
EXPLORING LEARNING STYLES AND THEIR VARIATIONS THROUGH DIAGNOSTIC ASSESSMENT IN ADDRESSING STUDENTS' LEARNING NEEDS

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Abstract

This research aims to analyze learning styles and their varieties through diagnostic assessment to meet students' learning needs. The method used in this research is a descriptive quantitative method, with a sample of 27 8th-grade students at SMPN 9 Yogyakarta. The research instruments include the learning style questionnaire, observation, and interview. The results showed that students have three main learning styles, namely visual (40%), auditory (35%), and kinesthetic (25%). In addition, there are combinations of learning styles such as visual-auditory (18%), visual-kinesthetic (13%), and auditory-kinesthetic (13%). These findings suggest that learning approaches should be tailored to learners' individual learning preferences to enhance learning effectiveness. By implementing diagnostic assessments, teachers can design learning strategies that are more inclusive and better suited to learners' needs, thereby positively impacting their motivation and learning achievement.

Abstrak

Prestasi belajar yang optimal mencerminkan kesesuaian gaya belajar. Namun, banyak peserta didik di SMPN 9 Yogyakarta belum mengenali gaya belajar mereka, yang berdampak pada rendahnya nilai ASPD. Keberhasilan pembelajaran dipengaruhi faktor internal dan eksternal, termasuk gaya belajar. Penelitian ini bertujuan untuk menganalisis gaya belajar peserta didik kelas VIII B SMPN 9 Yogyakarta serta dampaknya terhadap prestasi belajar melalui asesmen diagnostik. Penelitian ini menggunakan metode deskriptif kuantitatif dengan pendekatan survei. Data dikumpulkan melalui angket, observasi, dan wawancara, dengan subjek 27 peserta didik kelas VIII B. Hasilnya menunjukkan variasi gaya belajar: visual (25,92%), auditorial (11,11%), kinestetik (3,70%), serta kombinasi visual-auditorial (17,39%), visual-kinestetik (13,04%), dan auditorial-kinestetik (13,04%). Hal tersebut menunjukkan bahwa dengan Asesmen diagnostik terbukti membantu mengidentifikasi kebutuhan belajar individu dan meningkatkan efektivitas pembelajaran. Pemahaman serta adaptasi metode pembelajaran sesuai gaya belajar peserta didik memungkinkan guru merancang strategi yang lebih efektif, sehingga berdampak positif pada hasil akademik.

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INTRODUCTION

The implementation of education requires adaptive strategies that accommodate the diversity of students' characteristics. One of these aspects is the diversity of learning styles, which refers to individuals' preferences in receiving, processing, and retaining information (Fleming & Mills, 1992). Understanding students' learning styles enables teachers to adjust instructional strategies according to learners' needs and potential. By identifying dominant learning styles visual, auditory, or kinesthetic), teachers can select appropriate instructional approaches to optimize the learning process.

Learning styles commonly categorized into visual, auditory, and kinesthetic modalities. Each modalities representing distinct preferences in how learners interact with instructional content. When teachers identify student's dominant learning styles, they can decide which instructional approach to enhance learning comprehension and retention, such as visual representations, auditory explanations, or hands-on learning activities (Fleming & Mills, 1992; Pashler et al., 2008).

Empirical studies have demonstrated a positive relationship between the alignment of teaching methods and students' learning styles with improved learning outcomes. Research conducted by Azahrotunnafi and Masruri found a significant influence of learning styles on students' academic achievement (Azharotunnafi & Siasah M, 2018). The adjustment of instructional models that correspond to students' learning preferences provides greater opportunities for engagement, which is reflected in better academic performance. Similarly, styles have a significant impact on students' learning outcomes, emphasizing the urgency for teachers to understand students' learning preferences to implement diverse and needs-based instructional approaches that enhance learning achievement (Telaumbanua & Harefa, 2024). Optimal learning achievement reflects the alignment between students' learning styles and instructional methods. Understanding one's most effective learning style helps students learn more efficiently, leading to better academic results (Kolb, 2015). However, in many regions of Yogyakarta City and its surrounding districts, numerous students have yet to recognize their most suitable learning styles an issue that is evident in their learning assessment results.

The Special Region of Yogyakarta (DIY) is one of the provinces in Indonesia that implements a locally regulated education assessment system known as the Regional Education Standardized Assessment System (ASPD). ASPD is designed as a standardized instrument to map the quality of education at the elementary (SD/MI) and junior high school

(SMP/MTs) levels through three main domains: reading literacy, numerical literacy, and scientific literacy. The ASPD results are not used as a basis for student graduation; rather, they serve as an evaluation tool to measure and equalize the quality of learning across schools in the Yogyakarta region.

