

# Learning Styles of Medical Students - Implications in Education

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**ABSTRACT: Background:** The term “learning style” refers to the fact that each person has a different way of accumulating knowledge. While some prefer listening to learn better, others need to write or they only need to read the text or see a picture to later remember. According to Fleming and Mills the learning styles can be classified in Visual, Auditory and Kinesthetic. There is no evidence that teaching according to the learning style can help a person, yet this cannot be ignored. **Subjects and methods:** In this study, a number of 230 medical students were questioned in order to determine their learning style. **Results:** We determined that 73% of the students prefer one learning style, 22% prefer to learn using equally two learning style, while the rest prefer three learning styles. According to this study the distribution of the learning styles is as following: 33% visual, 26% auditory, 14% kinesthetic, 12% visual and auditory styles equally, 6% visual and kinesthetic, 4% auditory and kinesthetic and 5% all three styles. 32 % of the students that participated at this study are from UMF Craiova, 32% from UMF Carol Davila, 11% University of Medicine T Popa, Iasi, 9% UMF Cluj Iulius Hatieganu. **Discussions** The way medical students learn is different from the general population. This is why it is important when teaching to considerate how the students learn in order to facilitate the learning

**KEYWORDS:** *medicine students, learning styles*

## Introduction

The term “learning styles” refers to the concept that individuals differ in regard to what mode of instruction or study is most effective for them. Proponents of learning-style assessment contend that optimal instruction requires diagnosing individuals’ learning style and tailoring instruction accordingly. Assessments of learning style typically ask people to evaluate what sort of information presentation they prefer (e.g., words versus pictures versus speech) and/or what kind of mental activity they find most engaging or congenial (e.g., analysis versus listening), although assessment instruments are extremely diverse. The most common—but not the only—hypothesis about the instructional relevance of learning styles is the meshing hypothesis, according to which instruction is best provided in a format that matches the preferences of the learner (e.g., for a “visual learner,” emphasizing visual presentation of information). [1]

One of the most used classifications of the learning styles is the one proposed by Fleming and Mills in 1992: the VAK model. The name comes from the first letters of the three learning styles described: visual, auditory and kinesthetic.

**Auditory learners** learn through listening. They pick up new ideas and concepts better when they hear the information. These learners require verbal lectures and discussions, role – playing exercises, structured sessions and

reading aloud. Auditory learners can typically follow instructions very precisely after being told only once or twice what to do. In other words, written information may have little meaning until it is heard. Since hearing and speaking are so closely related, auditory learners usually use their voice as well as their ears. They will often repeat what is said or rephrase the information into a question for discussion. This helps them process the information.

Another instructional method can include background music to facilitate and accelerate the learning. Music is one of the principle tools for inducing a relaxed mental state in which material is more easily absorbed and retained.

**Visual learners** learn predominantly with their eyes, they learn through seeing. These learners prefer to see how to do things rather than just talk about them. They prefer to watch demonstrations and will typically get more out of videotaped instruction rather than a lecture.

These learners not only require visual displays such as diagrams, PowerPoint presentations, overhead transparencies, videos, flipcharts, handouts, field trips and so on, but they also require seeing the instructor’s body language and facial expressions.

**Kinesthetic learners** learn through moving and touching. They tend to want to get their body into action and move around. They are „hands-on” learners who prefer doing rather than talking. These learners require active – learning exercises. Because moving and action are so

fundamental to kinesthetic learners, they often fidget if they are not involved. Fidgeting helps they concentrate better. [2]

## Aim

The present paper aims to identify the distribution of the three learning styles among the medical students and to find ways to improve the way the courses, the practical hours and internship are performed. In the general population, the distribution of the three learning styles is: 65% visual, 30% auditory and 5% kinesthetic. Yet, medical students represent a special category, because of the nature and quantity of information they have to accumulate over the six years of study and because of the fact that this profession is a vocational one, which requires both skill and ability to relate socially with others. During the license studies, the medical student should acquire theoretical knowledge, to learn practical skills of examination or therapeutic techniques and communication skills with the patients, because, in their future job they will treat sick persons, not diseases.

Since the quantity of information is considerable and the healthcare is extensive, it is useful for these students to facilitate the access to information according to how they are more likely to absorb it. Knowing in which category they belong is of considerable importance in the implementation of courses and internships. The way information is presented is more than helpful for medical students, but this can only be done once the teachers know how their students are most receptive (visual, auditory or kinesthetic).

