

# The Analysis of Learning Styles and Their Relationship to Academic Achievement in Medical Students of Basic Sciences Program

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## ABSTRACT

**Introduction:** Learning style is an individual's preferred method of encountering information in specific situations in order to acquire knowledge, skills and attitudes through study or experience. Students and Planers' awareness of learning styles facilitate the teaching process, increases satisfaction and makes the future choices easier. This study aimed to examine different learning styles and their relation to academic achievement in medical students of basic sciences program at Tabriz University of Medical Sciences. **Methods:** In this descriptive – analytical study, the sample consisted of all medical students of basic sciences program at Tabriz University of Medical Sciences in 2011-2012. The data was collected through a questionnaire which included respondents' demographic information and overall grade point average (GPA) as well as Kolb standard questions on learning styles. **Results:** 4.3%, 47.8%, 44.9% and 2.9% of students preferred diverger, assimilator, converger and accommodator learning styles, respectively. Mean overall GPA of students who preferred diverger learning styles was  $14.99 \pm 0.39$ . Students who prefer assimilator, converger and accommodator learning styles had mean overall GPAs of  $14.94 \pm 0.56$ ,  $15.08 \pm 0.58$  and  $14.83 \pm 0.29$  respectively. The findings showed no significant relationship between students' learning academic achievement and their learning styles ( $p = 0.689$ ). **Conclusion:** There was no significant relationship between Students' academic achievement and their learning styles. Furthermore, the majority of the students preferred accommodator and converger learning styles. Consequently, adopting interactive teaching methods, using tutorials, running simulation programs, launching laboratory activities and encouraging students to think and analyze problems and issues can be greatly effective in prolonging their learning lifecycle.

## Introduction

All today's amazing advancements are the result of human learning. Environments and all their content are subject to constant change. Human beings are continuously trying to learn and add to their knowledge in order to understand the constant changes and deal with them. Consequently, they can more easily deal with the new situations and adapt to the ever changing life.<sup>1</sup> Recent technological advances and increased production of knowledge and information has shortened the lifecycle of information and knowledge. In order to overcome this situation, individuals must be taught how to learn and gain quick access to information instead of just using the transferred knowledge and information. The factors influencing the learning process vary considerably. As a result, identifying this wide range of factors is important in overcoming the problems and deficiencies of the education system.<sup>2</sup> An individual's preferred learning

style is considered as one of the important factors affecting his learning process. There are several theories on learning styles. One theory which is effectively used in researches in the field of learning and education is called David Kolb's Learning Styles Theory. According to Kolb, learning styles refer to the ways, in which individuals organize concepts, rules and principles so that they help them deal with new situations. Formal theorizing about learning differences began when Herbert Thelen first introduced the term "learning style" in 1954. For years, it was widely accepted by education experts that the differences in individuals' learning ability is simply due to their different capabilities and levels of intelligence. This long-believed idea has now changed. Researchers have proved that learners have different learning styles. This means they refine and manipulate information using different filters. Today it is clear that the differences in individuals' learning ability are only partly related to their capabilities and levels of

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intelligence. Therefore, other factors such as personality traits, levels of task difficulty and preferred learning styles are also involved. One's "style" is not one's level of intelligence or personality trait; in fact, it is the result of an interaction between an individual's intelligence and personality. In sum, as it is mentioned in several theories, style is defined as one's habitual or predominant pattern of performing tasks.<sup>3</sup> Studying different learning styles is considered a very important task for all those involved in the learning process. Being familiar with learning styles facilitates learning and teaching processes, helps teachers and professors to deal with a greater number of learners and allows instructors to send their communicative messages via more effective channels. If teaching methods match learning styles, learners will be more satisfied with their learning. Each individual is made for a specific job. Thus recommendations about his future academic choices can be made according to his learning style.<sup>3</sup>