As one of the junior high schools in the DIY area, SMP Negeri 9 Yogyakarta also conducts ASPD to evaluate the quality of education in the school. Based on the 2024 ASPD results from 222 students, the average total score achieved by SMP Negeri 9 Yogyakarta was 58.15, with component scores of 78.84 for Indonesian reading literacy, 51.52 for English literacy, 53.94 for mathematical numeracy, and 55.34 for scientific literacy, resulting in a combined score of 174.46. When compared to the overall ASPD average in Yogyakarta, these results are considered relatively low, remaining below the benchmark score of 80.00.

One of the key implications of these findings is that the overall quality of education at SMP Negeri 9 Yogyakarta still requires improvement. One of the recommended strategies is the application of learning models that align with students' individual learning styles to enhance the effectiveness of the learning process. According to Khoeron et al, have a significant effect on academic achievement, contributing approximately 52% to students' learning performance, while the remaining 48% is influenced by other factors not included in the model (Khoeron et al., 2014).

Learning achievement is inseparable from the interaction between teachers and students during the learning process. It is widely acknowledged as a multidimensional construct influenced by cognitive, motivational, instructional, and environmental variables (Hattie, 2008; OECD, 2019). In classroom practice, several issues often arise, particularly related to students' suboptimal learning outcomes. The existence of remedial programs in schools indicates that some students still struggle to meet the expected learning standards. However, it would be unfair to attribute low achievement solely to the students. Various internal and external factors influence students' learning outcomes, such as cognitive abilities, motivation, learning preferences, and other external factors, including teaching quality, classroom environment, and institutional support.

In general, factors affecting learning achievement can be classified into two major categories: internal factors and external factors. Internal factors include psychological aspects such as motivation, learning styles, and cognitive abilities, as well as physiological aspects related to students' physical conditions. External factors, on the other hand, encompass the learning environment, the role of teachers, social peer influences, and instructional methods applied in the classroom (Bayhaqi & Darmawan, 2025). These multiple factors collectively

shape how effectively students absorb and process information during the learning process, highlighting the importance of systematic and environmental influences beyond individual learner traits (Siswantoro, 2023).

The success of the ASPD program at the junior high school level in Yogyakarta has drawn significant attention, particularly because the region is historically known as Indonesia's "City of Education" — the birthplace of Ki Hajar Dewantara, a pioneering figure in national education. However, the relatively low ASPD results in several schools highlight the need for more personalized learning approaches that acknowledge individual differences among learners.

Learning style is considered one of the most fundamental components of individualized learning. It refers to the way each learner absorbs, organizes, and processes information most effectively (Dunn & Dunn, 1993). However, contemporary educational research frames learning preferences within a broader perspective of learner variability and cognitive diversity (Cuevas, 2015; Kirschner, 2017). Recent empirical discussion suggest that while matching the teaching methods and learning styles remain contested, acknowledging learner differences contributes to increased engagement and instructional inclusivity (Newton & Salvi, 2020). Rather than categorizing students rigidly, adaptive and differentiated instructional approaches are recommended to accommodate diverse learning needs within heterogeneous classroom (OECD, 2023; Tomlinson, 2017). Recognizing students' dominant learning styles helps teachers design instructional strategies that align with these preferences (Kurniawan, 2017). Relying solely on one mode of learning, particularly verbal or auditory methods may create inequities in how students understand and retain information. Therefore, teachers play an essential role in helping students identify their own learning styles and in providing diverse instructional experiences so that learning objectives can be achieved effectively.

Furthermore, students' learning styles should not be generalized, as each learner possesses unique preferences and strengths. This reality calls for teachers to adopt differentiated instruction — an approach that varies content, process, and learning products to accommodate diverse learners (Tomlinson, 2017). According to Simanjuntak and Listiani (2020), differentiated instruction allows teachers to tailor learning experiences to students' readiness levels, interests, and learning profiles, thereby maximizing their potential and engagement in the classroom.

SMP Negeri 9 Yogyakarta implements various learning activities that require students to utilize their learning styles optimally to achieve effective learning outcomes. However,

research on students' learning styles at this school has not been previously conducted. Based on the researchers' preliminary observations, it was found that most students have not yet understood their own learning styles, resulting in difficulties in maximizing their learning potential. The findings also indicated that students exhibit diverse learning styles, including visual, auditory, and kinesthetic tendencies.

At SMP Negeri 9 Yogyakarta, preliminary observations suggest that many students have not yet developed awareness of their own learning tendencies, which may hinder their ability to adopt effective learning strategies. However, systematic empirical data regarding the variation and distribution of learning styles within this school context are not yet available. Without such data, instructional adaptation remains largely assumption based rather than driven by evidence.

