# THE INFLUENCE OF KINESTHETIC AND AUDITORY LEARNING STYLES ON HIGH SCHOOL STUDENTS' ACADEMIC ACHIEVEMENT

# (A Case Study of Students at SMAN 1 Mutiara Beureunun, Pidie)

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**Abstract:** *Learning styles represent individual differences in the ways information is absorbed, processed, and retained. This study aims to examine how kinesthetic and auditory learning styles influence academic achievement among students at SMAN 1 Mutiara Beureunun, Pidie District. A descriptive quantitative method was applied using a learning style questionnaire and science achievement test as research instruments. The participants consisted of 31 students from class XII/A. Data were analyzed using the Pearson product–moment correlation to determine the strength of the relationship. The findings revealed a positive yet weak correlation (r = 0.121) between kinesthetic and auditory learning styles and students' academic performance. This suggests that learning styles contribute only minimally to student achievement. Therefore, flexible and multimodal teaching strategies are highly recommended to accommodate diverse learning preferences.*

***Keywords:*** *learning style, kinesthetic, auditory, academic achievement, senior high school*

## INTRODUCTION

Education is fundamentally a planned and continuous process designed to develop learners' potential optimally through systematic, adaptive, and meaningful learning. In the current era of educational transformation, education is not merely the transfer of information from teachers to students, but plays an important role in shaping 21st-century competencies such as critical thinking, creativity,

communication, collaboration, and digital literacy (Kemendikbudristek, 2023). The implementation of the Merdeka Curriculum represents a concrete manifestation of this paradigm shift, in which learning places greater emphasis on *student-centered learning* than on traditional, teacher-oriented approaches. In this approach, the teacher's role shifts to that of a facilitator who helps students build knowledge through relevant and contextual learning experiences.

One aspect that strongly determines the effectiveness of learning in this new paradigm is students' learning styles. Learning style reflects an individual's tendency to receive, process, store, and reproduce information. According to Kolb (2020), learning style is the result of experience construction through four stages of the learning cycle, namely *concrete experience*, *reflective observation*, *abstract conceptualization*, and *active experimentation*. This model emphasizes that every individual processes information with a distinctive pattern. Meanwhile, Fleming and Mills (2022) classify students' learning styles into the category of *Visual, Auditory, and Kinesthetic (VAK)*, which to this day is widely used in various educational contexts to understand learners' learning preferences. DePorter and Hernacki (2021) also state that understanding learning styles gives teachers opportunities to design learning that is more effective and responsive to students' needs.

However, the results of the National Survey of the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek, 2023) show that most teachers in Indonesia still rely on lectures as the main learning strategy. The lack of variety in methods means that learning is not fully adjusted to students' learning profiles, so the potential of students with kinesthetic and auditory learning styles is often not accommodated. This condition is reinforced by the findings of Sulastri and Ningsih (2025), who reveal that the implementation of differentiated instruction in the Merdeka Curriculum still faces challenges, especially in terms of teachers' readiness to understand differences in students' learning styles.

Yet a number of studies state that approaches that adapt to learning styles can improve the effectiveness of learning. Widodo and Puspitasari (2022) reported that multimodal learning—which integrates visual, auditory, and kinesthetic elements—can improve conceptual understanding by up to 28% in science subjects. Similar findings were put forward by Dahliana (2023), that a VAK-based learning model increases students' motivation, engagement, and learning achievement. Arni (2024) also revealed that learning style has a significant influence on science achievement at the elementary school level, especially in basic cognitive abilities and problem solving.

However, research results on the relationship between learning style and achievement are not always consistent. Aboregela et al. (2023) showed that the

relationship between learning style and academic achievement is contextual, depending on the type of subject, student characteristics, and the learning strategies used by the teacher. Mustika and Harjito (2023) stated that the kinesthetic learning style tends to be effective for science subjects because it involves process skills, manipulation of tools, direct observation, and experiments. Meanwhile, the auditory learning style yields better results in the context of discussion-based learning, verbal explanation, and interaction among students.