According to several researches conducted at universities of Iran, different learning styles have been seen in students of the same field of study. A study by Fereidoun Azizi *et al.* showed that the majority of medical students at Qazvin University of medical sciences (43.1%) preferred assimilator learning styles. Another research by Saeid Kalbasi *et al.* showed that the majority of medical students at Birjand University of Medical Sciences (52%) used converger learning styles. According to a research by Rezaei Kourosh, the majority of medical freshmen at Arak University of Medical Sciences (58.1%) preferred assimilator learning styles. There was also a research by Meyari Azam *et al.* showing that the majority of Medical students at Tehran University of Medical Sciences (69%) applied converger learning styles.<sup>3-6</sup> The researches and constant changes of learning styles over time indicated that the preferred learning style of students in each stage of the program should clearly be specified. So far, no research has been done to determine the preferred learning style in students of Tabriz University of Medical Sciences. Considering the variety of medical education content in basic sciences program and the need to use diverse learning and teaching styles in the program, education programs should be designed, planned and implemented based on the preferred learning style. On the other hand, many learning theorists argue that learning styles should be compatible with teaching styles to maximize learners' success rate.<sup>6</sup> The conformity of teaching styles with learning styles will further motivate students to learn and maximizes their academic achievements.<sup>7</sup> This study aimed to examine different learning styles and their relation to academic achievement in medical students of basic sciences program at Tabriz University of Medical Sciences.

### Materials and methods

In this study is a descriptive – analytical study, the sample consisted of all medical students of basic sciences program at Tabriz University of Medical Sciences (350 students) in 2011-2012. A questionnaire consisting of three separate sections was used to collect the required data. The first section included an explanation of research objectives, questionnaire instructions and a guide to help the respondents get notified of the results and calculate their answers in order to get to know their own learning

styles. In the second section, respondents had to answer the questions about their demographic information, overall GPA in basic sciences program, full name and learning styles. The third section included Kolb standard questions on learning styles version 2a (Kolb Learning Style Inventory Kolb LSI). The final section consisted of twelve multiple-choice questions. The respondents were asked to put 4 next to the choice that best matched them. They should put 3, 2 and 1 next to the other choices according to their own level of conformity with them. Each choice represented one of the four main learning methods including concrete experience, reflective observation, abstract conceptualization and active experimentation. The questionnaire's content reliability and validity has been examined and confirmed by Kolb and several researches in Iran and outside Iran.<sup>8,9</sup> The sum of the scores for each choice of the twelve questions referred to the respondent's overall score of four main learning methods. After subtracting abstract conceptualization score from concrete experience score and active experimentation score from reflective observation score, two scores were obtained. The scores were put on coordinate axes. The point where the scores met determined the respondent's preferred learning style. For evaluating respondents' academic achievement, their overall GPAs were inquired from University's relevant office. Mean of GPA of all students in four learning styles were elicited separately and compared. Data was analyzed using SPSS 16. The results (respondent's preferred learning style and suitable learning environment) were handed over to the student's representatives who in turn notified the respondents. Descriptive statistics (frequency distribution and central tendency and variability measures) and inferential statistics (one-way ANOVA) were used to study and analyze the collected data.  $p \leq 0.05$  was considered as the significance level.

### Results

140 out of 350 questionnaires were fully completed by the respondents. 41.7% of respondents were male with an average age of  $20.58 \pm 1.87$  and 58.3% were female with an average age of  $20.41 \pm 0.75$ . 64 respondents (44.9%), 65 (47.8%), 4 (2.9%) and 6 (4.3%) used converger, assimilator, accommodator, diverger learning styles respectively. No significant relationship was found between respondents' preferred learning styles and their gender and age ( $p=0.596$  and  $p=0.922$ ). (Figure 1)

In order to assess students' academic achievement, the researchers used their overall GPA so far. The respondents' calculated average overall GPA was  $15 \pm 0.61$ . There was no significance difference between academic achievement of male and female students ( $p=0.616$ ). Pearson's chi-squared test results showed a significant inverse relationship between students' academic achievement and their age ( $p=0.013$  and  $r=0.214$ ). One-way ANOVA test was used to examine the relationship between student's academic achievement and their preferred learning styles. The results indicated no significant relationship between the two variables ( $p=0.598$ ) (Table 1).

### Discussion

The results showed that the majority of students preferred assimilator and converger learning styles. Previous

researches carried out in the same field in Iran have had similar results. A research by Kalbasi Saeed, Pouladi Ali and Poursafar Ali in Kurdistan university of Medical Sciences, Guilan University of Medical Sciences and Birjand University of Medical Sciences showed that the majority of students preferred converger learning styles.<sup>3,10,11</sup> A research by Hosseini Lorgani Maryam indicated that the preferred learning styles of medical students at Tehran University were as follows: assimilator (30%), converger (29%), diverger (26%) and accommodator (15%).<sup>12</sup> Researches in other countries have shown similar results. A study by Lynch Thomas G and Kolb Alice Y showed that the majority of students used converger learning.<sup>8,13</sup> Similar results were obtained in a research carried out on surgery residents at Ohio University.<sup>14</sup>

