Concept of heat transfer in everyday life	3.6.1 Analyzing the use of heat energy in everyday life.	1
	3.6.2 Determine the benefits of heat energy in the surrounding environment.	2
	3.6.3 Determine the difference between temperature and heat.	4
	3.6.4 Find ways and events of heat transfer by conduction.	5
	3.6.5 Determine ways and events of heat transfer by convection.	3
	3.6.6 Determine the ways and events of heat transfer by radiation.	5
	3.6.7 Analyzing the objects around, which are conductors and insulators.	5
	3.6.8 Interpret the use of conductors and insulators in everyday life.	2
	3.6.9 Analyzing the events of objects' expansion and contraction due to temperature changes.	2
	3.6.10 Analyzing the concept of heat transfer or heat in everyday life.	1

The data analysis technique used is descriptive statistics and inferential statistics. The descriptive statistical analysis describes research subjects based on data from variables. Descriptive statistics to calculate the mean, median, mode, SD, Variance, Histogram, and PAP scale of five. The inferential statistics used in this study are parametric analyses consisting of a normality test for data distribution, a homogeneity test for variance, and a hypothesis test using an independent sample t-test. The normality test uses the Kolmogorov-Smirnov test—homogeneity testing using Levene Statistics. Test the hypothesis using an independent sample t-test.

3. RESULT AND DISCUSSION

Result

The data for this research study were obtained based on post-tests from the experimental and control groups to measure students' abilities after applying the Experiment-Based Visual Auditory Kinesthetic Learning Model (VAK)—first, a description of the experimental group's study results. The highest data result is 90, and the lowest is 66. The range of scores obtained is 25. The number of classes used is 6. The class length is 5. The calculation results obtained a mean, of 78.75. The median is 78.125. The mode is 76.25. The standard deviation is 6.7. The variance is 44, 89. Based on the results of data analysis, the average value of students in the experimental group, 78.75, fulfills the category $75 \leq \bar{x} \leq 100$, so the value of students' science learning outcomes can be categorized as very high. The results of the distribution of the experimental group are presented in Figure 1.

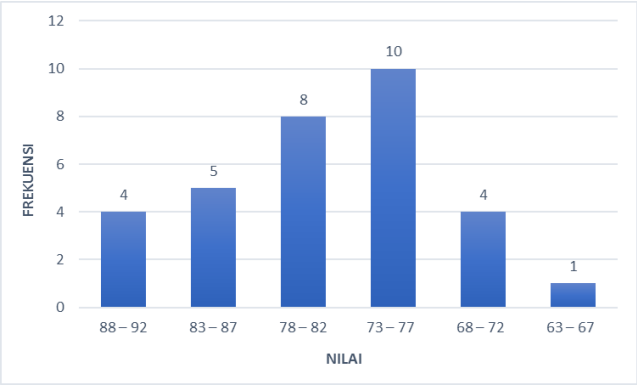

Figure 1. The results of the distribution of the experimental group

Second, the data on the control group's learning outcomes. The highest data result is 73, and the lowest is 40. The range of scores obtained is 15. The number of classes used is 6. As well as the length of class 6. The calculation results show that the mean is 59.21. The median is 59.5. The mode is 60.17. The standard deviation is 8.58. The variance is 73.62. Based on the results of data analysis, the average score of students in the control group, 59.21, fulfills the category $58 \leq \bar{x} < 75$, so the value of students' science learning outcomes can be categorized as high. The results of the distribution of the control group are presented in Figure 2.

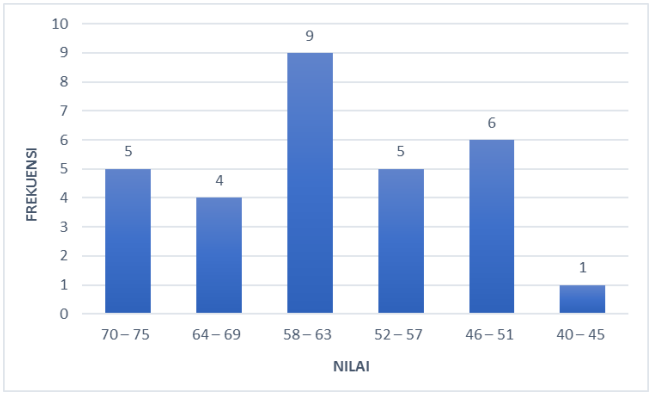

Figure 2. The results of the distribution of the control group

Based on the results of the normality test, the value of Sig. > 0.05, then the data is normally distributed, and if the Sig. < 0.05, then the data is not normally distributed. The normality test results for the distribution of data assisted by the SPSS 26.00 for the Windows program are in Table 2. Based on the variant homogeneity test results, the significance value in the Based on Mean column was 0.194. These results indicate that the significance value is greater than 0.05, so the data is homogeneous.

