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# LEARNING STYLE PROFILE OF MEDICAL EDUCATION STUDENTS UDAYANA UNIVERSITY FACULTY OF MEDICINE

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## ABSTRACT

Learning style refers to the process by which an individual processes information to make it easier to understand and remember. In the learning process, students use styles that suit their character. There are several types of learning styles: visual (V), auditory (A), read/write (R), and kinesthetic (K), collectively known as VARK. This study aims to determine the learning style profile of Medical Education students at the Faculty of Medicine, Udayana University. This research uses a descriptive quantitative method with a cross-sectional approach. Sampling was conducted among students from the 2020, 2021, and 2022 cohorts, based on inclusion and exclusion criteria. The sample was determined using total sampling, with the sample size calculated using the Slovin formula. Data was collected using the VARK version (8.01) online questionnaire. The univariate analysis showed that the majority of respondents, 369 (74.9%), preferred a unimodal learning style, while 122 (25.1%) preferred a multimodal style. The most commonly used learning style was kinesthetic, with 289 (59.3%) respondents indicating this preference. Therefore, the majority of Medical Education students at the Faculty of Medicine, Udayana University, from the 2020, 2021, and 2022 cohorts use the unimodal kinesthetic learning style.

**Keywords:** learning styles., VARK., medical education

## INTRODUCTION

Education is an integral part of everyday life that cannot be separated. Its purpose is to equip learners with personal development in spirit, self-management, personality, critical thinking skills, high morality, and quality.[1] Indonesia continues to strive to enhance the field of education, particularly in innovative teaching and learning processes, as an effective and quality education system is inseparable from educators success in designing and implementing learning systems.[2]

Each student has their own method of absorbing information during studying, known as a learning style.[3] Learning reflects attitudes and behaviors in determining the approach or method each student takes in learning. By understanding their suitable learning style, students can achieve highly effective and efficient learning.[4] Various experts have diverse perspectives, dividing learning styles into different categories. For instance, Bobbi DePorter and Hernacki categorize them into three types: visual (V), auditory (A), and kinesthetic (K). Neil Fleming classifies them into visual (V), auditory (A), reading/writing (R), and kinesthetic (K), often referred to as VARK.[5] The VARK learning style is a modification of the VAK learning style, yet VARK is the most commonly applied by the majority of students due to its widespread recognition and ease of application.[4]

Knowledge of the learning styles of medical students in Indonesia is still relatively low due to the varying learning processes implemented by each university, coupled with cultural differences. However, each learning style has its strengths and weaknesses, and there is no one-size-fits-all method, as every individual has a unique learning style.[6]

In higher education, especially in the Faculty of Medicine, students face challenges in learning during the pre-clinical years due to different learning environments and the vast amount of information to acquire.[7] With high learning demands, students must have effective learning strategies to succeed in their studies. One crucial step students can take to enhance learning effectiveness is to understand and determine their most suitable learning style.[8] The learning processes vary among universities, especially in the Faculty of Medicine at Udayana University, which currently employs a Student-Centered learning system.[9] In

the Medical Education Department of the Faculty of Medicine at Udayana University, the Problem-Based Learning (PBL) concept has been applied since the Studium Generale block in the early semesters.[1011]

As of now, there is no publication related to research on the learning style preferences of medical students at the Faculty of Medicine, Udayana University. Therefore, a more detailed discussion on the profile of learning styles is crucial to understanding the preferences of each medical student. Based on these issues, researchers aim to investigate the learning style profiles of medical students at the Faculty of Medicine, Udayana University.

This study aims to examine the learning style profiles of Medical Education students at the Faculty of Medicine, Udayana University. It seeks to identify dominant learning styles to help develop more effective teaching strategies tailored to student needs.

## METHODS

The type of research used in this study is quantitative descriptive with a cross-sectional approach, where variables are collected at a specific point in time during the study, and variable collection is done in a one-time research process. This study employs primary data aiming to determine the learning style profile of students in the Faculty of Medicine at Udayana University. The research is conducted online by distributing a questionnaire in the form of a Google Form within the Faculty of Medicine at Udayana University. The study spans 11 months, starting from January to November..

