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Analysis of Student Learning Styles Using Fleming's VARK Model in Science Subject

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Abstract

The implementation of high-quality learning is something teachers must ensure. Consequently, teachers need to be able to design engaging learning procedures that draw students' attention to the subjects they are teaching. Understanding a student's preferred learning style is one of the necessary teachers. People with learning styles closely tied to their environments and personalities are adjusted. The process of receiving knowledge will be improved by defining the learning material to the learner's preferred learning style. One of the most used diagnostic tools for determining learning type is the VARK model. The visual, Auditory, Read/Write, and kinesthetic learning styles are divided into four divisions in the VARK paradigm. This research aims to identify the dominant learning style among science students. A qualitative descriptive methodology used one hundred junior high school students as research participants. Diagnostic exams and interviews were the tools used. Data analysis was carried out qualitatively by reducing data, presenting data, and making conclusions. According to the findings, 35% of students are kinesthetic learners, with 30% being visual, 21% being Auditory, and 14%t being Read/Write. Identifying learning tools, such as choosing learning models, creating and choosing materials, and learning media and assessment approaches that are more effective in accordance with student learning styles, can be done by developing one's understanding of learning styles.

Keywords: *Learning Styles, Science, VARK*

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INTRODUCTION

Changes in the current global world have shifted the mastery of structured concepts into a 21st-century skill (Barak, 2017). In the era of the 21st century, the goal is to create quality human resources (Rinekso, 2021; van Laar et al., 2020). In the education field, the revolution in educational patterns this century is one of the characteristics of the embedded era (Hug, 2017), which is indicated by the development of science, technology, and collaboration between the two (Cornelius & Wilson, 2021). 21st-century student learning is different from previous centuries. The current generation is very dependent on technology (Lemley et al., 2014) because their lives are surrounded by technology, and

they learn a lot with the technology around them. One factor influencing the quality of learning is learning style (Marković & Jovanović, 2012).

The process of education in humans is the foundation built for their lives. For this reason, we need to understand the most effective way how the learner absorbs information in learning. By knowing learning styles, learners can enjoy and maximize the reception of information in the learning process. There are consequences if we apply the wrong learning style or impose it on students, which can hinder the learning process (Valiente, 2008). The concept of learning style is used to describe individual differences in learning because each individual does not use the same learning process (Kolb & Kolb, 2012). Student learning styles are important in all age groups because they are closely related to individual learning achievement (Magdalena, 2015). Learning style characteristics adapt to individuals closely related to personality and environment (Rochford, 2003). Generalization with a variety of student learning styles is a problem that has not been resolved because of the difficulty of presenting student groupings based on learning styles with the available resources, and not many schools apply class groupings based on a diagnosis of student learning styles.

Diagnostic models of student learning styles have been developed over the years (Felder & Silverman, 1988; Fleming, 2001; Kolb & Kolb, 2012; Seel, 2012) based on empirical, behavioural, cognitive, biological and psychological features. One such model is the VARK developed by Fleming. The VARK learning style diagnosis model is based on the human senses (Prithishkumar & Michael, 2014). VARK is an acronym for four different learning styles, namely visual (V), Auditory (A), Read/Write (R) and kinesthetic (K) (Fleming, 2001). Fleming (2001) defines learning style as individual characteristics and preferred ways of collecting, organizing, and thinking about information. VARK focuses on how we can receive and impart knowledge with our senses. As an illustration, visual learners prefer maps, charts, graphs, diagrams, brochures, flowcharts, highlighters, different colours, pictures, word pictures, and different spatial arrangements. Aural learners enjoy explaining new ideas to others, discussing topics with other students and their teachers, using tape recorders, attending lectures and discussion groups, and using stories. Read/write students prefer lists, essays, reports, textbooks, definitions, printed leaflets, readings, manuals, web pages, and taking notes. Kinesthetic learners love field trips, trial and error, doing things to understand through laboratory experiments and using their senses.

Based on the results of observations and interviews with science teachers, the class classification of students based on learning styles had not been implemented, and a diagnosis of student learning styles had never been carried out. In science teachers' opinion, most students liked the practicum method of learning science. However, practicum methods cannot be served optimally due to limited practicum tools and materials. In addition, according to the results of the interviews, it was shown that students liked learning science by using teaching media in the form of videos. In science learning, knowing students' learning styles is an important value. Because science generally has discovery learning characteristics that are suitable for kinesthetic types of learners, we need to see how the conditions of the types of learners we face in the classroom are real. Much material in science learning tends to be abstract if modelling is not presented in images, videos or other images that can help explain learning material.

