



## Use of Visual, Auditory, Kinesthetic (VAK) Models in Learning Mathematics on Curved-Sided Spatial Materials

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### Abstrak

Penelitian ini diperoleh karena rendahnya partisipasi langsung peserta pengajar dalam pelatihan. Penelitian ini bertujuan untuk mengetahui perbandingan menggunakan bentuk atau tidak menggunakan bentuk. Penggunaan formulir sangat penting dalam menjamin keberhasilan suatu proses pendidikan, semakin baik formulir yang digunakan maka semakin efisien pula target pendapatannya, salah satunya adalah formulir VAK. Bentuk visual auditori kinestetik (VAK) merupakan bentuk latihan yang memaksimalkan 3 gaya belajar berupa visual, auditori dan kinestetik agar siswa merasa aman. Penelitian ini bertujuan untuk melihat penggunaan bentuk VAK (visual, auditori, kinestetik) dalam pelatihan Matematika siswa kelas IV SDN 167647 dengan modul volume bangun ruang bersisi melengkung. Instrumen yang digunakan dalam penelitian ini adalah monitoring dengan melihat langsung menggunakan formulir VAK Matematika dengan modul volume bangun sisi lengkung. Setelah melakukan penelitian ini, Anda akan menemukan keberhasilan yang diinginkan dalam pelatihan yang sedang berlangsung.

**Kata Kunci:** Bangun Ruang Sisi Lengkung, Matematika, Model Pembelajaran

### Abstract (English-Indonesia)

*This research was obtained due to the low direct participation of teaching participants in training. This research aims to identify comparisons using shapes or not using shapes. The use of forms is very important in ensuring the success of an educational process, the better the form used, the more efficient the target income, one of which is the VAK form. The visual auditory kinesthetic (VAK) form is a form of training that maximizes 3 learning styles in the form of visual, auditory and kinesthetic to make students feel safe. This research aims to look at the use of the VAK (visual, auditory, kinesthetic) form in Mathematics training for class IV students at SDN 167647 with the volume module of curved sided space shapes. The instrument used in this research is monitoring by looking directly using the VAK form in Mathematics with the volume module of curved sided shapes. After carrying out this research, you will find the desired success in the ongoing training.*

**Keywords:** Building Curved Side Spaces, Learning Model, Mathematics

## Pendahuluan

Learning is an important instrument used to improve human resources based on affective, cognitive and psychomotor skills. Learning is also an application to make the nation's life smarter. The relationship between the conception of the effort to educate the nation and its implementation can be tried using several methods, including curriculum development, teacher training through pre-service education, learning and upgrading teacher training in in-service training, educational capacity building systems in on-the-job training, upgrading processes, especially in determining upgrading strategies, as well as the application of learning evaluation. Therefore, teachers are obliged to pay attention to the programming and implementation of learning well and maturely so that learning objectives can achieve maximum results and produce a learning generation that is in line with Law Number. 20 of 2003 (Melinda & Yermiandhoko, 2017).

Learning is also a process that is prolonged and never finished ( *never ending process* ), so that it can create sustainable quality, which is aimed at concretizing the future form of people and is based on the nation's traditional values and Pancasila. Learning must develop the philosophical values and traditions of the nation in a complete and global manner. As a result, there needs to be a deeper look at learning, so that learning begins to be viewed in a metaphysical way which refers to clarity on the basis of learning itself (Sujana, 2019).

Learning is a method that includes 3 forms, the individual, the citizen or the national community of that individual, as well as all realistic contents, both material and spiritual which play a role in determining the character, nature, form

of humans or society (Nurkholis, 2013).

Mathematics is one of the agents of knowledge that is taught at all stages of learning starting from the children's school to the high school. Besides that, mathematical design is something that is very close and we often encounter it in our routine. Mathematics is one of the sciences that underlies people's lives. Mathematics is also one of the fields of study given at every level of education and has very important uses for improving the potential characteristics of the human production process by developing the ability to think logically, rationally, critically, analytically and systematically. Understanding concepts is one of the goals of learning mathematics at school. Students must have an understanding of mathematical concept abilities after the mathematics learning process takes place. Students who have an understanding of mathematical concepts will be able to explain related concepts and apply them. This can certainly make it easier for students to understand mathematics lessons (Agustini & Fitriani, 2021).

