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Analysis of Visual, Auditory, and Kinesthetic Learning Styles of MTs Students in Science Learning

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A B S T R A C T

Science learning is an intentionally designed process to facilitate students in understanding scientific concepts and developing critical thinking skills. However, based on preliminary observations at MTs Nahjatus Sholihin, it was found that students have not yet identified their individual learning styles. Consequently, they have been unable to maximize their learning potential, which affects their understanding of science subjects. This study aims to analyze the Visual, Auditory, and Kinesthetic (VAK) learning styles of eighth-grade students in science learning at MTs Nahjatus Sholihin, Rembang Regency. The research employs a quantitative descriptive method involving all 86 eighth-grade students as respondents using a total sampling technique. Data were collected through observations, questionnaires, and documentation. The results show that in all three classes, the kinesthetic learning style dominates, with percentages of 45% in class VIIIA, 40% in class VIIIB, and 41% in class VIIIC. Meanwhile, the visual learning style shows the lowest percentage, namely 22% in class VIIIA, 29% in class VIIIB, and 28% in class VIIIC. These findings indicate that most students prefer hands-on activities and learning experiences that involve movement and practice. Therefore, teachers are encouraged to apply kinesthetic-based learning strategies, such as experiments and interactive demonstrations, to optimize student engagement and achievement in science learning. This research provides important implications for science educators in designing learning activities that align with students' dominant learning styles and contributes globally to the understanding of how culturally responsive and student-centered science instruction can enhance learning outcomes across diverse educational contexts.

Abstrak

Pembelajaran sains merupakan proses yang dirancang secara sengaja untuk memfasilitasi peserta didik dalam memahami konsep-konsep ilmiah dan mengembangkan keterampilan berpikir kritis. Namun, berdasarkan hasil observasi awal di MTs Nahjatus Sholihin diketahui bahwa peserta didik belum mengenali gaya belajar masing-masing. Akibatnya, mereka belum dapat memaksimalkan potensi belajar yang dimiliki sehingga berdampak pada pemahaman terhadap mata pelajaran sains. Penelitian ini bertujuan untuk menganalisis gaya belajar Visual, Auditorial, dan Kinestetik (VAK) pada siswa kelas VIII dalam pembelajaran sains di MTs Nahjatus Sholihin, Kabupaten Rembang. Penelitian ini menggunakan metode deskriptif kuantitatif dengan melibatkan seluruh siswa kelas VIII yang berjumlah 86 orang sebagai responden dengan teknik total sampling. Pengumpulan data dilakukan melalui observasi, angket, dan dokumentasi. Hasil penelitian menunjukkan bahwa pada ketiga kelas, gaya belajar kinestetik merupakan gaya belajar yang paling dominan dengan persentase 45% pada kelas VIIIA, 40% pada kelas VIIIB, dan 41% pada kelas VIIIC. Sementara itu, gaya belajar visual menunjukkan persentase terendah, yaitu 22% pada kelas VIIIA, 29% pada kelas VIIIB, dan 28% pada kelas VIIIC. Temuan ini menunjukkan bahwa sebagian besar siswa lebih menyukai kegiatan belajar yang melibatkan gerakan dan praktik langsung. Oleh karena itu, guru disarankan untuk menerapkan strategi pembelajaran berbasis kinestetik, seperti eksperimen dan demonstrasi interaktif, guna mengoptimalkan keterlibatan dan hasil belajar siswa dalam pembelajaran sains. Penelitian ini memberikan implikasi penting

bagi pendidik sains dalam merancang kegiatan pembelajaran yang selaras dengan gaya belajar dominan siswa serta berkontribusi secara global terhadap pemahaman tentang bagaimana pembelajaran sains yang responsif terhadap budaya dan berpusat pada siswa dapat meningkatkan hasil belajar di berbagai konteks pendidikan.

