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FIRST-YEAR STUDENTS' LEARNING STYLES IN NEYSHABUR UNIVERSITY OF MEDICAL SCIENCES IN 2019: A CROSS-SECTIONAL STUDY

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ABSTRACT:

One way to improve the quality of education is to gain knowledge and insight on how to learn. There are various factors involved in effective learning that identifying them can play a vital role in resolving the problems and deficiencies of the education system and improving its quality. Learners' learning styles are one of the factors that influence learning. Studies emphasize that it is necessary to examine students' learning styles in each discipline & educational course. This study was conducted to determine the first-year students' learning styles in Neyshabur University of Medical Sciences.

This cross-sectional study was conducted in 2019 on 197 first-year students of the 2018-2019 academic year in all available disciplines by census sampling method. The data collection tool was a demographic questionnaire and the Kolb Learning Style Questionnaire. Data were analyzed using descriptive statistics and SPSS version 16 software.

The students' dominant learning style was assimilator (40.1%). The dominant students' learning styles in nursing, anesthesiology, public health, environmental health, occupational health, food science & technology, health information technology, and midwifery disciplines were assimilator, in the medical emergency and food science & technology were divergent, and the operating room was convergent.

Since students' learning styles in different disciplines can be different, therefore, attention to the dominant learning styles of each discipline and using appropriate teaching methods can be effective in improving students' learning.

INTRODUCTION

Improving the quality and effectiveness of the higher education system has always been a concern of administrators, and today, all countries are trying to take steps in this direction. One of the important indicators in evaluating the higher education system efficiency is the level of academic achievement of students, which is related to effective learning(1). Learning means the process of relatively permanent changes in a person's potential behavior gained through experience(2). The learning process is such that people do not learn the same way and the same speed. One way to improve education quality is to gain knowledge and insight on how to learn. There are various factors involved in effective learning that identifying them can play a vital role in resolving the problems and deficiencies of the education system and improving its quality(3). Learners' learning styles are one of the factors that influence learning(4). Learning style means defining behavior to acquire knowledge, attitude, and skills through study or experience. In other words, it is a method that the learner prefers other forms of learning (5) and the ways and conditions by which learners more effectively and efficiently understand, process, save, and remember what they learn(6). Accordingly, every learner has preferred methods for understanding, organizing, and storing information. There are many theories about learning styles. One of these theories, mainly used to identify medical students' learning styles, is the Experiential Learning Theory of David Kolb(7). The basis of Kolb's theory is the combination of cognitive and social factors that emphasize the central role of experience in the learning process. There are four main ways of learning in Kolb's theory: Concrete Experience, Reflective Observation, Abstract Conceptualization, Active Experimentation(8). He describes learning as a four-step cycle. The first stage is the concrete experience that the learner first does an action; the second stage is the reflective observation that the learner thinks about practice; the third stage is the abstract conceptualization that the learner hypothesizes, and the fourth stage is active experimentation, the learner eventually tests his hypothesis (9). Kolb believes that everyone goes through these stages in learning, and this cycle repeats several times until learning completion, but not all learners can succeed at all stages of this cycle (10). In Kolb's model by the combination of four learning methods creates four learning styles: Diverger, Converger, Accommodator, and Assimilator (11).

Each style has special characteristics. Divergers or imaginative learners understand through concrete experience and process information through reflective observation. They have high imaging power and pay particular attention to meanings and values. Their ability to conceptualize and look at objective situations from different angles is remarkable(8). Their approach to situations is to observe rather than to act. They probably have a lot of cultural interests and like to gather information. These people tend to share their experiences and learning from each other(12). In this learning style, people often like collaborative learning and group discussion, so their preferred teaching methods is group discussion and brainstorming (13).

Assimilators or analytical learners understand through abstract conceptualization and process information through reflective observation. Assimilators have a good ability to generate theoretical ideas and inductive reasoning (8). In this learning style, learners learn more through thinking and are less interested in practical tasks (14). These people like organized and accurate presentations (15), tend to traditional education, and their preferred teaching method is lecture (13).

Convergers or common sense learners understand through abstract conceptualization, and process information through active experimentation. These people have a special ability to put ideas into practice, and they are successful in problem-solving and decision making. Given their ability to make deductive reasoning, they can respond well when there is only one answer to a problem (8). They are more inclined to think about the subject and to learn practical things like dealing with technical and laboratory issues. These individuals are more in control of their emotions and are stronger in matters of intelligence than in creativity. Convergers' preferred teaching methods are demonstration, role-playing, using simulators and diagrams, and teacher's handwriting (16).