Mathematics training is something related to many concepts. Design is an abstract idea with which we can divide objects into illustrations or non-illustrations. Concepts in mathematics are dependent on one another. The difference between one module design and another is the fact of the meaning of the mathematical design explanation (Novitasari, 2016).

According to Anugrah & Pujiastuti, (Munawwarah, 2022) geometry is an essential and important part to study and use in studying mathematical topics. By having high geometric skills, students will have high-level mathematical thinking skills and be able to solve problems in everyday life well. However, geometry is still a difficult material for students, especially in curved geometric figures. A

curved sided shape is a geometric shape that has curved sides. The surface area and volume of curved side shapes have many applications in everyday life.

Curved sided space figures are a part of geometry whose study is important, because it allows students to analyze and interpret the world in which they live and helps them in operating other materials. However, the facts found in the field show that there are still obstacles and errors encountered by students in this material. To overcome this, activities are needed to analyze students' mistakes solve the problem of curved sided shapes. This aims to ensure that the errors and factors that cause errors made by students can be identified, so that follow-up and handling of these errors can be carried out (Marasabessy et al., 2021).

A curved sided space shape is a space shape that has at least one curved side. Trash cans, ice cream cones, birthday hats and basketballs are models of curved-sided spatial structures in everyday life. These include:

Tube, A tube is a curved sided shape formed by two parallel identical circles and a rectangle that surrounds the two circles. The following is a picture of a tube building.

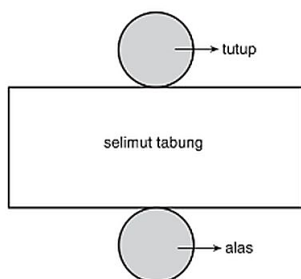


Figure 1. Tube mesh

A cone is a curved sided shape that can be formed from a tube by changing the tube cap to a point. This point is usually called the peak point. The following is a picture of a cone shape:

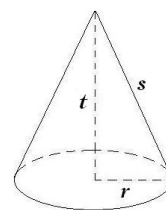


Figure 2. Conical Space Building

A ball is a curved shape formed from infinite circles that have the same radius and are centered at the same point. The ball only has one side which is the curved side. A ball can be formed by turning/rotating a half circle  $360^\circ$  with the diameter as the axis of rotation. The following is the shape of a spherical shape.

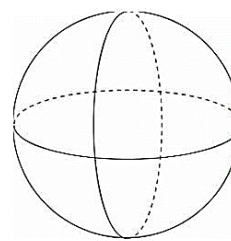


Figure 2. Build the Ball Room

stated that students' problems in understanding geometry material were seen in the use of axiomatic deductive, perception problems, misconceptions about visual processes and activities, problems in the use of procedural, concepts and principles as well as weak connections and reasoning in geometry (Wardhani, 2020).

According to (Marasabessy et al., 2021) the problems faced by students in curved sided geometric material, in general they are problems of concepts and principles (procedural, calculation, carelessness, and calculation). In this research, efforts are also given that teachers can make in teaching curved sided shapes, including: using teaching aids, giving questions periodically, providing remediation for students who experience difficulties, and in the learning process paying attention to the phases of

students' geometric development in van theory. hiele. It is hoped that this research will be useful in the field of education, especially mathematics teaching, where follow-up and handling of curved geometric problems found in the classroom can be carried out.