1. Introduction

Science learning is a process that is intentionally designed to facilitate the process of learning science. Science is the study of natural phenomena and everything in nature (Aboudonya, Ibrahim, & Osman, 2025). Science is objective and rational knowledge about the universe and everything in it that we must learn (De Haan, De Vries, Roorda, & Drijvers, 2024). Learning is a process that occurs in everyone throughout life . Learning is the effort of each individual to bring about changes in behavior in the form of knowledge, attitudes, skills and positive values obtained in the learning process. This process will run effectively when learning is well planned. Learning is a process that individuals do to bring about changes in themselves (Risnawati, Amir, & Sari, 2018). These changes include cognitive (understanding), affective (attitude and mental) (Apipah, Kartono, & Isnarto, 2018), and psychomotor (behavior) (Hassan, Habiba, Majeed, & Shoaib, 2021). The learning process is influenced by several factors, namely internal factors (physical and psychological factors) and external factors (family, school and community factors) (Newton, 2015). The success of learning is influenced by many factors such as the educational environment, student learning styles and many other factors . This research focuses on students' learning styles (richard oliver.

Learning style is the easiest way for individuals to absorb, organize, and process information that students receive (Newton & Miah, 2017). The right learning style is the key to a student's learning success. Through understanding learning styles, students are able to receive and process information and facilitate learning through their own learning styles (Kirschner, 2017). Using a learning style that is limited to one form only, especially the verbal or auditory pathway, can certainly lead to uneven information. Therefore, in learning activities, students must be supported and guided to find a learning style that suits them in order to achieve learning objectives effectively (Jin, Jin, Hu, Vechtomova, & Mihalcea, 2022). The learning style of each student is different, depending on the internal and external aspects of each student, the tendency is that each student has a learning style that is more prominent than other learning styles. With the help of knowledge about learning styles, each student is more familiar with his or her self-knowledge and knows his or her needs. For teachers, by knowing each student's learning style, teachers can apply the right techniques and strategies in learning and self-development. Teachers must be able to apply strategies according to the learning style abilities possessed by students.

A person's ability to understand and absorb science lessons naturally varies from one individual to another. Some students learn quickly, while others progress at a moderate or slower pace. Each student not only learns at a different speed but also processes and retains information in unique ways (Titchiev, Caftanatov, Iamandi, Talambuta, & Caganovschi, 2023). Generally, learning styles are categorized into three types: visual, auditory, and kinesthetic. Visual learners absorb information best through sight, auditory learners through listening (Truong, 2016), and kinesthetic learners through hands-on experiences. Among these types, some students show a strong preference for one dominant learning style, while others combine characteristics of all three. This diversity requires teachers to be creative and adaptive in designing their teaching strategies (Huang, Luo, Yang, Lu, & Chen, 2020). Educators must select appropriate methods and learning media to accommodate each student's needs (Balakrishnan & Gan, 2016). When the teaching approach aligns with a student's learning style, the learning process becomes more effective (Bakri, Rahman, Jabu, & Jassruddin, 2019), engaging, and

meaningful (Al-Azawei, Parslow, & Lundqvist, 2016). Ultimately, matching learning styles enhances students' comprehension and academic performance.

The research aims to understand how students' awareness and application of their respective learning styles influence their performance in science learning. Preliminary observations revealed that many students have not yet recognized their dominant learning styles, which prevents them from maximizing their potential during classroom activities. This condition gives rise to the argument that when students are able to identify and utilize their dominant learning styles effectively, their engagement and academic achievement in science learning will significantly improve. Furthermore, the study seeks to explore the diversity of learning styles among students and determine which type tends to be more dominant within the learning environment. The central question guiding this research is how the variations in students' learning styles affect the process and outcomes of science learning. It is hypothesized that students who apply their preferred learning styles—whether visual, auditory, or kinesthetic—will demonstrate better comprehension and performance than those who do not. Ultimately, the findings are expected to contribute to the development of instructional strategies that align with students' learning preferences, thereby enhancing the overall effectiveness of science education.