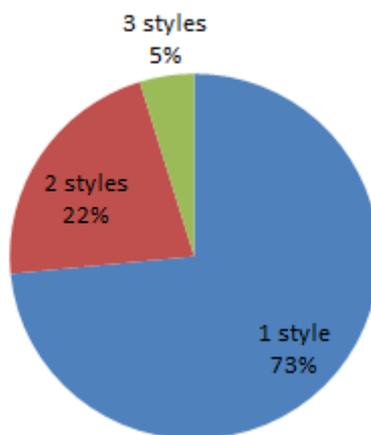
## Subjects and methods

To achieve such statistics among medical students, a questionnaire of 39 questions was applied to a number of 230 students. The questionnaire was distributed on the discussion groups of students from the Faculties of Medicine of all Universities in Romania over the Internet. Distribution via Internet helped the research because each of the respondents completed the form when he had the time, avoiding a test against time and facilitating the correct answering. In the interpretation of the responses, questions were grouped into 3 categories according to which learning styles is addresses and the number of positive responses were quantified for each category. The category with the highest score represents the predominate learning style. In some cases, a student preferred two or three learning styles equally.

The study aimed to achieve a statistics to highlight the predominant learning style among the medical students and to see if it meets the general population statistics. The students were also divided according to the faculties where they studied to see the relevance of this study in different universities.

## Results

The results were summarized as diagrams to facilitate interpretation. First, subjects were divided according to the number of learning styles prevailing for each subject. Thus, 73% of subjects prefer one learning styles, while 22% prefer two learning styles equally and only 5% can use all three learning styles.



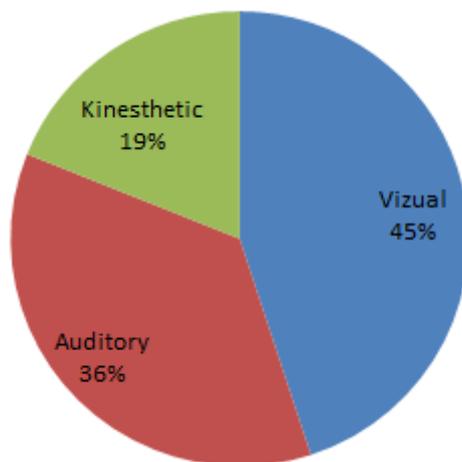
**Fig.1. Distribution of number of learning styles each student prefer**

Whereas the statistics currently available in the literature refer only to a predominant learning style rather than to the combinations

that are naturally distributed among the population, it is essential to have a statistics with the same parameters. Therefore, among the 73%

of students who prefer only one learning style: 45% are visual learners, 36% are auditory learners and 19% are kinesthetic. These data differ greatly from those generally accepted for the general population that is 65% for visual

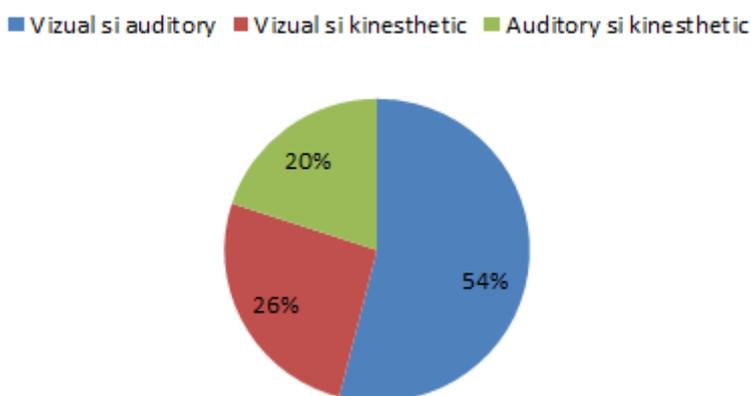
learners, 30 % for auditory learners and 5% for kinesthetic learners. The difference could be because of the special nature of medical students in terms of psychology and pedagogy.



**Fig.2.Distribution of learning styles among students that prefer only one learning style**

In what concerns the students that learn using equally two sensory channels, the distribution is as expected: 55% visual and auditory, 25% visual and kinesthetic and 20% auditory and

kinesthetic. These students can adapt better to a broader category of ways of presenting the courses



**Fig.3.Distribution of combinations of learning styles among students that prefer equally two learning styles**

Finally, to have an overview of the results we achieved a statistics showing in what proportion is preferred each learning style or combination among the tested students.