Meanwhile, according to (Dahlan & Kurniasari, 2022) states that : (1) students experience misconceptions in the material of curved sided shapes with an average misconception for each sub-indicator of 77.34%; (2) the students' biggest pure misconception lies in understanding the concept of ribs, where in the concept of edged sided shapes. curves, students are still fixated on the concept of ribs on flat-sided shapes, for false negative misconceptions students experience it on the concept of area, while on volume many students experience false positive misconceptions where on the concept of volume students do not understand the meaning of a volume itself. (3) the reason why students experience difficulties in dealing with problems related to the elements, area and volume of curved-sided spaces is because teachers do not use visual aids, media or visual aids in conveying spatial construction material during face-to-face learning.

Based on research conducted in class IV at SDN 167647, it was found that class IV students were having difficulty mastering and remembering mathematical concepts. Their motivation to learn mathematics is also small because they think that mathematics is difficult and not fun, this is because during the training the teacher did not use many forms or procedures in the ongoing training. Training methods that are less interesting and less exciting will affect students' learning outcomes .

Remembering how meaningful Mathematics training is for students, the

participation of teachers and students is very necessary to achieve an efficient way of practicing. Students' ability to master what they should learn is one sign that students have practiced well.

One of them is by implementing an interesting and innovative learning model that can arouse enthusiasm for learning, namely by using the VAK learning model. The VAK learning model is a learning model that combines the three learning styles (seeing, hearing and moving) for each individual by utilizing the potential they already have by training and developing them, so that all students' learning habits are fulfilled. In the VAK learning model, learning is focused on providing direct and enjoyable learning experiences. Direct learning experience by learning to remember (visual), learning by hearing (auditory), and learning by movement and emotions (kinesthetic). Learning will take place effectively and efficiently by paying attention to these three learning styles. Each student's needs will be met so that they are motivated in learning activities (Elisa et al., 2019).

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This form of training is interesting and innovative and can create enthusiasm and curiosity among teaching participants who can practice the form of (VAK) in this training. This form of VAK focuses on the character of the students' learning style. Mixing the VAK form with multimedia will

make it easier for students to study something from the abstract to something that they can construct in their descriptions. According to Deporter, et.al. in a journal (Rukmana et al., 2018)

The VAK training form is a form of training that produces students who can easily master the modules taught by the teacher because they maximize the three training modalities. This form of training prioritizes learning experiences in a direct and exciting way for students. Experience practicing directly by remembering (visual), practicing by following (auditory), and practicing with action and anger (kinesthetic). Upgrading is carried out by using the students' existing abilities by training and developing them. In the module, build curved spaces by practicing the VAK form to place more emphasis on the visual, auditory and kinesthetic aspects of children. The VAK form is a form of training that aims to train students' speaking skills, get an explanation of a plan, apply solutions to problems, increase learning activities and success, provide encouragement to practice, train to increase creativity, openness, and are expected to work together in a group. as well as a form of training that maximizes the three training modalities in students to make teaching participants feel safe for Suhara, 2014: 450 in the journal (History, 2019).

According to Shoimin, 2014, p.227 in the journal (Mustari et al., 2021) explains that the steps in the visual, auditory, kinesthetic (VAK) form of upgrading have 4 stages, namely: planning step (preface activity) where in this activity, the teacher provides motivation for arousing students' attention in practicing. Delivery steps (core activity in research) in this activity the teacher focuses students on creating new learning modules in a way that is independent, meaningful, fun, and

connects the senses that are in accordance with the VAK learning model. Educational training steps (core activity in elaboration) in this step, the teacher helps students to absorb and combine the latest insights and skills obtained using various methods, in this step the teacher also provides guidance according to the students' skills which are matched to the VAK training form, The result performance step (core activity in verification) in this step is a step for a teacher to help students practice and expand the new knowledge or skills they gain in practice activities so that the results of practice experience improvement.

Referring to the explanation above, a conclusion can be drawn to the case as follows: (1) How is the VAK form applied in improving mathematical upgrading on curved sided geometric figures? (2) Is there an effect of the VAK shape on mathematics learning skills in curved geometric shapes? Based on the conclusions of the problems above, it can be concluded that the aims of this research are (1) To recognize the use of the VAK form (2) To review the use of the VAK form in the mathematics training of class IV students at SDN 167647 with material on the volume of curved sided space shapes.

