The Influence of Learning Styles on Senior High School Students' Learning Outcomes and Its Supporting Factors

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ABSTRACT

Background: Student learning outcomes serve as a primary indicator of instructional effectiveness. However, variations in academic achievement are often influenced by individual characteristics, particularly learning styles. Understanding how visual, auditory, and kinesthetic learning preferences relate to academic performance is essential for developing more responsive instructional approaches. **Objective:** This study aimed to examine the relationship between visual, auditory, and kinesthetic learning styles and senior high school students' learning outcomes. **Method:** A quantitative correlational design was employed involving 40 students. Data were collected through a Likert-scale learning style questionnaire and students' report card scores. The data were analysed using Pearson product-moment correlation to determine the strength and significance of the relationships between variables. **Result:** The findings revealed significant positive correlations between learning styles and learning outcomes. The visual learning style showed a correlation coefficient of $r = 0.421$ ($p = 0.008$), the auditory learning style $r = 0.356$ ($p = 0.024$), and the kinesthetic learning style $r = 0.389$ ($p = 0.014$). These results indicate that students who effectively utilise their dominant learning styles tend to achieve higher academic performance. **Conclusion:** Learning styles are an essential internal factor influencing students' academic achievement, though their impact interacts with other factors, such as physiological and psychological conditions, family support, school and community environments, and time management. **Contribution:** This study provides empirical evidence to support educators and schools in designing adaptive, multimodal, and student-centred instructional strategies to improve student learning outcomes.

1. INTRODUCTION

Learning outcomes are a primary indicator of the success of the educational process, as they reflect the extent to which students can absorb, understand, and apply the knowledge, skills, and attitudes acquired through learning activities (Ridwan, 2021). Instruction does not merely emphasise mastery of content but also the development of critical thinking abilities, practical skills, and character (Rahim, 2023). In this context, teachers play a strategic role in designing adaptive, engaging, and contextual learning activities to ensure that every student has an equal opportunity to achieve the expected competencies (Wahyuni & Haryanti, 2024). Optimal learning outcomes result from integrating instructional methods, classroom interaction, and meaningful learning experiences and serve as

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indicators of educational success in developing students' overall potential (Virgantoro & Rofiqi, 2025). Therefore, effective instruction requires alignment among educational goals, teaching strategies, and students' learning needs.

However, empirical conditions indicate that students' learning outcomes are often neither optimal nor evenly distributed (Yazid & Ernawati, 2020). Differences in prior knowledge, individual characteristics, and mismatches between instructional methods and learning preferences significantly affect academic performance (Susanto & Yohana, 2025). Preliminary observations reveal disparities in student achievement, where some students exceed the minimum competency standards, while others struggle to understand the material. This suggests that the learning process has not fully accommodated diverse learning styles, resulting in uneven instructional effectiveness and limiting some students' opportunities to maximise their academic potential.

Based on this condition, the present study focuses on the relationship between students' learning styles and their learning outcomes. Each individual has a distinctive way of receiving, processing, and retaining information, which influences how they engage with learning materials. When instructional strategies are not aligned with students' learning preferences, their academic potential may be hindered, resulting in differences in achievement (Shunhajir & Saifullah, 2025). Therefore, it is essential to analyse the contribution of visual, auditory, and kinesthetic learning styles to learning outcomes and to understand how these differences explain variations in students' academic performance.

Learning outcomes are understood as measurable behavioural changes encompassing three main domains: cognitive, affective, and psychomotor (Putra, 2024). Meanwhile, learning style theory suggests that individuals differ in how they process information (Amelia et al., 2025). Visual learners rely on diagrams, images, and other visual representations; auditory learners process information effectively through listening and verbal discussion; and kinesthetic learners emphasise hands-on practice and physical involvement in learning (Wilyam, 2025). This perspective underscores the importance of aligning instructional strategies with students' learning characteristics to enhance effectiveness and achievement.

Previous studies have shown a positive relationship between learning styles and learning outcomes (Novela et al., 2022; Cahyani, 2018). Students who learn according to their preferred learning styles tend to demonstrate higher engagement, better understanding, and stronger motivation to learn (Syauky et al., 2025; Ramadhan & Darmawan, 2025). However, most prior research has primarily focused on identifying learning style types without systematically linking them to variations in classroom learning outcomes. Furthermore, studies examining the specific influence of visual, auditory, and kinesthetic learning styles on learning outcomes remain limited, providing an opportunity for further empirical investigation.

Although numerous studies have explored the relationship between learning styles and learning outcomes, a gap remains in the need for more focused research examining the influence of visual, auditory, and kinesthetic learning styles within actual classroom contexts. A systematic analysis of these three learning styles can provide empirical insights into their specific contributions to students' academic performance. Such findings may serve as a foundation for designing more adaptive and responsive instructional strategies that accommodate diverse learning preferences.