Accommodators or dynamic learners understand through concrete experience and process information through active experimentation. Their priority is doing the works and execute plans and programs, and they learn more from new and first-hand experiences (8). They often solve problems through trial and error (17), are not inclined to traditional learning, and are interested in teaching methods such as brainstorming, self-directed learning, individual homework assignments, and prepare an action plan (8).

Identifying learners' learning styles is important from different perspectives. Knowledge about learning styles can be used in organizing the learning environment, how teachers interact with students, and how to teach and learn content (18). Attention to individual learning styles in the educational process caused proper accountability to the learners' needs. Teachers' awareness of students' learning styles enables them to match their teaching methods to learners' learning styles and improve the learning process as much as possible (19). As a result, learners' learning, one of the main goals of the education system, will increase. Harmonizing teachers' teaching styles with learners' learning styles increase learning motivation (20), prevent academic failure (21) and increase student satisfaction (22). Learning styles also help learners learn more easily, remember more information, think more positively about school, university, and learning materials, achieve goals faster, and use information more efficiently.

The inappropriateness of teachers' teaching styles with learners' learning styles can have negative consequences. For example, it can cause disinterest in learners, failure to pass exams, poor performance (23), academic failure, discouragement of continuing education, and the dropouts (24). Therefore, identifying students' learning styles is essential to providing successful learning opportunities.

Although few studies have conducted on the learning styles of different medical students, different results of examining the dominant students' learning styles in these studies have reported. For example, the dominant nursing students' learning styles had been reported divergent at Isfahan University (25), assimilator at Qazvin University (26), convergent at Tabriz University (13), and accommodator at Torbat Heydariyeh University (27).

Other researchers have also pointed to the differences in reported students' learning outcomes in studies at different universities inside and outside the country, and emphasize that it is necessary to examine students' learning styles in each discipline and determine the dominant style among students of each course (28). According to the above-mentioned and since there was no study in this field at Neyshabur University, this study was conducted to determine the first-year students' learning styles in Neyshabur University of Medical Sciences.

METHODS

This study is a cross-sectional study in which the all first-year students' learning styles of Neyshabur University of Medical Sciences in all available disciplines (Ten undergraduate disciplines including Nursing, Anesthesiology, Operating Room, Public Health, Environmental Health, Occupational Health, Health Information Technology, Food science & Technology, Medical Emergencies, and Midwifery) were assessed using the standard Kolb Learning Style Questionnaire. The sample size in this study was 197. Inclusion criteria included being the first year and student satisfaction. After coordinating with the education administrator and the relevant teacher, the researcher was present at the beginning of one of the students' classes to complete the questionnaires. First, a brief introduction about the study's importance, and how to complete the questionnaires were presented, and then informed consent was also obtained. Two questionnaires were used for data collection. The first questionnaire included samples' demographic information. This information included age, sex, marital status, interest in the discipline, main place of residence, current place of residence, degree, and discipline. The second questionnaire was Kolb Style Inventory (Kolb LSI). This questionnaire includes 12 questions. In each question, different dimensions of learning styles are examined in a sentence with 4 options. The options have a Likert range of at least (1) to completely (4). The sum of the first option scores for each of the 12 questions represents a concrete experience, the sum of the second option scores represents reflection observation, the sum of the third option scores represents the abstract conceptualization, and the sum of the fourth option scores represents active experimentation. Subtracting the abstract conceptualization score from the concrete experience score, and subtracting the active experimentation score from the reflective observation score, two numbers are obtained. These two numbers lie on the coordinate axis (considering the number being negative and positive). From the intersection of these two scores on the coordinate axis, the individual's learning style is determined as depicted in Figure 1.