## Method

The Methods section explains in detail how the research was conducted. A complete description of the methods used allows the reader to evaluate the appropriateness of the research methodology. The method contains an explanation of how the research was conducted, especially how the research was carried out, research subjects/sample, research instruments, data collection techniques, and data analysis techniques. The research method for articles in this

journal is in the form of empirical studies, namely collecting data in the field and then processing, analyzing, interpreting and concluding. The contents of the method are written using Abadi font size 10, 1 space. This research was attempted in class IV at SDN 167647 which is located on Jalan Soekarno Hatta Gang Emas, Tambangan Hulu, Kec. Padang Hilir, Tebing Tinggi City. This type of research uses a qualitative approach with descriptive research procedures. For Sugiyono, 2016 in the journal (Rahmah & Sitorus, 2022).

Qualitative research is a research procedure that uses understanding of postpositivism as a basis for thinking used to examine a situation of a natural object. In qualitative research procedures, the researcher functions as a key instrument, the method of collecting information is carried out by combining and analyzing the information used by the researcher. Qualitative research procedures are inductive or qualitative in nature so that the results of the research are more concerned with meaning than the whole.

This research was attempted in semester 2 of the 2023/2024 academic year. This research point is class IV students with a total of 13 students consisting of 8 boys and 5 girls. This research uses monitoring, question and answer, and selection methods as methods for collecting the data needed for this research.

In the monitoring method, researchers carried out monitoring directly at State Elementary School 167647, where researchers had previously monitored the school when exploring campus activities guiding class 6. Researchers found several problems in their training. They are also not happy with mathematics lessons, in the end many of them just joke around in that lesson. The question and answer method used in this research is an organized question and answer where the researcher

will ask questions in an orderly manner that has been previously prepared by the researcher. In selecting informants, researchers chose class IV homeroom teachers based on benchmarks that had been set by researchers and suited the research objectives. The aim of this research is to identify how to use the VAK (visual, auditory, kinesthetic) form in Mathematics with the volume module of curved sided shapes.

### Results and Discussion

The VAK learning model is a learning model that combines three types of learning styles, namely visual, auditory and kinesthetic. Learning style is the easiest way for individuals to absorb, organize and process the information received. An appropriate learning style is the key to student success in learning. Learning style has an influence on several things, including: people with a visual learning style like to follow illustrations, observe pictures and review events directly. This greatly influences the choice of learning methods and media that predominantly activate the sense of sight. Children who are auditory type easily learn material that is presented in sound form, as the teacher explains, they quickly grasp the lesson material and discuss it with their friends. The kinesthetic learning style obtains information by prioritizing the sense of taste and physical movements. Individuals of this type easily learn material in the form of writing and movements.

As a teacher, you should understand your students' learning styles. Utilization and development of student potential in learning must pay attention to student needs and learning styles. For visual students, it will be easy to learn with the help of two-dimensional media such as using graphs, pictures, charts, models, and the like. Auditory students will find it easier to learn by hearing something

spoken or with audio media. Meanwhile, students with the kinesthetic type will easily learn while carrying out certain activities, for example experiments, taking things apart, making models, manipulating objects, and so on that are related to the movement system. With these three modalities, teachers will be able to pay attention to the learning situations that need to be created to make students with different modalities feel comfortable. Once comfort is realized, it will make it easy for students to receive learning material and effective learning will be achieved. Every human being must have these three modalities, it's just that some people develop with one modality and there are also those who develop with all three in almost the same portion. Learning with the VAK model helps teachers to make it easier to deliver material and provides comfort for students in studying in class which has an effect on improving learning outcomes.

This research began with problems encountered in class IV elementary school. This problem causes students to have poor learning outcomes, recording obligations every day before carrying out an activity.