2. Methods

This research was conducted at MTs Nahjatus Sholihin, Kragan District, Rembang Regency, in April 2023. The study employed a quantitative descriptive research design, which focuses on describing and interpreting phenomena as they naturally occur without any experimental manipulation. This design was chosen because it allows for an accurate depiction of students' dominant learning styles in the context of science learning. The population of the research comprised all eighth-grade students of MTs Nahjatus Sholihin, totaling 86 individuals. The sample was determined using a total sampling technique, meaning that every member of the population was included in the study to ensure comprehensive data coverage and to reduce sampling bias. The participants consisted of 30 students from class VIIIA, 28 students from class VIIIB, and 28 students from class VIIIC, representing a balanced distribution across classes. This comprehensive approach ensured that the findings would reflect the overall tendencies of the student population at the school.

The data collection process involved multiple methods to enhance validity and reliability. Observation and documentation were carried out to gain contextual understanding of the classroom environment and students' learning behaviors. The primary research instrument was a structured questionnaire designed to obtain detailed information about students' learning style preferences. The questionnaire consisted of 15 written items adapted from relevant literature and validated by experts in educational psychology. Each item was designed to assess students' tendencies toward visual, auditory, and kinesthetic learning styles, allowing for the identification of dominant modalities among participants. The collected data were analyzed using descriptive statistical techniques to determine frequency and percentage distributions, providing a clear overview of learning style characteristics among students. To ensure accuracy and consistency, all research procedures followed standardized protocols and ethical considerations throughout the study.

3. Results and Discussion

Results

Based on the research conducted, the data obtained from the analysis of learning styles in class VIII are depicted in the pie chart as follows:

a. Learning Style of Class VIIIA Students

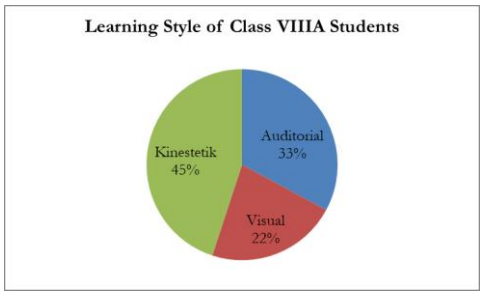

Figure 1. Learning Style of Class VIIIA Students

Based on the pie chart, it is known that 22% of students in class VIIIA have a visual learning style, 33% of students have an auditory learning style, and 45% of students have a kinesthetic learning style. In the diagram, class VIIIA students predominantly have a kinesthetic learning style with a percentage of 45%.

b. Learning Styles of Class VIIIB Students

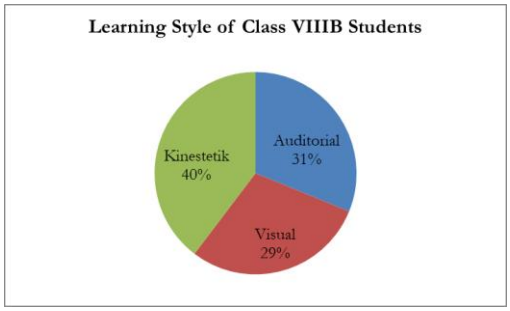

Figure 2. Learning Style of Class VIIIB Students

Based on the pie chart, it is known that 29% of students in class VIIIB have a visual learning style, 31% of students have an auditory learning style, and 40% of students have a kinesthetic learning style. In the diagram, kinesthetic learning style is the more dominant learning style owned by students with a percentage of 40%.

c. Learning Styles of Class VIIIC Students

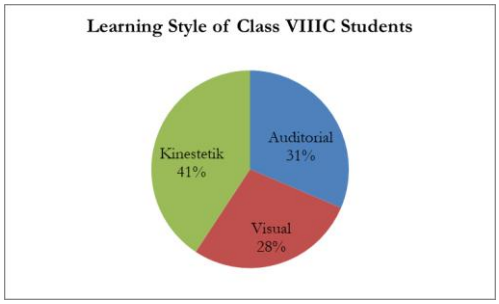

Figure 3. Learning Style of Class VIIIC Students

Based on the pie chart, it is known that 28% of students in class VIIIC have a visual learning style, 31% of students have an auditory learning style, and 41% of students have a kinesthetic learning style. In the diagram, kinesthetic learning style is the dominant learning style or occupies the highest percentage of learning styles in class VIIIC, which is 41% of students.