The current research showed that there was no significant difference between the preferred learning styles of male and female students ( $p=0.349$ ). Additionally, there was no significant relationship between students' age and their preferred learning styles ( $p=0.922$ ). Some similar researches carried out in Iran such as a research by Pouladi Ali, Valizadeh Leyla and Hosseini Maryam have had similar results.<sup>9,10,15,16</sup> A research by Decoucs and Piane suggested that there was no significant relationship between the students' preferred learning styles and their age and gender.<sup>17,18</sup>

The current research followed the main objectives: identifying the students' preferred learning style and analyzing the relationship between the students' academic achievement and their preferred learning styles. The final results showed that there was no significant relationship between preferred learning styles and academic

achievement of the students. Similar researches have shown different results.<sup>3,15</sup> A research by Pouladi Ali has shown a significant relationship between preferred learning styles and Overall GPAs of medical students at Tehran University.<sup>10</sup> Different results have been obtained in similar researches carried out in other countries. Bitran et al. have conducted a research to study the effect of medical students' learning styles and psychological factors on their academic achievement. The results showed no significant relationship between the students' preferred learning styles and academic achievement.<sup>19</sup> A research by Lynch Thomas G and et al. indicated that there was a significant relationship between the third year medical students' preferred learning styles and their USMLE (United States Medical Licensing Examination) grades. The students who preferred abstract conceptualization method had USMLE higher grades compared to the others.<sup>13</sup> The results of a study carried out by Piane et al. on Public health students showed that the students with assimilator learning styles achieved higher grades in examinations compared to the students who prefer other three learning styles.<sup>18</sup> In a research by Smits et al., it was suggested that those individuals who preferred accommodator learning styles had a considerable ability to extend their knowledge through further additional education.<sup>20</sup> Dibartola et al. have done a research on the effect of learning styles on learning efficiency in tele-education. The results showed that the students who preferred diverger learning styles had higher grades in examinations compared to the others.<sup>21</sup>

The results of the present study showed that the assimilator learning style is more suitable for the studied medical students. Those students who preferred assimilator

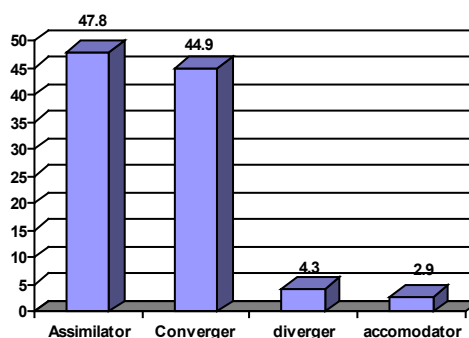


Figure 1. Percentage Distributions of Students' preferred learning Styles

Table 1. Comparison of Students' Academic Achievement According to Their Preferred Learning Styles

Preferred Learning Style	Number	Mean±Standard Deviation	Standard Error	Confidence Limit of 95%		Maximum Mean Value	Minimum Mean Value	P Value
				Highest Limit	Lowest Limit			
Diverger	6	14.99±0.397	0.162	15.41	14.57	15.44	14.39	0.598
Converger	64	15.08±0.589	0.073	15.22	14.93	17.18	13.59	
Assimilator	65	14.94±0.569	0.081	15.11	14.78	15.82	11.49	
Accommodator	4	14.83±0.293	0.014	15.30	14.36	15.22	14.56	
<b>Total</b>	139	15.00±0.610	0.051	15.11	14.90	17.18	11.49	

learning styles were more successful in understanding the transferred information and combining them with their previous knowledge. As a result, tutorials and speeches are suggested as the most suitable teaching method for medical students. According to the results, converger learning style is the second most suitable learning style for medical students. Consequently, simulation programs, laboratory activities, teaching practical application of educational materials and encouraging students to examine and analyze course materials are recommended along tutorials and speeches. This will facilitate and enhance the learning process. Finally, the researchers suggest that further study is needed to examine and analyze students' preferred learning styles and their probable changes during the medical course. The results will help the educators and relevant authorities to reconsider student recruitment, education and evaluation system so that it will become more compatible with assimilator and converger learning styles which are more suitable and effective for medical students.

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### Ethical issues

Participants' information was kept confidential.

### Conflict of interests

No competing interests to be declared.

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