Unfortunately, the data from the general population does not take in consideration the general population combinations of the learning styles. Asserting that each person prefers only one tip of learning style is a simplistic approach. Recognizing instead that there is diversity in terms of how people study helps the practical

implementation of ways of teaching according to this research.

The students surveyed in this research use the visual channel to accumulate information in a rate of 33%, followed closely by the auditory style (26%). This is not surprising given that the same ranking is observed in the general population. What differs is that an overwhelming percentage rate of about 14% prefers the kinesthetic style. This can be attributed to the fact that medical education involves teaching and accumulating a large

number of practical skills and the fact that over the years of college the learning style of a person can change in large or small lines to adapt the teaching style and requirements. Regarding those who prefer 2 learning styles equally,

things are not changed. 12% of the students who participated in this survey have as favorites the visual and auditory channels. The others combinations are lesser preferred.

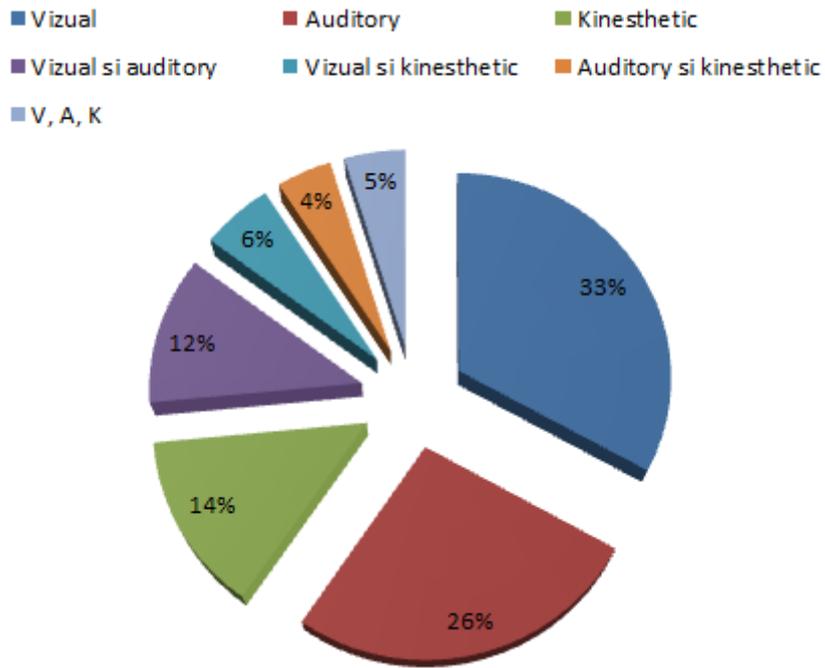


Fig.4.Distribution of learning styles

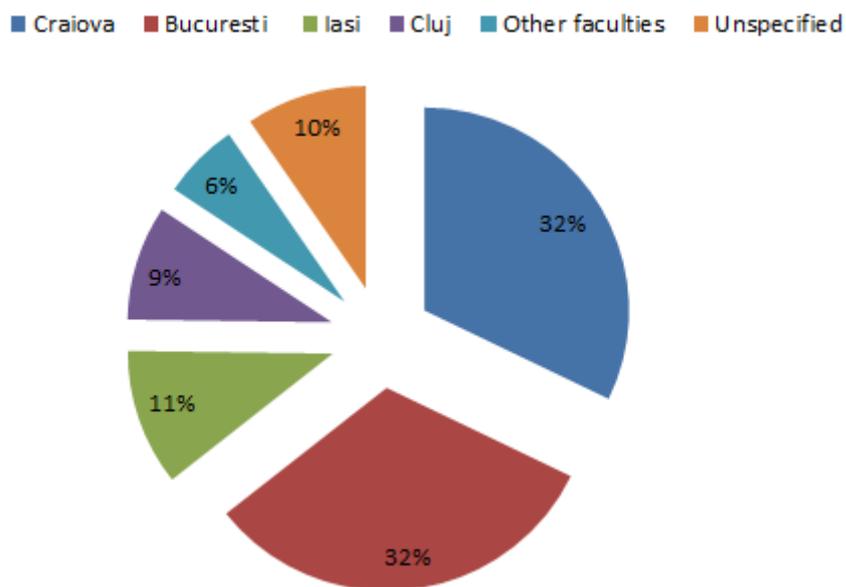


Fig.5.Origin of the medical students that participated in this study

Another aspect of this study is in which university the students that participated at these research study. The students were divided according to the faculties and where they study to gain insight

into the relevance of this study in different universities. The percentages are as follow: 32% UMF Craiova. 32% UMF Carol Davila, Bucharest, 11% University of Medicine T Popa,

Iasi, 9% UMF Cluj Iulius Hatieganu. 10% of the students did not specify in which university they study and the rest of 6% remaining follow the courses of the smaller centers (Timisoara, Galati, Sibiu and Brasov).