Discussion

Based on the observation data, it is known that from each class VIII analyzed for learning styles, the highest percentage of students have a kinesthetic learning style with a percentage of 45% in class

VIIIA, 40% in class VIIIB, and 41% in class VIIIC, while the lowest percentage of students have a visual learning style with a percentage of 22% in class VIIIA, 29% in class VIIIB, and 28% in class VIIIC. Learning style is the way students understand information so that it can be easily accepted. Learning style is the way a person uses in learning, including how the information received is collected, organized and processed to make learning effective. In addition, learning styles will be able to improve student achievement. Learning achievement is the mastery of knowledge in science subjects as indicated by the test scores given by the teacher (Hsu, 2017). To get good achievement, students must understand the learning style they have. Learning style is a very important form of learning that has its own characteristics (Sayed, Khafagy, Ali, & Mohamed, 2025).

Learning style characteristics refer to the characteristics of each learning style (Cheng & Chau, 2016). Teachers who understand the peculiarities or special characteristics of their students' learning styles, will be able to understand and know how to use learning materials and strategies that are suitable for their students' learning styles in science subjects. Learning strategies must be designed systematically in order to direct students' learning styles according to science learning needs. Students who know their own learning style will be able to determine important learning steps more quickly, precisely and easily according to their ability to absorb information (Mohammadnazar, Arvin, & Khattak, 2021). Students' ability to understand and absorb information or lessons is at various levels. Some are fast, some are medium (Buckley & Doyle, 2017), and some are slow. Each student not only learns at different speeds, but also processes information differently, so they often need to take different paths to understand the same information or lesson (Istiqomah & Suryadarma, 2023). There are three learning styles, namely visual learning style, auditory learning style and kinesthetic learning style.

Visual learning style is learning by seeing, observing, watching and the like. In this case, the teacher's teaching method should emphasize demonstrations and media. The visual learning style uses the ability to see, characterized by students preferring to receive learning in the form of pictures, charts, films, and demonstrations (Tumanggor, 2017). The characteristics of students with a visual learning style are that students remember what they see rather than what they hear, besides that students easily receive information through books and writing (Isnanto, 2022). The advantages of a visual learning style are that students can read (Rosyidah, Firman, & Rusyati, 2017), write and remember classes well, remember details and colors well, remember faces well but often forget their names. The weaknesses of the visual learning style are that students have difficulty learning in busy (Rahman, Sari Rahayu, 2019), noisy and distracting environments, have difficulty understanding teacher explanations without pictures or diagrams, have difficulty concentrating when looking at uninteresting or bad information.

Auditory learning style is learning by listening. Students with auditory learning styles can use their ears to achieve learning success, teachers should also pay attention to students' hearing aids. Students with an auditory learning style can learn faster by listening to conversations and words spoken by the teacher (Prabanitha, Sudarma, & Dibia, 2020). Students' hearing is able to digest the meaning conveyed through expressions, high and low speaking ability, and speaking speed (Labu, 2021). The characteristics of the auditory learning style are that they like to talk to themselves while studying, learn to listen, learn to remember what is spoken rather than see (Wati & Muzakkir, 2020), like to read aloud (Steviana, ., Kurniawan, & Gustria, 2022), move their lips while reading, and talk while reading books (Adapa, Gandi, Alekya, & Lakshmi Durga, 2021). The advantages of auditory learning style are that it can simply imitate other people's words in a short time and has good grammar in communicating with friends (Adawiyah, Harso, & Nassar, 2020). The weaknesses of the auditory learning style are that students find it difficult to remember information in written form and are easily distracted by noise (Azzahrah Putri, Magdalena, Fauziah, & Nur Azizah, 2021). Kinesthetic learning style is a learning style that involves motion and touch (Pratama, Rahman, Junaeti, Piantari, & Muntaharridwan, 2023). Students with a kinesthetic learning style will find it difficult to sit still for long periods of time due to their strong need for activity and exploration. The characteristics of the

kinesthetic learning style are not easily distracted by chaos, remembering by exploring and seeing, learning by manipulating and practicing, and using fingers as cues when reading.