In the context of science learning, integrating learning styles is highly relevant because the abstract nature of scientific material often requires an experiential approach. Fauziah, Rahman, & Hadi (2024) found that integrating learning styles into practicum can increase students' scientific literacy by up to 32%, while also reducing misconceptions. In addition, learning technology increasingly strengthens teachers' ability to meet learning style needs. Hanum and Pratama (2023) showed that the use of interactive digital media makes it possible to present audio, visuals, animation, experiment simulations, and educational games simultaneously so that diverse learning preferences can be served. Ramdhan and Fitri (2024) also affirmed that virtual laboratories effectively improve concept retention in auditory students and procedural skills in kinesthetic students.

The Merdeka Curriculum explicitly requires teachers to implement differentiated instruction, namely a learning process that adjusts content, process, and product to students' learning profiles, including learning styles (Sulastri & Ningsih, 2025). Differentiated instruction gives kinesthetic students room to learn through experiments, project activities, and fieldwork, while auditory students can be strengthened through dialogue, presentations, verbal reflection, and group discussions. If learning styles are not properly accommodated, the learning process can become less effective, affect motivation, and result in low academic achievement.

A similar phenomenon occurs at SMAN 1 Mutiara Beureunun, Pidie Regency. Initial observations show a fairly strong variation in learning preferences. Some students show a kinesthetic tendency and are more engaged when learning takes place through science practicum activities, exploration of laboratory equipment, and problem-based projects. Conversely, students with an auditory tendency show better understanding through listening to the teacher's explanations, discussing, and presenting ideas. However, the learning process is still dominated by lectures and exercise drills, so it does not fully meet students' learning needs. As a result, some students find it difficult to understand the material in depth, which is ultimately reflected in their learning achievement.

This gap between students' learning needs and teaching approaches underlies the importance of research on the influence of kinesthetic and auditory learning styles on high school students' science achievement. This study is expected to provide empirical understanding of the extent to which these two learning styles contribute to student achievement, as well as practical input for teachers in designing learning models that are more adaptive, effective, and aligned with the demands of the Merdeka Curriculum.

# METHOD

This study used a descriptive quantitative method. The population was the class XII students of SMAN 1 Mutiara Beureunun, and a sample of 31 students was selected purposively. The research instruments consisted of (1) a learning style questionnaire containing 30 statements to measure kinesthetic and auditory preferences, and (2) a science achievement test consisting of 25 multiple-choice questions.

**Table 1. Product-Moment Correlation Test**

| RESEARCH VARIABLES | TREATMENT | TEST RESULTS |
|---|---|---|
| Auditory and Kinesthetic Learning Styles (X) | - Learning Style Questionnaire Test | - Auditory and Kinesthetic Learning Style Classification Score |
| Science Material Test (Y) | - Learning Achievement Test | - Learning Achievement Score |

Source: Sugiono, (2021)

**Notes:**
X = Auditory and Kinesthetic Learning Styles
Y = Science Learning Achievement

The relationship analyzed in this study is the relationship between students' learning style (X) and science learning achievement (Y), analyzed using the Pearson *Product Moment correlation technique.*

**Table 2. Interpretation of the Relationship (Sugiyono, 2021)**

| r Value | Strength of Relationship |
|---|---|
| 0.00 – 0.199 | Very weak |
| 0.20 – 0.399 | Weak |

| r Value | Strength of Relationship |
|---|---|
| 0.40 – 0.599 | Moderate |
| 0.60 – 0.799 | Strong |
| 0.80 – 1.00 | Very strong |

Source: Sugiono, (2021)

**Hypotheses tested:**

$H_0$ : There is no significant relationship between learning style and students' science achievement.

$H_1$ : There is a significant relationship between learning style and students' science achievement.

Validity was obtained through *expert judgment* and reliability was measured using Cronbach's Alpha (α = 0.87). The analysis used Pearson correlation to determine the relationship between learning style and achievement. Interpretation criteria follow Guilford (1956).