However, some students with Read/Write learning types may not be too dependent on this model to understand learning material. Therefore, this study aims to describe how the dominant type of student learning style will be used as the basis for compiling teacher learning tools, especially in science subjects.

METHOD

This research method uses a qualitative descriptive research approach (Frankel et al., 2012) by describing students' learning styles in science subjects. This research begins with defining the phenomena to be observed through literature studies and formulating the formulation of problem, objectives and appropriate hypotheses in the analysis. Next is selecting research subjects according to the research to be carried out. This research was conducted at SMPN 3 Cibadak with research subjects, namely 100 students in class VIII. The data collection technique was structured interviews and diagnostic tests. The research instruments used were interview sheets and VARK learning-style diagnostic test sheets. The answers to each question in the test consist of 4 answer choices developed based on the four groups as visual, auditory, kinesthetic and read or write learning styles and are evaluated through the "frequency value" (f) and the percentage value "%". The data obtained is then analyzed by reducing, presenting, and providing conclusions. The conclusions generated in this study are a general description of how students' learning styles are most dominant in science subjects.

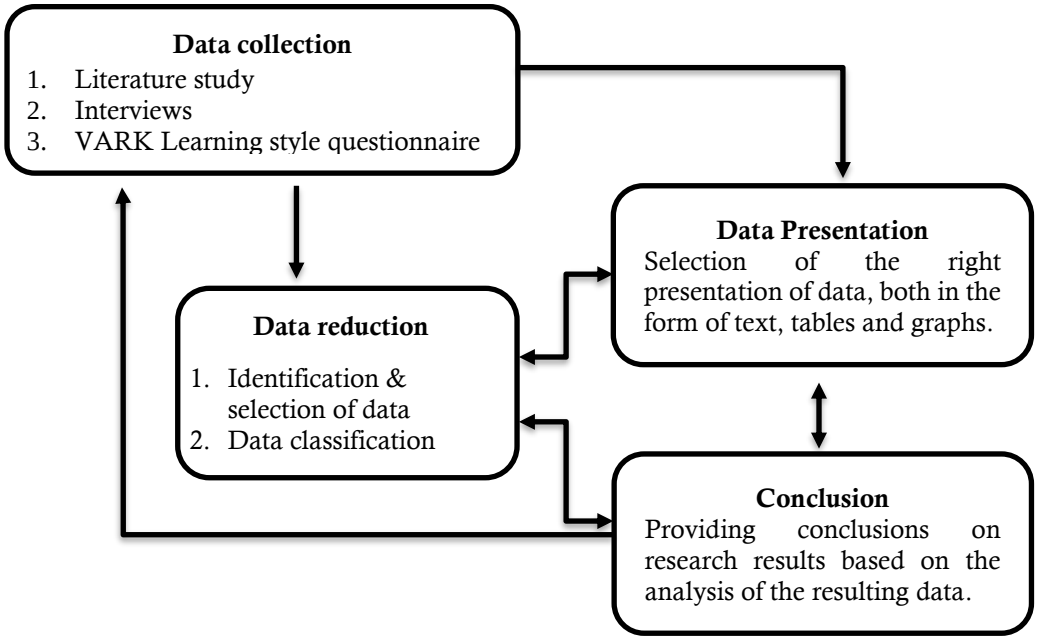

Figure 1. Research flow chart

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RESULTS AND DISCUSSION

The Overall Results of Class VIII VARK Learning Style Analysis

Based on the VARK learning style diagnostic test for students in science subjects, the results are shown overall in Figure 2, and analysis result in 3 varian class in figure 3-5.