The sample for this research includes students from the undergraduate medical program at the Faculty of Medicine, Udayana University, cohorts 2020, 2021, and 2022, who meet the inclusion criteria. The sampling technique used is total sampling. This technique involves using the entire population as the sample, with data collected through an online questionnaire in the form of a Google Form at the Faculty of Medicine. Inclusion criteria for this study are students in the undergraduate medical program at the Faculty of Medicine, Udayana University, cohorts 2020, 2021, and 2022 who are still active and willing to participate by signing an informed consent. Exclusion criteria are students from the same cohorts who do not complete the questionnaire.

Data collection in this study is conducted using the online self-administered questionnaire method. The questionnaire used is the VARK learning style model (Version 8.01), which will be collected online through Google Forms. All collected data are analyzed using Microsoft Excel and then transferred to SPSS version 25.0 with a confidence level of 95% ($\alpha$=0.05). Data analysis involves univariate analysis and cross-tabulation analysis. The processed data results will be presented in tabular form. The research has received ethical approval from the Research Ethics Commission of the Faculty of Medicine, Udayana University, with reference number 222/UN14.2.2.VII.14/LT/2023.

## RESULTS

The results of this research revealed that the number of respondents who filled out the questionnaire was 487 out of the total sample size of 727 individuals. In this study, the respondents were predominantly female, totaling 304 with a percentage of 62.4%, while males amounted to 183, constituting 37.6%. Data on the characteristics of respondents and their learning styles are presented in tabular form.

**Table 1.** Characteristics of Respondents Based on Gender

| Characteristic | N (487) | (%) |
|---|---|---|
| **Gender** | | |
| Man | 183 | 37,6% |
| Women | 304 | 62,4% |
| **Class Year** | | |
| 2020 | 172 | 35,3% |
| 2021 | 156 | 32,0% |
| 2022 | 159 | 32,6% |
| **GPA** | | |
| 2,00-2,75 | 5 | 1,0% |
| 2,76-3,50 | 88 | 18,1% |
| 3,51-4,00 | 394 | 80,9% |

Based on Table 1, it can be observed that the respondents were predominantly female, totaling 304 (62.4%). Furthermore, based on the academic year, the respondents were predominantly students from the 2020 cohort. In terms of GPA categories, 394 students (80.9%) fell into the GPA range of 3.51-4.00.

**Table 2.** Respondent Learning Style Model

| Learning Style Model | Number of Respondents | Percentage (%) |
|---|---|---|
| Unimodal | 365 | 74,9% |
| Multimodal | 122 | 25,1% |
| **Total** | **487** | **100%** |

Based on Table 2, it can be observed that there are 365 respondents who have a unimodal learning style model, accounting for 74.9%. Furthermore, 122 respondents were found to have a multimodal learning style model, constituting 25.1%. This indicates that the majority of respondents tend to have a unimodal learning style model, with a percentage of 74.9%.

**Table 3.** Types of Unimodal Learning Styles

| Types of Learning Styles | N | (%) |
|---|---|---|
| Auditors | 27 | 5,5% |
| Kinestetik | 289 | 59,3% |
| Multimodal | 122 | 25,1% |
| Read/write | 28 | 5,7% |
| Visual | 21 | 4,3% |
| **Total** | **487** | **100%** |

Based on Table 3, it is found that 289 students have a kinesthetic learning style, accounting for 59.3%. Furthermore, 122 students were found to have a multimodal learning style, constituting 25.1%. This means that students in the Faculty of Medicine at Udayana University tend to have a kinesthetic learning style, with a percentage of 59.3%.

