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Analysis of Learning Style Profiles to Optimize Student Achievement

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Abstract: Student achievement is an indicator of learning success that indicates the extent to which a student has acquired the skills and knowledge set forth by their educational program. Understanding students' learning styles plays a significant role in determining learning success. One of the efforts to optimize student achievement is facilitating learning activities that align with students' learning styles. Students are no longer preoccupied with understanding their learning styles but are focused on deepening the material. This study aims to describe the learning style profiles of students, and students and lecturers in the learning process can follow up on the results. This study uses a survey research method with a questionnaire instrument containing 54 statements. A learning styles questionnaire prepared based on the opinion of De Poter & Hernacki is used as a data collection tool. Learning styles are identified as visual learning style, auditorial learning style, and kinesthetic learning style. The questionnaire was distributed to students in semesters 2, 4, 6, and 8, totaling 51 students. The data analysis technique used is a descriptive analysis of the questionnaire results. The questionnaire results show that 36% of students have visual and kinesthetic learning styles, 14% have auditory, and 14% are inconsistent. This inconsistency may suggest a balanced learning style, where students do not rely heavily on one learning mode but rather integrate multiple styles depending on the context. Therefore, the Science Education Study Program lecturers should implement a learning model that can facilitate visual and kinesthetic styles, even though the subjects taught are theoretical. Incorporating a variety of teaching methods, such as visual aids, hands-on activities, and auditory discussions, can accommodate the diverse learning preferences of students, leading to a more inclusive and effective learning environment.

Keywords: Auditorial; Kinesthetic; Learning Styles; Visual.

Introduction

The tangible results of successfully implementing the teaching and learning process can be observed through student achievement. If students' final grades are reasonable, their academic performance is strong, and the knowledge transfer process from instructor to learner can be considered successful [1]. Academic achievement is a term that reflects the degree of success an individual attains in the learning process [2].

Academic performance is used to gauge how well educational and learning objectives have been met by a lecturer who plays a significant role in the success of the learning process. The reasons for fluctuations in performance, either improvement or decline, may be due to various factors that originate from individual or external influences [3].

Factors that affect learning achievement: 1. Internal factors (those within the student), which include the physical and psychological conditions of the student. 2. External factors (those outside the student) encompass the environmental conditions surrounding the student. 3. Learning approach factors involve learning efforts, including students' strategies and methods to study their course materials [4]. Education is one of the most crucial aspects of human life, and the success of formal education, particularly in schools, can be seen through learning styles [5].

Learning achievement positively reflects students' understanding of their learning styles because academic performance can be optimized by maximizing their knowledge of learning styles [6]. Students with a well-structured approach to learning tend to achieve better results than those needing an effective study method. A structured study method allows students to explore the learning material more thoroughly [7], [8] Students' learning styles (visual, auditory, kinesthetic) influence the success of the learning process, hence the need for instructional strategies that align with these learning styles [9].

During the learning process, each student has a unique learning style that differs from one another. In teaching, lecturers must consider the learning styles of their students. This is because the effectiveness of each teaching session largely depends on the students' learning styles, as well as their personal characteristics and intellectual abilities [10]. The diversity of learning styles within a classroom certainly creates varied learning needs among students, making it crucial for lecturers to understand their students' learning styles to maximize learning [9]. Profiling learning style can enhance learning efficiency and personalize the learning approach. Thus, this study is a reference that can help lecturers develop effective teaching methods.

Research Methods

This study aims to obtain a profile of students' learning styles and is a quantitative descriptive study. The

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research method used is a survey conducted in the Science Education Study Program at the University of Sarjanawiyata Tamansiswa during the even semester of the 2023/2024 academic year. The study involved 51 students as respondents to answer the questionnaire. The standard questionnaire by [11] contains 18 statements for each learning style, broken down into six aspects: speaking style, memory pattern, learning method, work style, communication style, and preferred activities, resulting in a total of 54 statements. The questionnaire was presented in a Google Form, which students could easily access. The data analysis techniques used in the study are data reduction, data display, and conclusion drawing or verification.

Results and Discussion

Students, as the main actors in higher education, have individual learning needs that educators must accommodate [8], [9], [12]. Learning style describes how each person learns or focuses on processes and understands difficulties and new information through different perceptions [9]. A learning style is a method that makes it easier for students to receive, organize, and manage the information they receive [13].

In addition, most students have cognitive intelligence, such as the ability to think about something and reason. Character is the way each individual thinks and behaves, becoming a habit in life, both on a micro and macro scale [14].