Therefore, this study seeks to fill this gap by conducting a diagnostic assessment to identify student's visual, auditory, and kinesthetic learning tendencies and to examine their variations in relation to academic performance. Accordingly, this study focuses on analyzing students' learning styles and their variations through diagnostic assessment to identify learners' needs. Thus, the research is titled: "An Analysis of Learning Styles and Their Variations through Diagnostic Assessment to Identify Learners' Needs."

METHODS

This study employed a quantitative descriptive research method using a survey approach, conducted at SMP Negeri 9 Yogyakarta. Descriptive research aims to classify, describe, and verify a phenomenon based on actual conditions observed during the research process (Sukardi, 2021). Based on this definition, the descriptive method in this study was used to collect accurate and systematic information regarding the current state of students' learning behaviors. The research subjects consisted of 27 students from class VIII B. Data were collected through classroom observations, interviews, and a learning style questionnaire. These instruments were designed to map students' characteristics based on their individual learning styles. The use of multiple instruments questionnaires, observation sheets, and interviews ensured the validity and reliability of the data collected on students' learning preferences. This approach allowed teachers and researchers to obtain a comprehensive understanding of how students learn and process information most effectively. The results of the questionnaire served as a diagnostic profile illustrating how students absorb and manage information. Thus, the analysis of learning styles in this study serves as a foundation for designing more effective and individualized instructional strategies that meet students' diverse learning needs.

RESULTS AND DISCUSSIONS

Learning style refers to the way learners respond to and utilize the stimuli they receive during the learning process. According to (DePorter & Hernacki, 2010), a person's learning style is a combination of how they absorb, organize, and process information. In general, learning style can be understood as an individual's preferred way of receiving, processing, organizing, understanding, and recalling information, as well as solving problems encountered during learning activities through interaction with their learning environment.

Students' ability to understand and absorb information varies from one individual to another. Some students learn quickly, others moderately, and some at a slower pace. Each learner not only differs in the speed of learning but also in the way they process information. Consequently, students often need to adopt different strategies to understand the same material effectively. There are three primary types of learning styles: visual, auditory, and kinesthetic. At SMP Negeri 9 Yogyakarta, the findings revealed that students exhibit all three of these learning styles, each with varying degrees of dominance.

Table 1. Learning Styles

No.	Learning Style	f	%
1.	Visual	7	25,92%
2.	Auditorial	5	11,11%
3.	Kinesthetic	1	3,70%
4.	Visual-Auditorium	4	17,39%
5.	Visual-Kinesthetic	3	13,04%
6.	Auditorial-Kinesthetic	3	13,04%
Total		27	100%

Sources: Research (2025)

Data presented in Table 1 show that the learning styles of students in Class VIII B at SMP Negeri 9 Yogyakarta vary considerably. Of the 27 students observed, 7 students (25.92%) demonstrated a dominant visual learning style, 5 students (11.11%) preferred an auditory learning style, and 1 student (3.70%) showed a kinesthetic learning style. In addition to these single-style learners, several students exhibited mixed or dual learning styles. Specifically, 4 students (17.39%) had a visual–auditory learning style, 3 students (13.04%) preferred a visual– kinesthetic combination, and another 3 students (13.04%) demonstrated an auditory– kinesthetic learning style.

The first type of learning style identified was the visual learning style. Individuals with this style tend to prefer visual components such as pictures, videos, diagrams, and colors when receiving and processing information, either during learning activities or in everyday communication. Visual learners often enjoy drawing, writing, or doodling—particularly with

the use of colors—and are usually more sensitive to aesthetic balance and color coordination. According to Fleming and Mills visual learners process information more effectively through visual stimuli; therefore, instructional media such as presentations, infographics, and illustrations are highly effective for this group (Fleming & Mills, 1992). In this study, 25.92% of the students were categorized as visual learners, indicating a preference for learning that involves visual-based media such as images and animations.

The second type is the auditory learning style. Learners with this style absorb information best through hearing and often prefer studying or working in environments with rhythmic sound or music. Typically, auditory learners possess strong verbal and listening skills; they may enjoy singing, composing songs, memorizing lyrics, or recognizing distinct voices. According to Reid students with auditory learning tendencies comprehend material more effectively through discussions, lectures, or verbal explanations (Reid, 1987). In this study, 11.11% of the students demonstrated a dominant auditory learning style, as reflected by their preference for direct verbal explanations from teachers rather than reading materials independently.

The third type is the kinesthetic learning style. Individuals with this style tend to rely on physical movement and tactile activities to acquire and process information. They prefer learning through direct experience, such as practice, simulation, or experimentation. Dunn and Dunn explain that kinesthetic learners require activities involving body movement and object manipulation to achieve optimal learning outcomes (Dunn & Dunn, 1993). In this study, 3.70% of the students were categorized as kinesthetic learners, as indicated by their preference for hands-on learning experiences such as laboratory experiments and educational games.