**Table 4.** Types of Multimodal Learning Styles

| Multimodal | Number of Respondents | Percentage (%) |
|---|---|---|
| A-K | 37 | 7,6% |
| A-R | 7 | 1,4% |
| A-R-K | 9 | 1,8% |
| R-K | 10 | 2,1% |
| V-A | 4 | 0,8% |
| V-A-K | 9 | 1,8% |
| V-A-R | 11 | 2,3% |
| V-A-R-K | 8 | 1,6% |
| V-K | 14 | 2,9% |
| V-R | 4 | 0,8% |
| V-R-K | 9 | 1,8% |
| **Total** | **122** | **25,1%** |

Based on Table 4, a total of 122 students were found to have a multimodal learning style, with the highest number being in the auditory-kinesthetic learning style, involving 37 students, representing 7.6%.

**Table 5.** Frequency Distribution by Sex with Unimodal Learning Style Model

| | | | Unimodall |
|---|---|---|---|
| Gender | Man | **F** | 133 |
| | | **P (%)** | 27,3% |
| | Women | **F** | 232 |
| | | **P (%)** | 47,6% |
| **Total** | | **F** | **365** |
| | | **P (%)** | **74,9%** |

Based on table 5. It can be seen that the female gender uses more unimodal learning style models.


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**Table 6.** Frequency Distribution Based on Gender with Unimodal Learning Styles

| | | Gender | | |
|---|---|---|---|---|
| | | **Man F (P)** | **Women F (P)** | **Total** |
| **Learning Styles** | **A** | 14 (2,9%) | 13 (2,7%) | **27 (5,5%)** |
| | **K** | 92 (18,9%) | 197 (40,5%) | **289 (59,3%)** |
| | **M** | 50 (10,3%) | 72 (14,8%) | **122 (25,1%)** |
| | **R** | 15 (3,1%) | 13 (2,7%) | **28 (5,7%)** |
| | **V** | 12 (2,5%) | 9 (1,8%) | **21 (4,3%)** |
| **Total** | | **183 (37,6%)** | **304 (62,4%)** | **487 (100,0%)** |

Based on Table 6, it can be seen that 92 male students, accounting for 18.9%, have a kinesthetic learning style. Furthermore, 197 female students, representing 40.5%, have a kinesthetic learning style. This means that students in the Faculty of Medicine at Udayana University, both male and female, tend to have a kinesthetic learning style.

**Table 7**. Frequency Distribution Based on Cumulative Grade Point Average (CGPA) with Unimodal Learning Style Model

| | | | **Unimodal** |
|---|---|---|---|
| **CGPA** | 2,00-2,75 | F | 3 |
| | | P (%) | 0,6% |
| | 2,76-3,50 | F | 60 |
| | | P (%) | 12,3% |
| | 3,51-4,00 | F | 302 |
| | | P (%) | 62,0% |
| **Total** | **F** | **F** | **365** |
| | **P (%)** | **P (%)** | **74,9%** |

Based on Table 7, it is found that the majority of students with a GPA range of 3.51-4.00 have a unimodal learning style model, involving 302 students with a percentage of 62.0%.

**Table 8.** Frequency Distribution Based on Cumulative Grade Point Average (CGPA) with Unimodal Learning Style Type

| | | GPA | | | |
|---|---|---|---|---|---|
| | | **2,00-2,75 F (P)** | **2,76-3,50 F (P)** | **3,51-4,00 F(P)** | **Total** |
| **Learning Style** | **A** | 2 (0,4%) | 4 (0,8%) | 21 (4,3%) | **27 (5,5%)** |
| | **K** | 1 (0,2%) | 53 (10,9%) | 235 (48,3%) | **289 (59,3%)** |
| | **M** | 2 (0,4%) | 28 (5,7%) | 92 (18,9%) | **122 (25,1%)** |
| | **R** | 0 (0,0%) | 1 (0,2%) | 27 (5,5%) | **28 (5,7%)** |
| | **V** | 0 (0,0%) | 2 (0,4%) | 19 (3,9%) | **21 (4,3%)** |
| **Total** | | **5 (1,0%)** | **88 (18,1%)** | **394 (80,9%)** | **487 (100%)** |

Based on Table 8, it is found that the GPA range of 3.51-4.00 predominantly has a kinesthetic learning style, involving 235 students with a percentage of 48.3%.