After distributing a questionnaire via Google Forms to 51 students, data reduction results showed that seven respondents provided inconsistent answers, making it impossible to determine their learning styles. The profile of learning styles among Science Education students is as follows:

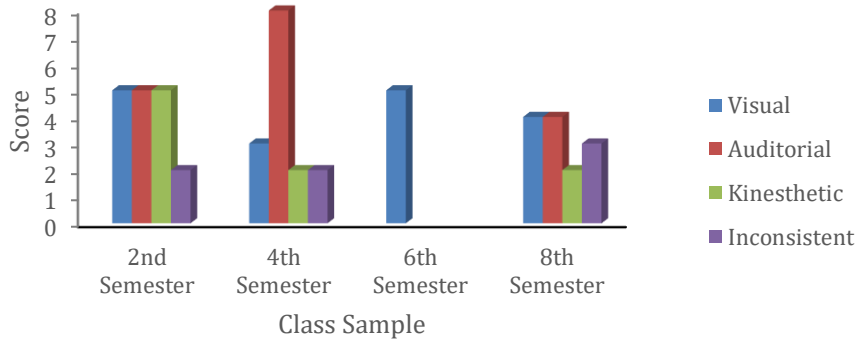

Figure 1. Learning Style of Each Semester

The learning style survey results show that most Science Education students have visual and kinesthetic learning styles. Based on the survey completed by the students, the percentage of learning styles among Science Education students is as follows:

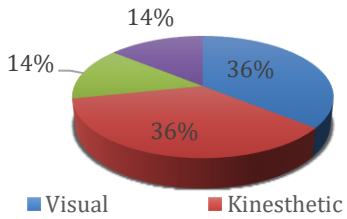

Figure 2. Learning Styles' Percentage in Science Education Study Program

Visual and kinesthetic learning styles are highly prevalent in students of science programs, particularly in applied science fields, due to the nature of these disciplines. Science subjects often involve complex concepts that are easier to understand through visual aids like diagrams, charts, and models and through hands-on experimentation. Visual learners tend to excel when seeing information presented in written or graphic form. They can quickly grasp concepts through visuals, such as graphs and illustrations, commonly used in science education. Research shows that science students, especially engineering and technology students, often prefer learning visually because it helps them understand and retain abstract ideas more effectively[15].

Similarly, kinesthetic learners thrive in environments where they can engage physically with the material. Science courses, especially those that involve practical experiments, laboratory work, or simulations, naturally cater to this learning style. Kinesthetic learners benefit from hands-on activities that allow them to manipulate objects or conduct experiments, which makes the learning process more tangible and memorable. This is supported by studies in science education, where students who engage in active learning through physical activities show improved comprehension and retention[15].

Based on the obtained data, it was found that there are still students who still need to be consistent in their responses. This has two meanings: 1) students have a balanced learning style between visual, kinesthetic, and auditory; 2) students did not respond sincerely. Kolb (cited in [16]) argues that no individual's learning style is dominated by just one of these poles. Usually, what happens is a combination of two poles that form a tendency or learning orientation. Therefore, it is surprising that students produce consistent or balanced questionnaire assessments based on the two learning styles. Other findings show that the dominant learning style is kinesthetic.

The learning styles included in the diagram are the results of the questionnaire responses that indicate the sensory preference learning style possessed by the students. [8] explain that sensory preference learning style is one of the learning style theories. Based on sensory preferences or

the brain's ability to absorb, process, and convey information, individual learning styles can be divided into three categories: visual, auditory, and kinesthetic, each marked by specific behavioral characteristics. This categorization does not mean that an individual only has one particular learning style characteristic and does not possess the attributes of another learning style.

A learning style is a preferred way of engaging in thinking, processing, and understanding information ([17], [18], [19]. Students' learning styles can be observed from their multiple intelligences, and each student has dominant intelligence [10]. A learning style is how we input information into the brain through the senses [20]. Based on this description, it is known that a learning style is a learner's dominant orientation to acquire and process information by maximizing the use of the senses, so it is not surprising that each person may have a different learning style.

The visual learning style is a learning style that utilizes vision more. People with a visual learning style tend to see or imagine what is being discussed. In addition, they have a strong sensitivity to color and a good understanding of artistic issues [21]. Characteristics of visual learners include 1) the need to see something visually to know or understand it, 2) strong sensitivity to color, 3) adequate understanding of artistic issues, 4) difficulty in direct dialogue, 5) being too reactive to sound, 6) difficulty following oral instructions, 7) often misinterpreting words or speech. The visual learning style emphasizes the sense of sight. [22] state that approaches that can be used to enhance learning success if visual learners dominate students include using 1) visual materials or objects such as maps, pictures, or diagrams; 2) colors to help understand key points; 3) digital media such as computers/videos; 4) asking students to present their ideas in sketches.