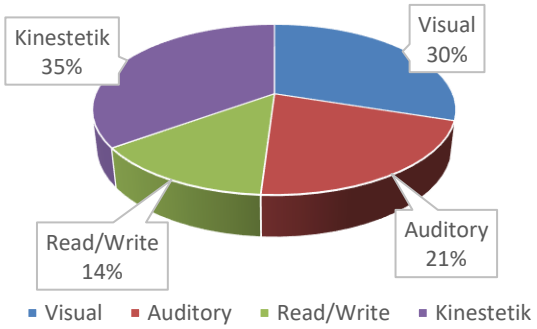

Figure 2. Results of the Overall Analysis of Class VIII VARK Learning style

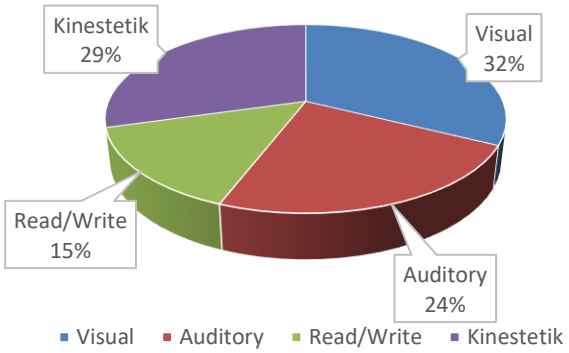

Figure 3. Results of Class VIII A VARK Learning Style Analysis

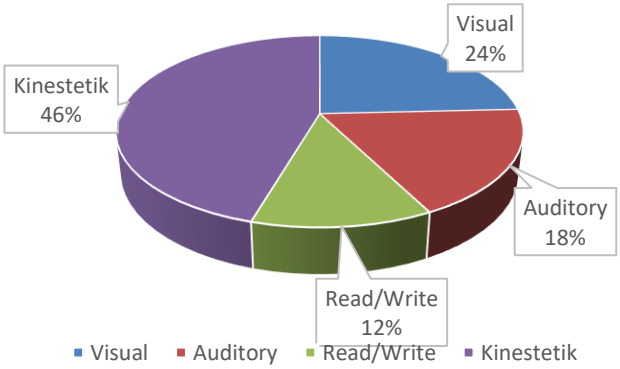

Figure 4. Results of Class VIII B VARK Learning Style Analysis

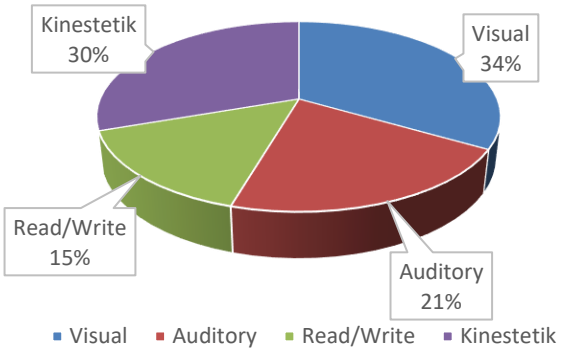

Figure 5. Results of Class VIII C VARK Learning Style Analysis

Discussion

Learning Style Trends

The results of the analysis of learning styles as a whole show that the kinesthetic learner type dominates student learning styles compared to other learning styles. Learning style shows a person's tendency to receive information so that it can be maximally absorbed.

a. Visual Type

Natural science learning using a picture, chart, torso and video learning media has been widely used by teachers to assist the learning process. Learning with this type of media is highly favoured by visual learners. In the process of absorbing information, visual learners often try to visualize the information they receive. Based on the diagnosis results, as many as 30% of students are group of students with the Visual Learner type. They prefer to choose answers that use their sense of sight/visualization to maximize learning. Based on the results of interviews related to science material, visual learners prefer to use teaching materials with colourful pictures or videos. In the classroom, visual learners usually have detailed notes that are comprehensive, organized, and neat and tend to sit in front (Kiang, 2010). After being interviewed further, the visual learners also did not resist or were disturbed if learning was carried out using a practicum (kinesthetic) or listening (Auditory) approach. However, they tend to dislike learning that only relies on text without modelling. This is in line with Raiyn (2016), which states that the selection of devices that present more visualization can increase visual learners' higher-order thinking skills. According to interviews with science teachers, teachers have facilitated visual learning by providing modelling in the form of pictures and videos in education, for example, using cell and tissue structure charts, torsos of human organs and videos about organizational life systems.

b. Auditory Type

Teachers often use group discussion and presentation learning methods to hone students' communication skills and self-confidence. Learning methods with peer teaching (peer tutors) stimulate students to convey their knowledge and listen to new information known by others, including peers. This method turns out to be very popular with auditory learners because auditory learners are very good listeners. As many as 21% of students were identified as a group with the Auditory learning type. According to (Kayalar, 2017), the characteristics of Auditory learners are getting

information by listening and preferring to listen rather than reading or writing. Auditory learners have difficulty communicating through body language and facial expressions. They can reproduce symbols, letters or words by hearing them, finding clues written is more difficult to follow than spoken, enjoys dialogue, drama, and dictation, and loves music. According to the results of the interviews, the Auditory students wanted science learning with video, storytelling and discussion. They also like it when modelling is presented, which is explained verbally in detail.