**Table 9**. Frequency Distribution Based on Gender with Multimodal Learning Style Model

| | | | **Multimodal** |
|---|---|---|---|
| Gender | Man | **F** | 50 |
| | | **P (%)** | 10,3% |
| | Women | **F** | 72 |
| | | **P (%)** | 14,8% |
| **Total** | | **F** | **122** |
| | | **P (%)** | **25,1%** |

Based on Table 9, it can be observed that females tend to use the multimodal learning style model more frequently


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**Table 10.** Frequency Distribution Based on Gender with Multimodal Learning Style Type

| | | Gender | | |
|---|---|---|---|---|
| | | **Man F (P)** | **Women F (P)** | **Total** |
| **Multimodal** | **A-K** | 13 (2,7%) | 24 (4,9%) | **37 (7,6%)** |
| | **A-R** | 5 (1,0%) | 2 (0,4%) | **7 (1,4%)** |
| | **A-R-K** | 6 (1,2%) | 3 (0,6%) | **9 (1,8%)** |
| | **R-K** | 2 (0,4%) | 8 (1,6%) | **10 (2,1%)** |
| | **V-A** | 1 (0,2%) | 3 (0,6%) | **4 (0,8%)** |
| | **V-A-K** | 4 (0,8%) | 5 (1,0%) | **9 (1,8%)** |
| | **V-A-R** | 7 (1,4%) | 4 (0,8%) | **11 (2,3%)** |
| | **V-A-R-K** | 1 (0,2%) | 7 (1,4%) | **8 (1,6%)** |
| | **V-K** | 6 (1,2%) | 8 (1,6%) | **14 (2,9%)** |
| | **V-R** | 2 (0,4%) | 2 (0,4%) | **4 (0,8%)** |
| | **V-R-K** | 3 (0,6%) | 6 (1,2%) | **9 (1,8%)** |
| **Total** | | **50 (10,6%)** | **72 (14,5%)** | **122 (25,1%)** |

Based on Table 10, it can be observed that both male and female genders who have a multimodal learning style model tend to use the auditory-kinesthetic learning style.

**Table 11.** Frequency Distribution Based on Cumulative Grade Point Average (CGPA) with Multimodal Learning Style Model

| | | | **Multimodal** |
|---|---|---|---|
| CGPA | 2,00-2,75 | F | 2 |
| | | P (%) | 0,4% |
| | 2,76-3,50 | F | 28 |
| | | P (%) | 5,7% |
| | 3,51-4,00 | F | 92 |
| | | P (%) | 18,9% |
| **Total** | **F** | **F** | **122** |
| | **P (%)** | **P (%)** | **25,1%** |

Based on Table 11, it is found that students who use the multimodal learning style model are more prevalent in the Cum Laude GPA category, involving 92 students with a percentage of 18.9%.

**Table 12.** Frequency Distribution Based on Cumulative Grade Point Average (CGPA) with Multimodal Learning Style Type

| | | **Cumulative Grade Point Average (CGPA)** | | | |
|---|---|---|---|---|---|
| | | **2,00-2,75 F (P)** | **2,76-3,50 F (P)** | **3,51-4,00 F (P)** | **Total** |
| **M** | **A-K** | 0 (0,0%) | 7 (1,4%) | 30 (6,2%) | **37 (7,6%)** |
| | **A-R** | 0 (0,0%) | 3 (0,6%) | 4 (0,8%) | **7 (1,4%)** |
| | **A-R-K** | 0 (0,0%) | 2 (0,4%) | 7 (1,4%) | **9 (1,8%)** |
| | **R-K** | 0 (0,0%) | 3 (0,6%) | 7 (1,4%) | **10 (2,1%)** |
| | **V-A** | 0 (0,0%) | 2 (0,2%) | 2 (0,4%) | **4 (0,8%)** |
| | **V-A-K** | 1 (0,2%) | 0 (0,0%) | 8 (1,6%) | **9 (1,8%)** |
| | **V-A-R** | 0 (0,0%) | 1 (0,2%) | 10 (2,1%) | **11 (2,3%)** |
| | **V-A-R-K** | 0 (0,0%) | 1 (0,2%) | 7 (1,4%) | **8 (1,6%)** |
| | **V-K** | 1 (0,2%) | 5 (1,0%) | 8 (1,6%) | **14 (2,9%)** |
| | **V-R** | 0 (0,0%) | 1 (0,2%) | 3 (0,6%) | **4 (0,8%)** |
| | **V-R-K** | 0 (0,0%) | 3 (0,6%) | 6 (1,2%) | **9 (1,8%)** |
| **Total** | | **2 (0,4%)** | **28 (5,7%)** | **92 (18,9%)** | **122 (25,1%)** |