This study aims to analyse the influence of visual, auditory, and kinesthetic learning styles on students' learning outcomes. It is expected to provide a comprehensive understanding of the relationship between students' learning characteristics and academic achievement, while also serving as a reference for teachers in developing more effective, varied, and adaptive instructional strategies. Thus, this research contributes not only to the theoretical development of learning outcomes and learning style concepts but also to practical efforts to improve instructional quality and optimise student achievement.

2. METHOD

2.1 Research Design

This study employed a quantitative correlational design. The design was chosen to determine the presence and strength of the relationship between learning styles (visual, auditory, and kinesthetic) and senior high school students' learning outcomes. Correlational research does not involve experimental treatments but seeks to identify relationships among variables using field data.

2.2 Participants

This study was conducted at SMAN 1 Menganti, Gresik Regency. The participants consisted of 40 senior high school students selected as the research sample. All participants were drawn from the same school and educational

level, resulting in relatively homogeneous academic characteristics and curriculum exposure. The sample was selected to represent students with varied learning styles.

2.3 Data Collection

Data were collected using two techniques: a psychological scale and documentation. The psychological instrument was a Likert-scale learning-style questionnaire covering three dimensions: visual, auditory, and kinesthetic. Before use, the instrument underwent validity and reliability testing to ensure its appropriateness. Learning outcome data were obtained from students' report card scores as indicators of academic achievement.

2.4 Data Analysis

Data were analysed using Pearson Product-Moment correlation to examine the relationship between each learning style and students' learning outcomes. This analysis was selected because the data were measured on an interval scale and met the necessary statistical assumptions. Significance testing was conducted at the 0.05 level, with relationships considered significant if $p < 0.05$. The results were presented as correlation coefficients (r) and significance values (p) for each variable.

3. RESULT AND DISCUSSION

3.1 Result

The correlation analysis results indicate that visual, auditory, and kinesthetic learning styles are significantly related to students' learning outcomes. All three learning styles contribute positively to academic achievement, though to varying degrees.

Table 1. Correlation Results Between Visual Learning Style and Learning Outcomes

Variable X	Variable Y	r	Sig. (p)	Description
Visual Learning Style	Learning Outcomes	0.421	0.008	Significant

Based on Table 1, the Pearson correlation test yielded a correlation coefficient of r = 0.421 with a significance value of p = 0.008 (p < 0.05). This finding indicates a statistically significant relationship between visual learning style and students' learning outcomes. The positive correlation coefficient shows a direct relationship, meaning that the stronger the students' tendency toward a visual learning style, the higher their academic achievement. The magnitude of r suggests that the relationship falls within the moderate category.

Table 2. Correlation Results Between Auditory Learning Style and Learning Outcomes

Variable X	Variable Y	r	Sig. (p)	Description
Auditory Learning Style	Learning Outcomes	0.356	0.024	Significant

Based on Table 2, the Pearson correlation analysis produced r = 0.356 with a significance value of p = 0.024 (p < 0.05). This result indicates a statistically significant relationship between auditory learning style and students' learning outcomes. The positive direction of the relationship means that students with a stronger tendency toward an auditory learning style tend to achieve better academic results. The strength of this correlation is categorized as low to moderate.

Table 3. Correlation Results Between Kinesthetic Learning Style and Learning Outcomes

Variable X	Variable Y	r	Sig. (p)	Description
Kinesthetic Learning Style	Learning Outcomes	0.389	0.014	Significant

Based on Table 3, the Pearson correlation test yielded a correlation coefficient of r = 0.389 with a significance value of p = 0.014 (p < 0.05). This result demonstrates a statistically significant relationship between kinesthetic learning style and students' learning outcomes. The positive correlation indicates that students with a higher tendency toward a kinesthetic learning style tend to achieve better academic performance. The strength of the relationship between the two variables is classified as moderate.

3.2. Discussion

The findings demonstrate that visual, auditory, and kinesthetic learning styles are significantly associated with senior high school students' learning outcomes. This relationship suggests that the processes through which students receive, process, and interpret information meaningfully contribute to their academic performance. Each student approaches learning with distinct cognitive preferences, which influence how effectively instructional content is understood and retained. When instructional delivery aligns with students' dominant learning tendencies, comprehension tends to improve, resulting in greater academic achievement. Conversely, mismatches between instructional strategies and learning preferences may limit students' ability to grasp the material, thereby affecting performance outcomes fully.