The participation of a large number of students from Craiova and Bucharest makes the results of this study relevant for both UMF Craiova and UMF Carol Davila students.

## **Discussions**

For this study to find its utility the teachers should change the way of presenting the information during their courses or internship. Given the fact that most students acquire the concepts better visually, it is important to them that the material is exposed as a PowerPoint presentation, with many pictures, diagrams or drawings. The easiest, these things can be implemented on subjects like anatomy, histology or morphology, but also, in clinical materials like semiology, general surgery, ophthalmology etc., where certain pathological aspects can be presented as pictures or videos. In the same time, students that prefer the auditory learning style must not be omitted. For them it is necessary that each visual presentation must be accompanied by a coherent discourse, in which important elements are highlighted with tonal fluctuations. A well designed course is one that combines in a perfect balance the two channels of communication: visual and auditory. In reality most of the courses in the Romanian medical school are presented in this manner, satisfying the needs of about 71% of students. And for those who prefer the combinations auditory – kinesthetic and visual – kinesthetic, approximately 10% of students, this way of teaching is useful.

Problems arise for the students whose predominant style of learning is kinesthetic (14%) because they have a particular way of knowledge. These students feel much better during the internship hours. Because of their constant need of activity, those students may be considered disturbing elements during the courses where they have to stay for tens of minutes in a desk trying to focus on information transmitted on an auditory or visual way. If the teacher is not aware of this typology, these students may be disadvantaged. All medical students are dependent on teachers to instruct them in acquiring skills, but these students depend greater on their teachers. The professors should take this into account when setting the behavior during their courses.

Let's take the example of Ziehl-Nilsen staining method that students of UMF Craiova learn for the first time in the second year of college during the practical work of the Microbiology discipline to analyze how each of the three categories of students learn easier depending on their learning style. The teacher will present orally the method step by step and, at the same time, or later he can show how it is done practically to the whole group. Thus 76% of students have learned the technique. There remains the 14% of kinesthetic students who need to make this procedure with their own hands at least once. If in other disciplines such as Medical Semiology, a kinesthetic student can return home where he can ask a family member or friend to serve as a patient to repeat the maneuver such as the palpation of the gallbladder, for example, it is harder to do the same for the Ziehl-Nilsen staining method because it requires special laboratory equipment. That is why it is extremely important that this environment is provided in the faculty. Returning to the previous example, a kinesthetic student cannot do the Ziehl – Nilsen coloring in another environment than that provided by the Microbiology laboratory. Therefore it is necessary that during the practical work they will be allowed, and even more, encouraged to perform these techniques.

As a general way of presenting a course so that each student can benefit the maximum, the professor must consider the following: structuring the information by making a brief summary of course content, if possible, putting on the front page the names of the chapters and subchapters. The text should not be excessive, but should abound with suggestive images. Also, it should not be made the mistake of using dozens of images without explanation. Sometimes just a few images accompanied by an expressive speech, with the teacher emphasizing the important concepts is more than enough. A great way to keep students' attention and also orientate them is the use of pointers. The teacher should avoid using images, without emphasizing the elements described there. For example, presentations like this: "Here is a picture of upper limb muscles", "Here is a cross section in the union 1/3 average 1/3 distal" should be avoided.

Another aid could be resuming the content of the course at the end of it. As a teacher cannot know how each student preferred learning and because this study demonstrated no major differences in the distribution of learning styles

among medical students it is important to use all the three channels both in teaching and in evaluating. While some students will answer questions orally, others will be asked to indicate anatomical structures on images.