Based on Table 10, it is found that the majority of students with a multimodal learning style, using the auditory-kinesthetic learning style, are in the GPA range of 3.51-4.00, with a percentage of 6.2%.

**DISCUSSION**

From the univariate analysis conducted, it is evident that students from Udayana University's Faculty of Medicine, spanning three different cohorts (2020, 2021, and 2022), predominantly use a unimodal learning style. This aligns with the findings of a study by Meutia Anwar et al. (2019), which stated that a higher number of students adopt a unimodal learning style.12 Similarly, research by Akbar et al. (2021) asserts that the majority of students apply a unimodal learning style.[13]

In this study, a total of 365 students, accounting for 74.9%, exhibited a preference for the unimodal learning style model. This indicates that students predominantly lean towards using a single type of learning style in their educational process. Medical students tend to opt for the unimodal learning style model, as the use of a preferred learning style can be quicker, simpler, and enhance the effectiveness of learning. The advantages of the unimodal learning style include consistency in time and among individuals, as it involves only one sensory type. Additional efficiency lies in students' ability to prepare themselves in accessing the required information and focusing on one sensory type. Furthermore, the unimodal learning style supports students' ability to pay more specific and detailed attention to information, as it involves only one sensory type.[14]

Furthermore, the most commonly used unimodal learning style among students is kinesthetic, totaling 289 students with a percentage of 59.3%. Based on gender in this study, both male and female students were found to mostly have the same learning style, namely the kinesthetic learning style. The findings in this study align with previous research conducted by Rahmawati et al. (2018), stating that out of 167 students, 80 students adopted the kinesthetic learning style. Similarly, research by Malik et al. (2018) indicates that first-year students tend to use the kinesthetic learning style. However, this study differs from some other studies, such as the one by Papilaya et al. (2016), stating that the majority prefer the visual learning style.[15163]

kinestetik The cross-tabulation results in this study reveal that out of 487 respondents, 48.3% with a Cum Laude GPA have a kinesthetic learning style. This is consistent with a study conducted by Rahmawati et al. (2018), which found that among all respondents with a Cum Laude GPA, the dominant learning style used is kinesthetic.[15] Medical students tend to adopt a kinesthetic learning style because the medical education process requires the application of clinical skills involving physical activities and direct interactions with patients.[15] The kinesthetic learning style enables them to learn effectively through direct experience, active practice, and medical case simulations, aiding in developing a profound understanding of the practical aspects of the medical profession. It enhances their ability to apply knowledge effectively in real clinical situations. This learning style also allows them to acquire practical skills such as physical examinations and medical procedures more effectively, which is crucial in medical education.[15]

In this study, the results indicate that the majority of students who participated as respondents predominantly use the kinesthetic learning style. This is attributed to the learning system employed by the Faculty of Medicine at Udayana University, which is a student-centered learning system with a Problem-Based Learning concept.[11] The learning system with the Problem-Based Learning (PBL) concept aims to position students at the center of learning and provides them with more control over their learning processes. Hence, it is highly relevant for students who prefer the kinesthetic learning style.[12] The learning system with the PBL concept often involves activities that actively engage students, such as group discussions, collaborative projects, and action-based learning, which are key components. Students who prefer the kinesthetic learning style are well-suited to this approach as they can move, participate directly, and interact with the learning material.[12] Furthermore, the PBL concept emphasizes the application of knowledge in practical situations, providing kinesthetic learners with the opportunity to integrate theory with practical experience. They also have greater control over how they learn, allowing them to choose learning methods that align with their preferences, such as simulations or hands-on exercises. This not only facilitates a deeper understanding but also enhances their motivation, as kinesthetic learners tend to be more motivated when actively engaged in the learning process.[15]