# RESULTS AND DISCUSSION

The following section presents a description of the research results as follows:

**Table 3. Results of the Kinesthetic Learning Style Questionnaire Test Based on Learning Style Indicators**

| No | Kinesthetic Learning Style Indicator | Item No. | Mean Score | Category | Interpretation |
|---|---|---|---|---|---|
| 1 | Learning with physical activities | 1,2,3,5 | 82.4 | Very Good | Students are very accustomed to understanding concepts through movement and direct practice. |

| | | | | | |
|---|---|---|---|---|---|
| 2 | Sensitive to expressions and body language | 6,7,9,11 | 81.0 | Very Good | Students quickly understand messages through the expressions and body movements of others. |
| 3 | Oriented toward physical activity and movement | 12–15,17 | 78.8 | Good | Students are active and like moving around while learning. |
| 4 | Likes trial and error and is less neat | 18,20,21 | 76.6 | Good | Students learn through direct experimentation, although they pay less attention to neatness. |
| 5 | Weak in verbal activities | 24–28,30 | 74.2 | Good | Students do not like long oral explanations and are more comfortable with physical activities. |

Source: Categories according to Sugiyono (2019)

Based on the data in Table 3, the analysis of the kinesthetic learning style questionnaire results by indicator for 31 (thirty-one) students shows that the average score of the kinesthetic learning style indicators ranges from 74.2 to 82.4. These values fall in the good to very good categories (Sugiyono, 2019). In general, this shows that most students understand science concepts more effectively through physical activity, body movement, and direct experience.

**Table 4. Results of the Auditory Learning Style Questionnaire Test Based on Learning Style Indicators**

| No | Auditory Learning Style Indicator | Item No. | Score Mean | Category | Interpretation |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| 1 | Learning by listening | 1,2,3,4,6,7 | 85.2 | Very Good | Students predominantly learn by listening to teachers' explanations and instructional audio. |
| 2 | Good in oral activities | 8,10,12 | 80.6 | Good | Students are fairly active in speaking, discussing, and conveying ideas orally. |
| 3 | Sensitivity to music | 14,15,16,18 | 79.6 | Moderate | Students are sensitive to sound and enjoy learning that involves elements of sound or music. |
| 4 | Easily distracted by noise | 20,22,23 | 77.2 | Moderate | Students are sensitive to noise and focus better when learning in a quiet environment. |
| 5 | Weak in visual activities | 25,26,27,28 | 74.6 | Moderate | Students rely less on visual aspects such as reading or pictures. |

Source: Categories according to Sugiyono (2019)

Based on the results of the Auditory Learning Style questionnaire from 31 (thirty-one) respondents (students), by analyzing learning styles based on the learning style indicators, the achievement scores obtained varied. In general, the overall average score for the Auditory learning style ranged between 74.6 and 85.2, in the Moderate and Very Good categories. These results show that the majority of students find it easier to understand science material by learning through listening activities and verbal communication.

## DISCUSSION

Based on the results of this study, the influence of learning style on learning outcomes falls into the category of weak to moderate**,** and does not show a consistent relationship empirically. This finding is in line with Aboregela et al. (2023) whose study on digital learning showed that learning style preferences have no significant impact on academic achievement. Aboregela explains that the factor

that more strongly determines learning success is not the match of learning styles, but cognitive engagement**,** the quality of pedagogical interaction, and the instructional strategies used by teachers. The study emphasizes that learning approaches that overemphasize the categorization of learning styles can lead to misconceptions and potentially limit students' flexibility in processing information.

The results of this study are also consistent with the landmark meta-analysis by Pashler et al. (2008) which showed no strong evidence supporting the *meshing hypothesis*, namely the assumption that students will learn better when instructional material is delivered in line with their dominant learning style. This study examined hundreds of studies and found that the majority did not meet the methodological criteria to support the effectiveness of matching instruction to learning styles. Similarly, Riener and Willingham (2010) argue that learning style preferences have not been shown to directly influence cognitive processes and that learning ability is more influenced by the characteristics of the material than by students' sensory preferences. However, the results of this study differ from Arni (2024) who reported a strong influence of learning style on elementary school students' learning outcomes. Arni found that aligning learning media with students' sensory preferences (visual, auditory, or kinesthetic) had a positive impact on retention and understanding of the material. This difference can be explained by the cognitive developmental context of elementary school students, who are still in the concrete operational stage according to Piaget's theory. At this stage, students need more concrete representations, intensive visualization, and motor activities that support the construction of meaning. The effectiveness of learning styles at the primary education level may also be influenced by factors such as still-low intrinsic motivation, dependence on direct sensory experience, and teachers' more structured learning methods.