The key problem is that fourth grade elementary school students do not master mathematics. This is caused by a boring classroom atmosphere, students who are not active in practicing, and Mathematics teachers who are giving lessons or modules in a conventional way, namely by giving modules with lectures only and then giving assignments to students, which has an impact on the results. learning for young students.

In an effort to improve the results of practicing Mathematics in class IV Elementary School. Researchers cite the action of sharing *visual, auditory, kinesthetic (VAK)* shapes in Mathematics training in the curved-sided geometric

shape module.

Based on research that has been carried out at SDN 167647 from monitoring information that has been carried out during training using the VAK (*visual, auditory, kinesthetic*) form, it is very useful to apply in this training, because training is more efficient, because it combines the three learning styles. This form of upgrading is able to train and improve the abilities of students that each individual already has. With this form of VAK, students will not easily get bored while practicing, because in this form the teaching participants will participate with the teacher throughout the training.

Each student has a different personality and method of mastering modules. Therefore, if you use this form of VAK training, it includes 3 types of styles that suit the personality of each student, such as visual, auditory and kinesthetic. Visual type children can practice optimally by using visual enhancement tools which have unlimited benefits for children. Film representations trigger children's minds to work faster.

After that, children can also respond more quickly to visual data compared to reading modules. Meanwhile, auditory children use their sense of hearing to capture information. People with an auditory learning style find it easier to process, digest and convey data by observing directly. They tend to practice or receive data by observing or verbally. There are also children with the kinesthetic type who need to carry out physical actions in order to remember things. With a kinesthetic learning style, students are active and also enjoy observing directly what they see.

*visual, auditory, kinesthetic (VAK)* learning style is a multi-sensory learning style that combines 3 factors of learning style, namely sight, hearing and action.

The steps in upgrading using the VAK upgrading form are:

1. In the *visual step*, students practice by looking. Students look at the picture or teacher's submission regarding items given treatment with equipment display. The teacher explains the material and examples of questions related to the material on curved sided shapes (Auditory). Apart from that, when the teacher explains the material on curved sided shapes, learning media helps to display the shapes to make the material presented clearer (*Visualization*). And the teacher shows several experimental videos related to the material on curved side shapes (*Visualization*).
2. In the *auditory step*, students practice by following. Not only following data from the teacher, students can share data in groups discussions built by the teacher. The teacher divides students into 5 groups consisting of 4 to 5 people (*Kinesthetic*). The teacher distributes Student Activity Sheets which contain questions related to the material of curved sided shapes (*Kinesthetic*). Students work together with their groups, share ideas and insights in working on the questions on the student activity sheet (*Auditory Kinesthetic*). The teacher gives one of the students from representatives of several groups the opportunity to present the results of their respective group's work (*Auditory Kinesthetic*).
3. In the *kinesthetic step*, students practice through sports activities and direct participation. Students practice independently under the guidance of a teacher who actively carries out experiments. The teacher gives one of the students from representatives of several groups the opportunity to

present the results of their respective group's work (*Auditory Kinesthetic*). The teacher gives other groups the opportunity to respond to the results of the discussion presented, so the other students listen, express opinions, complete and conclude the results of discussions from other groups regarding the material on curved sided shapes (*Visualization, Auditory, Kinesthetic*).

According to Budiyanto, 2016:99 in the journal(Nargis et al., 2021) The form of VAK training (*visual, auditory, kinesthetic*) has advantages and disadvantages, namely:

#### 1. **Advantages of the VAK training form**

- a) Training will be more efficient because it combines the three learning styles.
- b) each individual 's students.
- c) Share direct experiences with students.
- d) Able to engage students optimally in creating and mastering a plan through physical activities, such as demonstrations, experiments, monitoring and active discussions.
- e) Able to reach every learning style of students.
- f) Students who have good skills will not be held back by students who are weak in learning because this form is able to serve the wishes of students who have above skills in general.

#### 2. **Weaknesses of the VAK upgrading form**

The weakness of the VAK training style is that not many people are able to combine the three training styles. As a result, people who are only able to use one learning style will only be able to grasp the material if they use a method that prioritizes one of the dominant learning styles.