In this study, respondents with a visual and reading/writing learning style dominance were less active. This occurs in PBL learning system discussions as individuals with a visual learning style find it challenging to receive verbal instructions, thus requiring visual aids and activities such as reading and writing to facilitate their understanding.[1617] Similarly, respondents with a reading/writing learning style, individuals who have a reading/writing learning style typically spend more time analyzing information before they can arrive at the conclusions they want to convey. As a result, they may sometimes appear less proactive in participating in discussions.[12]

The decision-making process of learning styles in each individual is influenced by several factors.[18] Factors influencing learning styles can be categorized into two main categories: internal factors encompassing individual characteristics such as gender, age, intelligence, and interests, and external factors involving the learning environment, such as teaching methods and social norms. Additionally, cultural and social influences play a crucial role in shaping individual learning style preferences, making it important to understand the diversity and complexity of

these factors in designing effective and inclusive learning approaches.[19]

Changes in learning styles occur with age development. Young children tend to use more exploratory learning styles, preferring game-based learning and direct experiences. Meanwhile, teenagers and adults may lean towards more reflective and analytical learning styles. Additionally, age influences an individual's openness to various learning methods, with higher cognitive development allowing for a deeper understanding of the complexity of learning materials.[19]

Research in educational psychology has carefully investigated the influence of gender on learning styles. Several empirical studies suggest that there are differences in learning style preferences between individuals based on gender. For example, some research indicates that females tend to prefer learning methods involving social interaction, such as group discussions, while males may lean towards more competitive or independent methods. However, these differences are statistical in nature and can vary among individuals, so they should not be generalized absolutely.[20]

The second most prevalent learning style model from this study is the multimodal learning style. Based on cross-tabulation results, out of 487 respondents, 25.1% use the multimodal learning style model. Additionally, 18.9% of those with a GPA in the range of 3.51-4.00 utilize the multimodal learning style model. This aligns with research conducted by Fahim et al. (2021), stating that the majority of students tend to apply the multimodal learning style model. Medical students often adopt a multimodal learning style due to the complex and unique nature of the material in the field of medicine. Medicine requires a profound understanding of human anatomy, the course of diseases, and various intricate medical procedures. The multimodal learning style, involving the use of various learning methods, becomes a common choice among medical students because it aids them in comprehending and retaining diverse and intricate information. Medical programs also aim to present a variety of learning methods, and students will adapt their learning styles according to the type of material and learning situation. Furthermore, the multimodal learning style enables students to participate more effectively in collaborative learning, which is often prevalent in medical environments.[21]

The analysis of this research revealed that respondents who chose the multimodal learning style predominantly utilized the auditory-kinesthetic learning style, comprising 37 respondents with a percentage of 7.6%. From the cross-tabulation with the GPA category with praise, 30 respondents, accounting for 6.2%, adopted the auditory-kinesthetic learning style. This is attributed to individuals employing a multimodal learning style using more than one sensory modality, allowing them to easily adapt to the learning process. The advantage for students using the multimodal learning style is their ability to adjust their learning style to teaching methods that align with their preferences. They also do not encounter difficulties if one of their learning styles does not align with a specific teaching method.[21]

## CONCLUSION

Most of the students at Udayana University's Faculty of Medicine predominantly use a unimodal learning style, with the kinesthetic learning style being the most dominant. Additionally, some students opt for the multimodal learning style, especially the auditory-kinesthetic learning style, allowing them to adapt their learning style based on the type of material and learning situations.

It is hoped that students can benefit from the findings of this research by gaining a better understanding of their own learning styles. For educational institutions, especially the Faculty of Medicine at Udayana University, considering various approaches in the teaching and learning process is encouraged. Future research could delve deeper into the relationship between learning styles and the academic performance of medical students, contributing to the development of more effective and inclusive learning strategies in the medical education environment.

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