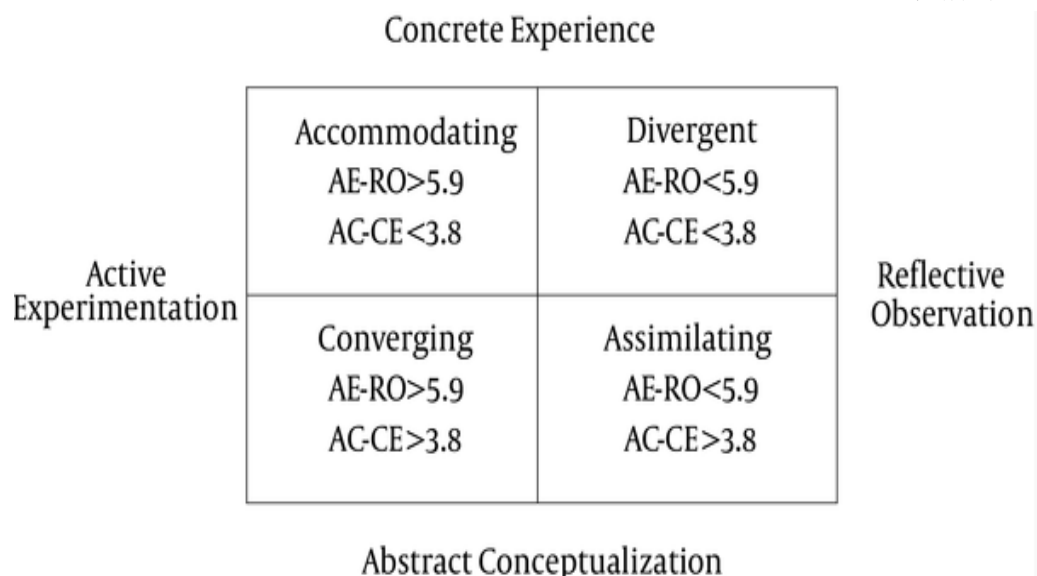


Figure 1 Kolb’s Tow Dimensional Learning Model and Four Learning Styles

The validity and reliability of this questionnaire have been confirmed in various external and internal studies (41 ,40). However, to assess the reliability of the instrument, 15 questionnaires were distributed among a group of students. The instrument's internal consistency was measured using Cronbach's alpha, which was 0.681 for concrete experience, 0.646 for reflective observation, 0.765 for abstract conceptualization, 0.804 for active experimentation, and 0.864 for overall instrument coherence. Pearson Chi-Square test was used to test the relationship between demographic information and students' learning styles. Pearson Chi-Square test was performed using the Monte Carlo method to test the relationship between educational discipline and learning style due to the presence of empty cells and the high number of cells. Data analysis was performed using SPSS version 16. The Ethics Committee of the Neyshabur University of Medical Sciences approved this study with code of ethics IR.NUMS.REC.1397.26.

RESULTS

122 of the participants (61.9%) were female, and 75 (38.1%) were male. The mean age was 23.2 years. The number of students according to their educational discipline was: Nursing 22, Anesthesiology 21, Operating Room 16, Public Health 26, Environmental Health 17, Medical Emergencies 33, Occupational Health 13, Health Information Technology 15, Midwifery 26, Food Technology 8.

Students' demographic information is presented in Table 1.

Table 1 Demographics Characteristics by Learning Style

Learning Style		Demographic Characteristics				P-Value*	Total n(%)
		Diverger n(%)	Assimilator n(%)	Accommodator n(%)	Converger n(%)		
age		24.17±6.84	22.87±7.14	23.13±7.17	21.50±4.46	0.33	23.21±6.77
sex	Woman	31 (57.4)	49 (62.0)	19 (70.4)	23 (62.2)	0.73	122 (61.9)

	Man	23 (42.6)	30 (38.0)	8 (29.6)	14 (37.8)		75 (38.1)
Marital Status [#]	Single	36 (67.9)	61 (77.2)	20 (74.1)	30 (81.1)	0.50	147 (75.0)
	Married	17 (32.1)	18 (22.8)	7 (25.9)	7 (18.9)		49 (25.0)
Area	City	49 (90.7)	72 (91.1)	24 (88.9)	34 (91.9)	0.98	179 (90.9)
	Village	5 (9.3)	7 (8.9)	3 (11.1)	3 (8.1)		18 (9.1)
Living Place	University dormitory	26 (48.1)	41 (51.9)	16 (53.9)	22 (59.5)	0.92	105 (53.3)
	Private home	8 (14.8)	9 (11.4)	3 (11.1)	3 (8.1)		23 (11.7)
	With family	20 (37.0)	29 (36.7)	8 (29.6)	12 (32.4)		69 (35.0)
Degree	Associate	8 (14.8)	6 (7.6)	4 (14.8)	2 (5.4)	0.26	20 (10.2)
	Continuous Bachelor's	31 (57.4)	57 (72.2)	19 (70.4)	30 (81.1)		137 (69.5)
	Discontinuous Bachelor's	15 (27.8)	16 (20.3)	4 (14.8)	5 (13.5)		40 (20.3)
Interest in the Discipline	Yes absolutely	17 (31.5)	21 (26.6)	7 (25.9)	9 (24.3)	0.79	54 (27.4)
	Yes Partly	29 (53.7)	40 (50.6)	12 (44.4)	21 (56.8)		102 (51.8)
	No	8 (14.8)	18 (22.8)	8 (29.6)	7 (18.9)		41 (20.8)