According to Ngalimun, (Aisyah, 2019) the shortcomings of the VAK learning model are:



- a. Requires maximum preparation and planning.
- b. Facilities such as adequate equipment, space and costs are not always available properly.
- c. The VAK learning model requires special educator skills, because without this support, the learning process will not be effective.

Without using *the visualization, auditory, kinesthetic* (VAK) learning model, there are still many students who carry out other activities during learning compared to students who use the *visualization, auditory, kinesthetic* (VAK) learning model. Learning with the *visualization, auditory, kinesthetic* (VAK) learning model is able to make students more active in learning and gives students the opportunity to apply mathematical concepts to solve everyday problems or problems in other fields.

The Visual, Auditory, Kinesthetic (VAK) learning model combines three forms of student learning styles, namely visual by showing pictures or videos, auditory by providing explanations to students, and kinesthetic by involving students in physical activities such as conducting experiments so that teachers are able to utilize their potential. students already have, this is proven by Sugiyanto's theory (Elisa, 2019) that the Visual, Auditory, Kinesthetic (VAK) learning model combines three learning styles for each individual by utilizing students' potential by training and developing them, so that all students' learning habits are fulfilled.

Learning modality is interpreted as a learning style that is unique to each individual, in line with what is said (Sani, 2019) that children who understand their own learning modality will benefit in their learning because they know how to learn that is suitable for themselves. In the

learning process, students have different learning modalities, therefore teachers need to understand the learning modalities of each student. For example, when carrying out research activities, for students who have a visual learning modality, it appears that students will be more enthusiastic if the teacher shows videos, pictures, etc. that show concrete evidence in accordance with Kizi's theory (Mustari et al., 2023). That the visual modality is a learning style that focuses on emphasize visual acuity, or concrete evidence, therefore at the next meeting the teacher always provides learning materials related to the student's visual learning modality.

Students who have the auditory learning modality look serious or listen to the teacher's explanation and look enthusiastic when discussing. This is in accordance with what Ulia and Sari said that students with the auditory learning modality easily learn by communicating the lesson material, listening to the material presented and summarizing the information obtained. Therefore, the teacher carries out discussion activities and question and answer activities with students at each meeting. Students who have a kinesthetic learning modality appear very active when carrying out experimental activities or who use physical activity, in line with Bakri's theory (Mustari et al., 2023). That students with kinesthetic activities usually like learning that activates the body's organs. It was proven that during experimental activities regarding energy sources, students looked enthusiastic in carrying out these activities.

From the results of collecting and inputting information, it can be seen that each person taking part in Mathematics training has increased. This can be seen from each task given to learning participants before and after using the

visual, auditory, kinesthetic (VAK) form. Before the training was given using this VAK form, they only got an average score of 60.38 from 10 questions. And after teachers started training using the VAK form, their average score increased and got a score of 79.23.

This has been proven to mean that using the VAK form in Mathematics training in curved sided spatial figures can be applied and this form will create efficient training.

Through this innovative Visual Auditory Kinesthetic (VAK) learning model, learning achievement can be improved. This is shown by increasing understanding of the material the teacher conveys. Increasing the level of activeness and critical attitude of students towards a discussion of material makes students more knowledgeable about the knowledge they gain. The classroom atmosphere feels fun and comfortable no longer feeling bored, but instead students enjoy the ongoing learning process. Learning that was previously boring and monotonous becomes more enjoyable so that over time, students' interest in learning increases in understanding Islamic learning material and can improve learning achievement.

### **Conclusion**

Based on the results of the research carried out, it can be concluded that the application of the VAK (visual, auditory, kinesthetic) form in Mathematics training in the curved sided spatial structure module for students in class IV SDN 167647 is very useful to apply in the classroom because the training will be more efficient, because it combines The 3 styles of practice are hearing, sight and movement. With the VAK training form, students can practice modules with different types of training.

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