a. Read or Write Type
   Searching for literature is an important part of learning. Teachers can invite students to visit the school library and look for important information about the studied material. In addition, giving assignments to look for current issues related to learning materials is also an effective technique for providing contextual examples of material being learned in everyday life. Reading and writing summaries are what read/write learners like. The study revealed that 14% of students are read/write learners. Learners feel most comfortable learning by processing text. This learner likes to read detailed writings and then process and remember that information. These learners also tend to have complete and detailed notes but do not like learning with hands-on activities or too many pictures or sounds. They are happy to be in a quiet and quiet place to read and process information obtained from books and other text media they like.
b. Kinesthetic Type
   Practicum is one of the important features of science subjects. Learning models such as inquiry learning and project-based learning are learning models that are often used to facilitate students in practicum-based education. Observing, identifying, classifying, processing data, and reporting are some activities carried out in discovery-based learning activities. Kinesthetic learners highly favour practicums and learning involving other physical activities. The majority of students studied turned out to have a kinesthetic learning style, namely 35% of students. Kinesthetic learners do "learning by doing". They like learning that does direct activities and often talk accompanied by hand and body gestures (Kiang, 2010). Because they prefer hands-on activities, these students want science learning accompanied by a practicum, games and other physical activities. They tend to be able to receive information maximally by movement rather than sound, writing or pictures. In science learning, kinesthetic learners tend to be more active in trying and asking questions and have a very high curiosity which encourages students to be engaged in learning.

The Importance of Knowing Learning Styles for Learning Science

Knowledge of student learning styles will influence teachers in selecting learning tools (Ford & Chen, 2001; Gilakjani, 2011). In science learning, the teacher's role in determining teaching materials becomes more crucial because the concepts of science material tend to be abstract and difficult to understand if one chooses the appropriate learning tool. The impact is not the maximum learning outcomes. Learning Outcomes are abilities possessed by students after students receive learning experiences, both in the form of cognitive, affective and psychomotor aspects. The quality of learning outcomes depends on the quality of the teaching provided. Teachers need to consider variations in

the types of learning styles in designing learning and all the activities involved. The role of the teacher in accommodating student learning styles includes visual learning styles (1) using teaching materials and media that use various forms of presentation (graphs, diagrams), illustrative images (charts of the respiratory system, pictures of the evolutionary system) and interesting props (torso human body, planetarium), (2) give students the freedom to save the information conveyed by the teacher, not only in the form of notes but in the form of pictures or other visualizations, (3) use assessment techniques that are appropriate for the type of visual learner. Auditory learning style, students (1) use group discussion techniques and reinforce material that is explained repeatedly, (2) use clear and varied intonation, (3) allow students to record learning so they can listen to the reviews again, (4) intersperse learning with instrumental music (5) use assessment techniques appropriate to the type of auditory learner. Kinesthetic learning style students: (1) use learning models that stimulate students to carry out movements such as practicum activities, (2) use demonstration techniques that make students want to try, (3) intersperse learning with games related to motion, (4) use techniques direct performance assessment to test mastery and learning outcomes.

The study results show that there are more kinesthetic learners compared to the other three learners. So in teaching science, teachers need to formulate learning that stimulates students' movement or physical activity. Learning models such as Inquiry Learning, Discovery Learning, and Nature of Science are some learning models that are suitable to be applied to facilitate kinesthetic learners. Practicum activities involving students' active role in science learning will maximize the acceptance of information in learning for kinesthetic learners. Games that are interspersed in education also help kinesthetic learners to explore. Understanding outcomes assessment activities such as performance, role-playing, and making projects are also suitable for kinesthetic learners.

CONCLUSION

Based on the analysis of student learning styles in science subjects, the results showed that 35% were kinesthetic learners, 30% were visual learners, 21% were auditory learners, and 14% were read/write learners. This research can be further developed in identifying learning tools such as model selection, lesson plans, development and teaching media, and assessment techniques that are more effective according to student learning styles

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