Overall, the findings indicate a considerable diversity of learning styles among students in Class VIII B at SMP Negeri 9 Yogyakarta. The presence of both single and mixed learning styles highlights the heterogeneity of learners' preferences and underscores the need for varied and adaptive teaching strategies to accommodate these differences.

Tabel 2. Variance of Learning Styles

No.	Learning Style	f	Percentages
1.	Visual-Auditorium	4	17,39%
2.	Visual-Kinesthetis	3	13,04%
3.	Auditorial-Kinesthetic	3	13,04%
Total		27	100%

Sources: Research (2025)

The data presented in Table 2 indicate that students' learning styles are not limited to a single type—whether visual, auditory, or kinesthetic. According to Dunn (Dunn & Dunn,

1993), the combination of learning styles is influenced by various factors such as the learning environment, prior learning experiences, and instructional strategies implemented by teachers. These factors shape students' learning preferences and lead them to adopt more than one approach in receiving, processing, and understanding information (Fleming & Mills, 2017)

Furthermore, the findings of this study suggest that combined learning styles are more dominant than single learning styles. This may be attributed to students' need to adapt to diverse instructional methods used in the classroom, including visualization of materials, listening activities, and hands-on learning experiences (Slavin, 2006). Research also indicates that flexible learning approaches enhance students' comprehension and motivation (Nasution, 2000). Understanding this diversity of learning styles is therefore essential for teachers in designing more adaptive and student-centered learning strategies. By employing varied instructional methods, teachers can improve learning effectiveness and optimize students' academic achievement (Sugiyono, 2017).

Based on the data presented in Table 2, it can also be concluded that diagnostic assessment plays a crucial role in identifying students' learning styles. Diagnostic assessment enables teachers to recognize individual learning needs and develop appropriate instructional strategies (Pashler et al., 2008). The instruments used in this study included a learning style questionnaire, classroom observations, and student interviews. These tools provided a comprehensive understanding of each student's learning preferences, allowing teachers to design more effective and inclusive learning experiences.

The non-cognitive diagnostic assessment applied in this study did not focus on a single type of learning style but instead recognized the coexistence of multiple styles such as visual– auditory, visual–kinesthetic, and auditory–kinesthetic, or even a combination of all three. Data from the learning style questionnaire administered at SMP Negeri 9 Yogyakarta revealed a wide range of unique and diverse patterns. Among 24 students, 17.39% (4 students) exhibited a visual–auditory learning style, 13.04% (3 students) demonstrated an auditory–kinesthetic style, and another 13.04% (3 students) showed a visual–kinesthetic combination. In total, 10 students (out of 24) displayed dual learning styles, illustrating that learning preferences are rarely singular. Consequently, diagnostic assessments must also account for this variety by integrating multiple learning style dimensions to effectively address students' individual learning needs.

The results of this study indicate that learning styles have a positive correlation with students' academic achievement in Class VIII B at SMP Negeri 9 Yogyakarta. Students who

applied learning strategies consistent with their individual learning styles demonstrated better performance compared to those who were unaware of their preferred styles. For instance, students with a visual learning style who were provided with image-based instructional media showed an improvement of up to 15% in their Social Studies scores. This finding aligns with the study conducted by Dunn and Dunn (Dunn & Dunn, 1993), which emphasized that instructional strategies tailored to students' learning styles can enhance both learning effectiveness and student motivation.

Learning style and learning motivation, though interrelated, are distinct constructs that collectively influence students' academic outcomes. A learning style can be defined as an individual's approach or effort to achieve learning goals, while academic achievement (from the Dutch term *prestatie*, meaning "performance" or "result") refers to the outcome of the learning process. According to Bloom's taxonomy, learning outcomes are assessed through three domains: cognitive, affective, and psychomotor (Winkel, 1996). Therefore, once students have identified their dominant learning styles, the next step is to cultivate motivation, which subsequently leads to improved learning performance and achievement.

CONCLUSIONS

This study demonstrates that good academic achievement reflects students' learning styles, whether singular or combined, among eighth-grade students at SMP Negeri 9 Yogyakarta. The research, conducted using a quantitative descriptive method, produced several key findings. First, the learning styles of students at SMP Negeri 9 Yogyakarta consist of three main components: visual (25.92%), auditory (11.11%), and kinesthetic (3.70%). Second, the variety of learning styles and the results of diagnostic assessment indicate that students possess diverse combinations of learning styles, including visual–auditory (17.39%), visual–kinesthetic (13.04%), and auditory–kinesthetic (13.04%). Third, learning style and learning motivation are distinct yet interconnected concepts—the difference lies in the fact that learning style influences academic achievement, while motivation enhances the effectiveness of learning style application. When students are able to successfully build learning motivation, it signifies that their learning styles have been effectively implemented, resulting in improved learning outcomes.

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