The kinesthetic learning style is learning through movement, working, and touching. It means learning by prioritizing the sense of touch and physical movements. Individuals with this learning style learn more quickly when they move, feel, or take action [10], [20]. This learning style is disadvantaged in the current education system because kinesthetic learners need to move, but students must sit still in class and listen to what the teacher presents. Kinesthetic learners learn through movement; they need to move to input information into their brains. Additionally, kinesthetic individuals love to learn by touching or manipulating objects or models/tools and tend to be field-dependent [20], [22]. The kinesthetic learning style relates to hands-on practice or experiential learning [23]

The auditory learning style is a learning style used to acquire information by utilizing the sense of hearing [23], [24] Auditory learners prefer learning by using the sense of hearing, making it easier for students to understand information well through sound [6]. The auditory learning style involves accessing all sounds and words created or remembered. This modality highlights music, tones, rhythms, rhymes, internal dialogue, and voices. Characteristics of highly auditory individuals include easily distracted attention, speaking with a rhythmic pattern, learning by listening, moving lips/talking while reading, and internal and external dialogues. The kinesthetic learning style involves accessing all movements and emotions created or remembered. This modality highlights movement, coordination, rhythm, emotional responses, and physical comfort. Characteristics of highly kinesthetic individuals include touching people and standing close, moving a lot, learning by doing, pointing to text when reading, responding physically, and remembering while walking and driving [25]

Based on the above opinions, lecturers can develop learning activities using visual-kinesthetic learning styles because most students have this style. The characteristics of science learning can accommodate visual, kinesthetic, and auditory learning styles. However, the quantity of learning models that can facilitate all three styles still needs to be balanced. In the odd semester of 2024/2025, there are ten courses for semesters 3 and 5, while for semester 7 students, there are only eight courses. Only two of the 18 courses are practical, so lecturers must provide activities that can facilitate kinesthetic learning styles in theoretical classes. Learning styles are essential to studying because they can support students' success. Students will learn quickly if they know the learning style that suits their preferences and abilities. Learning style correlates directly with learning outcomes. [26] argue that learning style is an internal factor affecting students' academic achievement. Their applied learning style influences a student's success in achieving academic performance. Students with good academic performance always show values above the minimum standard of learning achievement. Certain factors, including learning styles, strongly influence students' success in achieving their learning achievements.

The importance of lecturers understanding all students' learning styles is based on the ineffectiveness of classroom learning. Musrofi [27] states that only 30% of students successfully follow classroom learning because they have a learning style that matches the teaching style applied by the lecturer in class. The remaining 70% of students need help following classroom learning because they have different learning styles that do not match the teaching style applied in class. This means that 70% of students' learning styles need to be accommodated by the lecturer's teaching style in learning.

Understanding students' learning styles is crucial for teachers, educators, or lecturers. Lecturers become one of the creators of a learning environment that supports students' academic achievements. The learning environment impacts students' academic achievements, as evidenced by [28], who conclude that the learning environment positively and significantly affects educational performance. This aims to build effective and creative learning in responding to the uniqueness of students' learning styles. Moreover, the design of teaching materials and the use of teaching methods should be relevant to the needs of students. However, in reality, such understanding still needs to be improved. Therefore, educators must be competent in preparing this so that the classroom learning process becomes meaningful, inspiring, enlightening, creative, transformative, and productive [29]

Knowing students' learning styles is the key to overcoming learning difficulties [30]. Suppose we (lecturers) want what is conveyed to be received well. In that case, we must combine various approaches, making the material enjoyable to deliver, especially by aligning it with the students' learning styles. Ensuring the future of the discipline’s students. One unquestionable assumption in career counseling is that all individual desires will improve when aligned with specific tasks, critical areas, and careers

they have, such as personality function compatibility, talents, learning styles, and so on [24]

This categorization is only a guideline that an individual has one most prominent characteristic, so if students receive appropriate stimuli in learning, it will be easier for them to absorb lessons. In other words, if someone finds a learning method that matches their learning style characteristics, they will quickly become proficient, and intensive courses or private lessons may no longer be needed. [29] found that educators' lack of understanding of children's learning styles and their learning styles could lead to ineffective and uncreative learning. Meanwhile, educators who understand different learning styles can create compelling, creative, and productive learning processes.

The success of students' learning can be seen from their academic achievements [2]. Academic achievement is the overall proficiency in behavioral changes resulting from learning achievements measured through achievement tests, and the results are expressed in grades [31]. High-achieving students tend to be influenced more by internal and controlled factors than low-achieving students. Academic success is associated with internal and controlled factors, while academic failure is related to external and uncontrolled factors [32]. Another factor affecting learning achievement is learning interest. Learning interest is the drive that motivates someone to engage in learning activities, allowing them to choose freely what they will do without pressure from others. Interest will persist and grow in an individual when it is encouraged by an environment in the form of experiences. These experiences are gained based on interactions between individuals and the outside world, both through practice and learning [33]

Conclusion

The dominant learning styles of science programs (IPA) students are kinesthetic and visual. They learn best through hands-on activities, practical experiments, and visual aids like diagrams and charts. These methods help them understand complex concepts more effectively and engage with the material in a way that suits their learning preferences. Therefore, the Science Education Study Program lecturers should implement a learning model that accommodates visual and kinesthetic learners, even if the course is theoretical. Learning activities can be made more specific because students' learning styles can be clarified through the dominance of each student's right or left brain.

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