This research recommends that educators adopt a multimodal instructional approach that integrates visual, auditory, and kinesthetic components to accommodate diverse learning needs. Students with a kinesthetic learning style generally demonstrate strong hand–eye coordination and perform well in physical or movement-based tasks (Irawati, Ilhamdi, & Nasruddin, 2021). However, they often experience restlessness, frustration, and difficulty maintaining concentration during extended listening activities, as well as challenges in tasks that require spelling or memorization (Fenny Rezki, Cyntia Cyntia, Ana Seftiana Zuhel, Akpal Pangestu, & Halwizal Zulkifli, 2022). The study also identified a positive and significant relationship between visual, auditory, and kinesthetic learning styles and students' science learning outcomes (Fatmawati, Hidayat, Damayanti, & Rasyid, 2020). This finding suggests that the better students understand and apply their dominant learning styles, the higher their academic performance tends to be. Such a multimodal approach can enhance student engagement, comprehension, and retention, thereby improving overall learning achievement (Soe, Chondamrongkul, & Temdee, 2024). Furthermore, professional development programs should be implemented to equip teachers with the necessary skills to identify students' learning styles and effectively adapt their teaching strategies (Putu Krisna Dewi, I Gusti Ayu Tri Agustiana, & Putu Ari Dharmayanti, 2023). Future studies are encouraged to examine the long-term effects of multimodal learning interventions on students' academic performance across various disciplines and educational levels.

4. Conclusion

The findings of this study show that the majority of students from all eighth-grade classes at MTs Nahjatus Sholihin demonstrated a kinesthetic learning style, with 45% in class VIIIA, 40% in class VIIIB, and 41% in class VIIIC. In contrast, the visual learning style represented the smallest percentage, with 22% in class VIIIA, 29% in class VIIIB, and 28% in class VIIIC. These results indicate that most students tend to learn more effectively through physical activity, practice, and direct interaction with learning materials rather than through visual observation alone. Furthermore, the analysis revealed a positive and significant correlation between visual, auditory, and kinesthetic learning styles and students' science learning outcomes. This finding suggests that students who are aware of their dominant learning styles and utilize them effectively tend to achieve better results in science learning. Therefore, identifying learning preferences plays a crucial role in developing more personalized and meaningful educational experiences that encourage active participation and enhance academic achievement among students.

This study emphasizes the importance of integrating diverse learning styles into science learning practices to increase engagement and optimize students' academic performance. Teachers are advised to implement multimodal instructional strategies that combine visual, auditory, and kinesthetic approaches in classroom learning activities. The results of this study can serve as a reference for educators and curriculum developers to design student-centered learning environments that accommodate varied learning preferences and promote equal learning opportunities. Practically, the findings may also be applied to develop training programs that help teachers recognize and respond to students' dominant learning styles. For future research, further studies could explore the integration of digital learning tools and adaptive teaching systems in supporting different learning styles. Moreover, longitudinal research is recommended to examine the long-term effects of learning-style-based teaching on students' motivation, retention, and overall academic success.

Declarations

Author Contribution Statement

Nailatus Sholihah contributed to the conception and design of the study and drafted the initial manuscript; Erna Wijayanti conducted the data analysis and refined the research methodology; and

both authors collaboratively reviewed, revised, and finalized the manuscript for submission. All authors have read and approved the final version of the manuscript.

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Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Declaration of Interests Statement

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this paper.

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