Table 2. Results of Normality Test Data Distribution of Student Post-test Scores

	Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Score	Experiment	0,135	32	0,143	.945	32	0,104
	Control	0,153	30	0,069	.961	30	0,324

The results of hypothesis testing were carried out to determine the effect of the experimental-based VAK model on students' science learning outcomes. The results of the analysis above obtained the value of Sig. in the Sig column. (2-tailed) in the Equal variances assumed line of 0.000. These results indicate a significance value of less than 0.05 (0.000 <0.05), so H0 is rejected, and H1 is accepted. These results state a significant influence of the Experiment-based Visual Auditory Kinesthetic (VAK) learning model on the science learning outcomes of fifth-grade elementary school students in GUgus VI, Sawan District. The results of hypothesis testing are presented in Table 3.

Table 3. Hypothesis Test Results

		t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
Score	*Equal variances assumed*	10,241	60	0,000	19,727	1,926	15,874	23,580
	Equal variances not assumed	10,164	55,261	0,000	19,727	1,941	15,838	23,616

Discussion

Based on the results of data analysis, it was found that the Experiment-based VAK learning model could improve science learning outcomes. The following factors cause this. First, the experimental-based VAK learning model helps students learn. Learning activities using the VAK model make it easy for students to learn because they pay attention to the learning styles of students with visual abilities. They will be given convenience by using learning media such as pictures or videos. Students who have auditory abilities will be given audio media assistance. And kinesthetic students will be taught through physical activities such as experiments. The learning model is a form or learning activity that is illustrated from the beginning to the end of the lesson, which will be presented by the teacher (Iswantiningtyas & Wulansari, 2019; Pasek et al., 2018; Widayanti et al., 2019). Other studies also interpret this model as a conceptual framework that can guide learning activities to achieve the goals optimally (Rahmayani et al., 2019; Wijanarko, 2017). This creative use of capital will guide the teacher in designing an appropriate lesson. The success of this learning objective can be seen from the increasing student achievement (Fitriyah et al., 2017; Kosilah & Septian, 2020). The cognitive aspect will determine students' achievement because it indicates their ability to understand the material. Research reveals that cognitive development relates to reasoning, remembering, solving problems, or memorizing (Noorhidawati et al., 2015; Prihandoko et al., 2017).

Second, the Experiment-based VAK learning model increases enthusiasm. Experimental-based science learning will require students to do something to increase student enthusiasm for learning. Previous research findings revealed that the VAK learning model makes students more enthusiastic about learning using the three learning styles that students have (Nurmayani et al., 2017; Rahmadani et al., 2021). This learning model can certainly develop and train students' abilities and involve students in general in carrying out and understanding concepts through experimental activities, discussions, or demonstrations. It is what causes the learning model to provide opportunities for students to learn directly freely by using their modalities so that it will increase students' enthusiasm for learning (Iswatun et al., 2017; Margunayasa et al., 2019; Prihandoko et al., 2017). In addition, at the end of the activity, students are given tests and evaluations to measure the achievement of the material that students have learned. The teacher also asked the students their feelings during the learning activity. All students said they were enthusiastic about participating in learning activities by applying this VAK model. It can be concluded that the Experiment-based VAK learning model increases enthusiasm for learning science.

Third, the experimental-based VAK learning model creates a fun atmosphere. In learning activities, the application of this model runs optimally. It is because students are actively involved in learning activities using their three learning styles. In addition, this learning model also motivates students to participate in learning because every learning takes place, and the teacher gives rewards in the form of reinforcement to create a conducive learning atmosphere (Nurmayani et al., 2017; Rahmadani et al., 2021). Learning activities originally focused on the teacher are student-centred to make the learning atmosphere more enjoyable. Previous research also revealed that appropriate learning methods could increase student enthusiasm and activity (Edeltrudis, 2018; Pudjiastuti, 2020; Sugihartono, 2019). Other research findings also reveal that the VAK learning model can improve student learning outcomes (Jannah et al., 2019; Kusumawati, 2019). Thus, this model can broaden students' insights and enhance a pleasant learning atmosphere. This research implies that the application of the Experiment-based VAK learning model helps students in learning so that it impacts increasing student learning outcomes.

4. CONCLUSION

The data analysis results showed a significant effect of the Experiment-based Visual Auditory Kinesthetic (VAK) learning model on the science learning outcomes of fifth-grade elementary school

students. It was concluded that the Experiment-based VAK learning model could improve science learning outcomes. The Experiment-based VAK learning model helps improve and create a fun learning atmosphere to improve student learning outcomes.

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