* Pearson Chi –Square test, [#] Variable with missing data

According to Table 1, there was no statistically significant relationship between students' demographic information and learning styles at $\alpha = 0.05$ level. According to the Pearson Chi-Square test using the Monte Carlo method, the relationship between the students' educational discipline and learning styles was statistically significant ($P = 0.004$).

A detailed description of the frequency of each learning styles to differentiate the students' educational discipline is presented in Table 2.

Table 2 Students' Learning Style by Educational Discipline

learning style Educational discipline	Diverger <i>n</i> (%)	Assimilator <i>n</i> (%)	accommodator <i>n</i> (%)	Converger <i>n</i> (%)
Nursing	6 (27.3)	10 (45.5)	1 (4.5)	5 (22.7)
Anesthesiology	3 (14.3)	11 (52.4)	1 (4.8)	6 (28.6)
Operating Room	1 (6.2)	7 (43.8)	0	8 (50.0)
Public Health	4 (15.4)	10 (38.5)	9 (34.6)	3 (11.5)
Environmental Health	3 (17.6)	7 (41.2)	1 (5.9)	6 (35.3)
Medical Emergencies	13 (39.4)	10 (30.3)	6 (18.2)	4 (12.1)
Occupational Health	6 (46.2)	6 (46.2)	0	1 (7.7)
Health Information Technology	5 (33.3)	5 (33.3)	4 (26.7)	1 (6.7)
Midwifery	10 (38.5)	11 (42.3)	3 (11.5)	2 (7.7)
Food science & Technology	3 (37.5)	2 (25.0)	2 (25.0)	1 (12.5)

Total	54 (27.4)	79 (40.1)	27 (13.7)	37 (18.8)
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According to the last line of Table 2, the students' dominant learning style was assimilator (40.1%), and the frequency of diverger, converger, and accommodator learning styles was 27.4, 18.8 and 13.7%, respectively.

The students' dominant learning style was assimilator (40.1%). The dominant students' learning styles in nursing, anesthesiology, public health, environmental health, occupational health, health information technology, and midwifery disciplines were assimilator, in the medical emergency and food science & technology disciplines were divergent, and in the operating room discipline was convergent.

The scatter plot of learning styles is also presented in Figure 2. The horizontal axis of this diagram is the difference of the concrete experience from abstract conceptualization, and the vertical axis is the difference of the reflective observation from active experimentation. For an intuitive understanding of this division, point (3.8, 5.9) was chosen as the source of the coordinates.