The analysis revealed that the visual learning style has a significant and positive relationship with learning outcomes. Students with strong visual tendencies tend to process information more efficiently when it is presented through images, diagrams, charts, graphs, concept maps, and other visual representations. Visual stimuli help learners structure complex information into organised patterns, making abstract concepts easier to understand. This aligns with research indicating that optimal use of visual perception supports systematic information organisation and strengthens memory retention (Buhamad et al., 2024). Visual elements can also reduce cognitive overload by simplifying explanations into structured formats. Therefore, integrating visual media such as infographics, slide presentations, and illustrated materials into classroom instruction can enhance conceptual clarity and improve students' academic performance.

Similarly, the auditory learning style shows a significant relationship with learning outcomes (Masela & Subekti, 2021). Students with auditory preferences tend to learn more effectively through listening activities, spoken explanations, discussions, and verbal repetition (Wandah et al., 2024). For these learners, sound functions as the primary channel for absorbing and processing information. Verbal interaction between teachers and students including lectures, guided discussions, question-and-answer sessions, and peer dialogue plays a crucial role in deepening understanding (Hossain, 2024). Through listening and speaking, auditory learners refine their comprehension, clarify misunderstandings, and reinforce memory through repetition. Learning environments that actively encourage dialogue, collaborative discussion, and oral feedback can therefore significantly enhance academic achievement among students with strong auditory tendencies.

The kinesthetic learning style also shows a significant, positive correlation with learning outcomes. Students with kinesthetic tendencies learn most effectively through direct experience, physical movement, and hands-on engagement with learning materials (Harapan et al., 2024). Rather than relying solely on passive listening or visual observation, these learners benefit from active participation through experiments, simulations, role-play activities, and practical demonstrations. Experiential learning allows students to connect theoretical concepts with tangible experiences, making abstract material more concrete and meaningful. Research indicates that active involvement strengthens comprehension and long-term retention by enabling students to internalise knowledge through physical and emotional engagement (Shieh & Yu, 2016). Consequently, instructional approaches that incorporate practical activities and experiential tasks can significantly enhance academic performance for kinesthetic learners.

These results confirm that learning style represents an important internal factor influencing academic achievement. However, it does not function independently. Learning outcomes are shaped by a complex interaction of multiple internal and external factors that collectively determine the effectiveness of the learning process. While aligning instruction with learning styles can improve performance, broader contextual influences must also be considered to understand variations in academic achievement fully.

Physiological Factors. Physical health, overall fitness, and proper functioning of sensory organs directly influence students' ability to absorb and process information (Griban et al., 2020). Students who are physically healthy and well-rested are better able to maintain concentration, sustain attention, and actively engage in classroom activities. Visual learners depend on optimal vision, auditory learners rely on effective hearing, and kinesthetic learners benefit from physical readiness and coordination. Conversely, health problems, fatigue, or sensory limitations may hinder students' ability to utilise their preferred learning styles effectively, thereby impacting learning outcomes.

Psychological Factors. Motivation, interest, attention, attitude, and emotional stability significantly affect how students engage with instructional content (Baimenova et al., 2015). Even when students possess a strong learning style preference, low motivation or emotional distress can reduce their capacity to benefit from instruction. Highly motivated students tend to actively seek strategies that align with their learning preferences, while those with positive attitudes toward learning demonstrate greater persistence and engagement. Emotional readiness and psychological well-being also enhance focus and cognitive processing, thereby supporting improved academic achievement.

Family Environment. The family serves as the primary educational environment and plays a fundamental role in shaping students' learning habits (William, 2024). Parental involvement, encouragement, and supervision contribute to the development of consistent study routines. A supportive home environment that provides adequate learning resources and minimises distractions enables students to practice and refine their preferred learning approaches. In contrast, limited parental support or an unfavourable home environment may weaken students' study discipline and reduce academic performance, regardless of their learning style.

School Environment. The structure and climate of the school environment significantly influence how effectively students can benefit from their learning preferences (Vasileva-Stojanovska et al., 2015). Teaching methods, variety of instructional media, teacher–student interaction, and classroom atmosphere collectively shape students' engagement levels. Schools that implement diverse and adaptive instructional strategies are better positioned to accommodate different learning styles. Additionally, adequate facilities, clear academic expectations, and a supportive classroom climate create conditions that foster concentration and motivation, thereby enhancing learning outcomes.

Community Environment. The broader community context also affects students' academic development (Saifi et al., 2024). Access to educational programs, tutoring centres, libraries, and community-based learning initiatives can enrich students' academic experiences and reinforce classroom learning. Positive peer influence within the community may encourage productive study habits, while environments characterised by limited educational support or negative distractions can reduce academic focus. Thus, community conditions can either strengthen or undermine students' efforts to optimise their learning styles.