In line with this, the study by Dahliana (2023) found that learning style has no direct effect on learning outcomes, but has an indirect effect through motivation**,** learning interest, and student engagement. Students who feel that their learning style is taken into account tend to be more confident, more active, and have a higher level of attention in following lessons. This finding shows that learning style functions more as an affective mediator, not as the main determinant of academic achievement. Meanwhile, the study by Widodo and Puspitasari (2022) emphasizes that the success of applying learning styles depends on multimodal instructional design. In their analysis, learning strategies that combine text, visuals, audio, simulations, collaborative activities, and kinesthetic activities simultaneously proved more effective in improving learning outcomes than strategies that follow only one particular learning style. They argue that the multimodal approach not only meets students' preferences, but also provides *multiple channels* for information processing, thereby increasing the chance of deeper internalization of concepts. This

perspective is in line with the research results of Mayer (2020) on *multimedia learning*, which shows that learning that uses a combination of verbal and visual elements simultaneously can improve conceptual understanding and knowledge retention.

International research also supports the finding that the effectiveness of learning styles is not universal. Fleming and Baume (2006) emphasize that the VARK model is not a tool for determining instructional strategies, but only helps students understand their tendencies in accessing information. Meanwhile, Hattie (2009; 2023) in the study *Visible Learning* states that learning styles have a relatively low *effect size* (around 0.17), far below other learning strategies such as feedback (0.70), direct instruction (0.59), and metacognitive strategies (0.67).

From the perspective of modern instructional design, the *Universal Design for Learning (UDL**)** framework (CAST, 2018)* emphasizes that learning must ensure the provision of: (a) *Multiple Means of Representation, (b**)** Multiple Means of Action and Expression**,** (c) Multiple Means of Engagement.* This approach does not depend on the concept of learning styles, but recognizes the diversity of students' learning needs. Learning is designed to be inclusive, flexible, and to accommodate various ways of processing information without pigeonholing students into particular learning styles. In line with the recommendation of Hidayat and Pratiwi (2024**)**, teachers need to apply a multimodal learning approach that encompasses various forms of presentation, expression, and interaction.

Multimodal learning not only responds to the diversity of learning styles, but also increases motivation, strengthens understanding, and increases students' opportunities to construct knowledge through various cognitive pathways. From all of these findings, it can be concluded that: Learning style is not the main factor that differentiates learning outcomes, and its effectiveness is contextual, especially in primary education and learning based on concrete activities., The impact of learning style is more related to motivational and affective aspects, and A multimodal or UDL learning approach is far more effective and better supported by empirical evidence. Thus, this study reinforces the modern paradigm that learning success is more influenced by rich, varied, and evidence-based instructional design, not by matching instruction to a particular learning style.

# CONCLUSION

In conclusion, the kinesthetic and auditory learning styles of students at SMAN 1 Mutiara Beureunun, Pidie, show a positive but very weak relationship with science learning achievement, as indicated by the Pearson product–moment correlation coefficient of \(r = 0.121\). The findings indicate that although students

demonstrate preferences for learning through physical activities, direct experiences, listening, and verbal communication, these preferences have a limited relationship with their academic achievement. Learning outcomes are also associated with other factors, including learning motivation, teaching methods, student engagement, and the learning environment. Therefore, teachers are encouraged to implement flexible and multimodal learning strategies that integrate practical activities, verbal explanations, discussions, visual representations, and interactive media to accommodate students' diverse learning needs without restricting them to particular learning styles. Such an approach is expected to promote more inclusive and meaningful learning experiences and support the improvement of students' science learning achievement.

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