The clinical internships may appeal means of instruction, one could say unconventional. It involves a role play in which one of the students will represent the patient, and the other will be the doctor. This technique can suffer a variety of forms. One of these could be the patient- student will document on his one about a certain disease. He will create a clinical case, will provide data on the clinical exam necessary to make a presumptive diagnosis. Of course, all this documentation can be done in cooperation and under the supervision of professional medical control. During an internship, students will get out in front of other colleagues and will start the role-play, assuring the physician-patient discussion. The patient-student will make available to colleague all data necessary for the formulation of a diagnosis of syndrome. Subsequently, the student-doctor will make an evaluation strategy of the patient. The data obtained from this examination will be provided either by the teacher or even by the student who played the role of the patient. At the end of this game there will be a complete case report and there can start an argumentation about the diagnosis. Now, the rest of the students can intervene to make additions or to ask for explanations. For this exercise to be made correctly, the students involved should certainly have good theoretical notions. Such a "game" can be applied multiple times throughout a semester so that it includes all the students at least once. The advantage of this technique is that the student who plays the role of a patient studies the disease and the student who played the doctor role has the chance to practice and to assess his knowledge. This is an exercise that helps both the visual and the auditory learners because the first have the chance to see the play and the auditory learners hear the replicas exchange. Even the kinesthetic are able to use this exercise in the educational – instructive process due to the fact that they can participate actively, which does not happen in the case of a course presenting the same pathology. This technique can be used most easily in the clinical disciplines like: medical or surgical semiology, general medicine. The disadvantage of the method is that it reduces the contact between the student and the patient during the medical training, but it is a minor disadvantage.

In respect of the assessment of students there must be made some specifications. The purpose of an evaluation is not to highlight the things that the student doesn't know, but rather the way they use the terms accrued up to that point. To each learning style correspond a way of evaluating the acknowledges. If the visual learners prefer the written assessments, be it in the form of summary or test grid, the auditory learners prefer the oral tests, preferably when the teacher asks questions and the student respond. Most assessments of the Faculty of Medicine from Craiova merged the two methods.

For the kinesthetic students, a new stage in the evaluation should be considered – the practical examination. It has to be something more than just a series of questions and answers from practical work. It should include performing experiments, dissections, clinical examinations of the patient. There are a very small number of subjects in which this assessment cannot be included: modern languages, history of medicine, and for others there are some limitations: immunohistochemistry, immunology, pharmacology, histology, physiology, pathophysiology, genetics, and microbiology. For the others, the practical examination is unlimited, so it must be used without limitations.

## Conclusions

The concept of learning style originated in the idea they could facilitate the accumulation of information. The extent to which the teaching learning style improves results is not yet definite. However there appeared a long series of theories and classifications of learning styles. One of these is that of Fleming who shares the styles of learning in auditory, visual, tactile or kinesthetic. Currently is one of the most used classifications.

According to it, visual learners prefer seeing images; they have good "visual memory ". For them it is much easier when to read or to make diagrams in order to retain the information. According to these characteristics, the courses must be made in the form of PowerPoint presentations that include diagrams, drawings, pictures, videos. The text should not be crowded, and important concepts must be well highlighted.

Auditory style involves the accumulation of information easily when it is heard, so teachers must have a clear speech, with tonal changes where the information displayed are more important.

Kinesthetic need to participate actively in the process of learning, practicing maneuvers, associating the information with a certain activity. For them, the practical work and training are the best times to accumulate concepts easily.

Students in medicine, unlike other students, depend highly in the teacher's guidance. Doctors, which in this case are professors, are the student's model, a model. In this situation it is all the more necessary that the way in which information is transmitted to be consistent with the way in which students gain them.

Among the medical students who have completed the questionnaire it is showed that the predominate learning style is the visual style 33%, followed closely by the auditory style - 26%. In a smaller percentage students prefer the kinesthetic style - 14% or combination of these.

The relevance of this study is that it can provide information about the way in which teachers should present their courses. The most important aspect is that the prevailing styles of learning are the visual and auditory ones, therefore, the medical information should be structured and transmitted using both sensory channels equally, the most effective way is to merge the images with a coherent discourse in

order to attract and keep the attention of both types of students.

Training must focus widely on practice, connecting with the patient. It is demanding to avoid situations where the practical training is conducted in the form of a questioning in which teachers want to highlight what their students have or haven't read from the previous presented course. In what concerns the preclinical laboratories, students should be encouraged to carry out practical experiments as far as they can be done within the available hours.

Assessments must offer equal opportunities to all students to expose the notion gained. The best assessment is that which comprises a theoretical and a practical part. The design should be conducted in the form of questions and answers. Students must have an allocated period of time to respond in writing to the topic, and then respond to questions asked by the assessor to highlight in particular the quantity and quality of knowledge.

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