Time Management. Effective time management is another critical determinant of academic success. Students who allocate sufficient time to study, rest, and extracurricular activities demonstrate better cognitive balance and sustained productivity. Organised scheduling allows learners to apply strategies aligned with their dominant learning styles without experiencing fatigue or burnout. Poor time management, on the other hand, may lead to rushed study sessions and reduced comprehension, even among students with strong learning preferences.

Overall, the study reinforces that learning styles and academic achievement are influenced not only by individual cognitive preferences but also by physiological readiness, psychological stability, family support, school conditions, community context, and effective time management. These factors interact dynamically rather than functioning in isolation. Therefore, initiatives aimed at improving students' learning outcomes should adopt a comprehensive, integrated approach that addresses both individual differences and environmental influences to achieve sustainable academic improvement.

4. IMPLICATIONS AND CONTRIBUTIONS

4.1 Research Implications

The implications of this study indicate that teachers need to understand and accommodate students' diverse learning styles within the instructional process. The finding of a significant relationship between visual, auditory, and kinesthetic learning styles and learning outcomes underscores the importance of implementing varied, multimodal instructional strategies. Teachers are expected not only to rely on lecture methods but also to combine them with visual media, discussions, and practical activities to support all student learning styles effectively. In addition, schools and educational counsellors can use the results of this study as a foundation for providing academic guidance services to help students recognise and optimise their learning styles, thereby improving learning outcomes more effectively.

4.1 Research Contributions

The contribution of this study lies in providing empirical evidence of a significant relationship between learning styles and senior high school students' academic achievement. This research enriches theoretical discussions in educational psychology by affirming that learning style is an internal factor influencing students' academic performance. Furthermore, this study offers practical contributions for educators and educational policymakers in designing more adaptive and student-centred instructional approaches. The findings may also serve as a reference for future research examining learning styles by incorporating additional variables or employing more diverse methods of measuring academic achievement.

5. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

5.1 Research Limitations

This study has several limitations that should be considered. First, academic achievement was measured using report card grades that had undergone remedial processes, so the scores may not fully reflect students' original academic abilities. Second, the relatively limited sample size and the fact that participants were drawn from only one school restrict the generalizability of the findings. Third, the study examined learning style as the independent variable, without exploring other influential factors, such as learning motivation, teachers' instructional strategies, or the learning environment, in greater depth. As a result, the broader influence of additional variables on learning outcomes has not been fully revealed.

5.1 Recommendation for Future Research Directions

Given these limitations, future studies are recommended to use academic achievement instruments in the form of standardised tests developed by the researchers to obtain more objective results. In addition, subsequent research should involve a larger sample size drawn from multiple schools to strengthen the generalizability of the findings. Future studies may also combine learning styles with other variables, such as learning motivation, instructional models, and learning environments, and apply a mixed-methods approach to gain a more comprehensive understanding of the factors influencing students' academic achievement.

6. CONCLUSION

The findings of this study indicate a significant relationship between visual, auditory, and kinesthetic learning styles and senior high school students' academic achievement. All three learning styles show positive relationships with learning outcomes, meaning that the more effectively students utilise their preferred learning styles, the better their academic performance. These findings affirm that differences in how students receive and process information play an important role in academic achievement.

In addition to learning styles, the results indicate that a range of internal and external factors influences students' academic achievement. Internal factors include physiological and psychological aspects such as health conditions, sensory functioning, motivation, interest, and mental readiness. External factors include family, school, and community environments, as well as time management. These factors interact and collectively determine the effectiveness of the learning process.

This study emphasises that efforts to improve students' academic achievement should adopt a comprehensive approach. Teachers are expected to recognise and accommodate differences in learning styles by implementing varied instructional strategies while also considering supporting factors. Through such integrated efforts, the learning process can become more effective, meaningful, and focused on optimising academic outcomes.

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Author Contribution Statement

All authors discussed the results, contributed to the final manuscript, and approved the final version for publication. Adilla Lilik Dewi Kirana: Conceptualization, Design, Methodology, Writing - Original Draft, Performed data collection and Analysis, Interpretation of the results. Mudhar Mudhar: Conceptualization, Writing - Review & Editing.

Declaration of Generative AI (GenAI) Usage in Scientific Writing

The authors declare that Generative Artificial Intelligence (GenAI) tools were employed in the drafting and revision of this manuscript to check spelling and grammar, identify typos, grammatical errors, suggest paraphrases, reduce passive voice, and eliminate repeated words, sentences, and unnecessary adverbs. The suggestions provided by GenAI were critically evaluated and modified to ensure that the final draft remains representative of the authors' own work. All instances of Generative AI usage in this article were conducted by the authors in accordance with the

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Conflict of Interest Statement

The authors declare that they have no significant competing financial, professional or personal interests that might have influenced the performance or presentation of the work described in this manuscript.

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