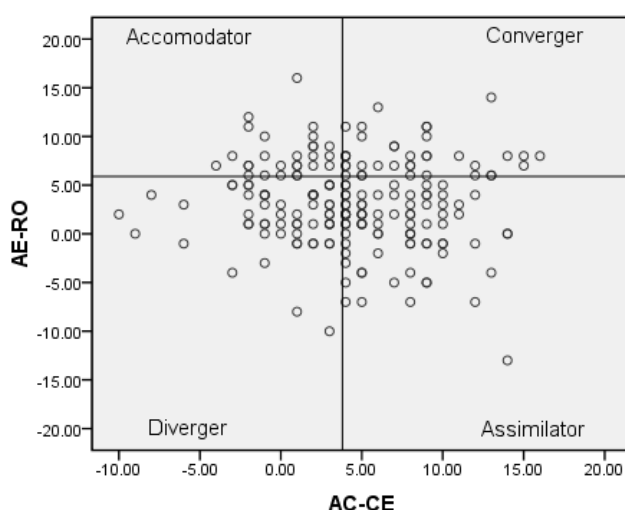


Figure 2 Scatter Plot of Learning Styles

DISCUSSION

This study was conducted to determine the first-year students' learning styles in Neyshabur University of Medical Sciences. The results showed the students' dominant learning style was assimilator (40.1%). To have a better analysis of the results of the present study compared to other similar studies in the world and Iran in the field of learning styles, we review the results achieved in these studies especially in the field of dominant learning styles. For example, the results of a study by Zoghi et al. in Australia that examined students' learning styles in 10 different disciplines (Nutrition, Midwifery, Nursing, Occupational Therapy, Paramedical, Pharmacy, Physiotherapy, Radiotherapy, Radiography, and Social Work) shows the dominant learning styles was convergence (32). In 2012, D'Amore et al. conducted a cross-sectional study to determine the nursing and midwifery students' learning styles using the Kolb Questionnaire. The results indicate that 30% of participants were divergent, 28.8% assimilator, 23.9% accommodator, and 17.9%

convergent(31).Colucciello also conducted a study in the United States on 100 nursing students. The findings show that the dominant learning style was accommodating(34). As can be seen, the results of the present study are inconsistent with those of other countries, which may be due to cultural differences and environmental issues that affect students' learning. Another reason could be the difference in the admission system of medical students. In Iran, student admission is based solely on a multiple-choice test entrance exam. There is widespread agreement that applicants should be selected based on broader criteria than entrance exam scores(3 ,2). For example, UK universities use a combination of academic performance scores, psychometric testing, and structured interviewing to decide on student admissions(3).There have also been studies on students' learning styles in Iran that have yielded different results. The results of the study by Ranjbar et al. on nursing and midwifery students' learning styles show that 86% of participants had an accommodating learning style(4).The findings of Geranmayeh et al. indicate that the dominant learning style of nursing and midwifery students at Tehran University of Medical Sciences is divergent(5).But most studies indicate that the dominant learning style of medical students is assimilator, which is consistent with the results of our study. For example, the results of research by Azizi et al. at Qazvin University of Medical Sciences show that the distribution of learning styles among medical students was assimilator (43.1%); converger (38.1%); diverger (9.6%) and accommodator (9.2%)(6). In another study conducted by Rezai et al. at Arak University of Medical Sciences, the students' dominant learning styles were also assimilator (7). The findings of the study by Ahanchian et al. on nursing and midwifery students of Mashhad University of Medical Sciences show that the students' dominant learning styles were assimilator (8).Sabzevari et al. in Kerman Medical Sciences also report that the learning style of most students was assimilator and following, respectively, diverger, converger, and accommodator (9).A review study of Imani et al. about the nursing students' learning styles in Iran, also confirm that most students are assimilator (10). Assimilators or analytical learners understand through abstract conceptualization and process information through reflective observation.Assimilators have a good ability to generate theoretical ideas and inductive reasoning (8).In this learning style, learners learn more through thinking (14). They are interested in working with others to set goals, do things, test theories, and complete projects(5). They like organized and accurate presentations (15),tend to traditional education, and their preferred teaching method is lecture and sample reading materials (13). The assimilating learning style is useful for knowledge-based occupations. Therefore, having this style according to its characteristics seems appropriate for medical students(9). Teaching these students through computers without direct contact with the educator is more successful than people with other learning styles. Therefore, the use of e-learning and blended learning is appropriate for this group of students(13).In our study, there was no statistically significant relationship between demographic information and the students' learning style. Studies on learning styles and demographic characteristics of learners have yielded different results. This relationship has been reported in a few studies, such as the study by Rashidi et al. But in many studies, such as Hosseini Lergani et al (39), Sarchami et al (40), Kalbasi et al (41), Salehi et al (10), Ahanchian et al. (37), Troski et al. (14)and Meyari et al.

(42) this relationship has not been found which is consistent with the results of our study. Although the dominant learning style in this study was assimilating, there was a significant relationship between the educational discipline and the students' learning styles, so that medical emergencies and food science & technology students were more divergent and operating room students were more convergent. The limitation of the present study was that of using only one questionnaire for data collection, and in this tool, information bias can have a confusing role in the validity of the findings. Therefore, it was attempted to avoid such bias as far as possible by expressing the importance of the subject and encouraging the participants to provide honest and documented answers.

CONCLUSION

This study showed that the majority of Neyshabur University of Medical Sciences' first-Year students had an assimilator learning style, and there was a relationship between the field of study and the students' learning styles. Due to the students' dominant learning styles, teachers can make more use of appropriate teaching methods. It is recommended that teachers identify the dominant learning style of each class and plan the teaching methods accordingly. The results of this study can provide useful information for improving medical student's learning experiences.

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