

Assessing learning styles of medical students using Kolb's learning style inventory and their association with preferred teaching methodologies

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Abstract

Objective: To determine the frequency of learning styles of medical students and their association with preferred teaching methodologies.

Methods: The cross-sectional study was conducted at Baqai Medical College, Gadap, Karachi, from July to October 2019, and comprised medical students regardless of age, gender and academic year. David Kolb's learning style questionnaire, along with another questionnaire, was used to collect data. Data was analysed using SPSS 23.

Results: Of the 523 students, 213(40.7%) were males and 310(59.3%) were females. The overall mean age was 21.5 ± 1.69 years. Of the total, 268(51.7%) students were divergers, 118(22.8%) assimilators, 86(16.6%) accommodators and 46(8.9%) were convergers. There was a significant association between learning styles and selected teaching methodologies ($p < 0.05$).

Conclusion: Majority students were found to be divergers and assimilators. Aligning instructional strategies with learning styles will improve learning and academic performance.

Keywords: Learning, Problem-based learning, Teaching methods, Students, Medical. (JPMA 71: 1157; 2021)

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Introduction

Globally, the traditional teacher-centred learning (TCL) approach has gradually given way to student-centred learning (SCL) and the focus is now on teaching methods that establish better communication between the students and the teacher.¹ Moreover, being aware of one's own learning style helps to understand one's strengths and weaknesses and to develop instructional strategies which can be an expansion of both learning styles and preferred teaching methodologies. Since each individual learns in a distinctive way, one needs to identify the diverse means of gaining knowledge and information used by various people. Many variables, such as culture, personality type, educational specialisation, career choice or current job, may affect learning styles and teaching strategies.² In the given context, understanding the learning styles of the students is of utmost importance for better and effective teaching. The Learning Style Inventory (LSI) has been developed over time and is considered an important tool in this regard.²

Identifying the learning styles is useful for medical students since it gives an idea of how to teach specific skills.³

In 1984, David Kolb proposed the experiential learning theory (ELT), with focus on the principle role of experience differentiating ELT from other learning theories.^{2,4,5} Kolb's

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theory defines the perceiving continuum for grasping and the processing continuum for transformation in order for learning to occur.² The combination of these two continuums creates four quadrants representing learning styles:² Diverging in which the learner uses concrete experience, feeling and watching; Assimilating in which the learner uses abstract conceptualisation, thinking and watching; Converging in which the learner uses abstract conceptualisation, thinking and doing; and Accommodating in which the learner uses concrete experience, feeling and doing.² As per the model, it is postulated that a learner usually moves through all the learning quadrants in different situations and with the passage of time adapts to one or two learning styles.^{1,2} Understanding students' learning styles could be beneficial for both the students and the teacher since it helps the students to realise the pros and cons of their preferred learning style, and could also help the teacher in evaluating approaches.^{6,7}

According to research, people with specific learning styles are drawn towards particular subject areas that may have an effect on their future preferences for specific teaching methods.^{8,9}

The current study was planned to assess the frequency of learning styles of medical students and their association with preferred teaching methodologies.

Subjects and Methods

The cross-sectional study was conducted at Baqai Medical College, Baqai Medical University, Gadap, Karachi, from

July to October 2019. After approval from the institutional ethics review committee, the sample size was calculated while keeping the frequency of the study outcome at 50% for the most liberal estimate with 95% confidence level and 5% precision. The sample was raised from among male and female medical students from 1st year to final year who volunteered to take part in the study. Those who did not volunteer were excluded.

The self-administered data-collection tool did not request any identifying information and the serial number of the questionnaire was used as the identifying variable. The independent variables of the study were gender, year of study, and preferred teaching methodology, while learning style was the dependent variable.

The study questionnaire was administered to all the enrolled undergraduate medical students on the campus. LSI 3.1 has

been previously well-validated among medical students.² The 12-point questionnaire had four choices for each prompt, which the examinees ranked by similarity to their learning style on a five-point Likert scale. LSI has earlier been shown to be a reliable and a valid assessment tool, with Cronbach's alpha coefficients ranging from 0.77 to 0.84.²

The second part of the questionnaire was to assess students' preferences for teaching methodologies. All the students had appropriate exposure to all the teaching methodologies like one-way lecture, interactive lectures, small group discussions (SGDs), student's presentation in tutorials, problem-based learning (PBL), demonstration on models and specimens (DMS) and self-study. It included selecting the best teaching methodology and also scoring all the methodologies regarding usefulness in learning on a five-point Likert scale from 5 = strongly agree to 1 = strongly disagree (Annexure).

Annexure: Questionnaire for Kolb's Learning Style Study.

Form No: _____
 DATE: _____
 AGE (Years): _____
 GENDER: M / F _____
 DEPARTMENT: _____
 YEAR OF STUDY: _____
 Current Address (City): _____
 Permanent Address (City): _____

Kolb's Learning Style Inventory (Version 3.1)

Column 1	Column 2	Column 3	Column 4
1- ___ Discriminating	___ Tentative	___ Involved	___ Practical
2- ___ Receptive	___ Relevant	___ Analytical	___ Impartial
3- ___ Feeling	___ Watching	___ Thinking	___ Doing
4- ___ Accepting	___ Risk Taking	___ Evaluative	___ Aware
5- ___ Intuitive	___ Productive	___ Logical	___ Questioning
6- ___ Abstract	___ Observing	___ Concrete	___ Active
7- ___ Present Oriented	___ Reflective	___ Future Oriented	___ Pragmatic
8- ___ Open to Experience	___ Observative	___ Conceptual	___ Experimental
9- ___ Intense	___ Reserved	___ Rational	___ Responsible

What is your preference of teaching Methods on following scale?

Methods	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1 Interactive lecture					
2 Problem based learning					
3 Small group discussion					
4 Demonstration on models					
5 Self study					
6 Lab work					
7 One way lecture					
8 Student presentation					
9 Guest speaker					

Data was analysed using SPSS 23. Mean values and standard deviations (SDs) were calculated for basic characteristics, while frequencies and percentages were calculated for gender, learning styles and teaching methodologies. The association of various learning styles with preferred teaching methodologies was assessed by using Pearson chi-square tests. Statistical significance was set at $p < 0.05$.

Results

Of the 523 students, 213(40.7%) were males and

Table-1: Characteristics of the participants.

Characteristics (n=518)	n (%)
Age (years)	21.5 ±1.69
Gender	
Male	213(40.7)
Female	310(59.3)
Year of Study	
1st Year	69 (13.3)
2nd Year	88(16.6)
3rd Year	172(33.2)
4th Year	169 (32.6)
5th Year	22(4.2)
Preferred teaching methodology	
Problem-Based Learning	106 (20.3)
Traditional	52 (9.9)
Both	187 (35.8)
No method identified	178 (34.0)

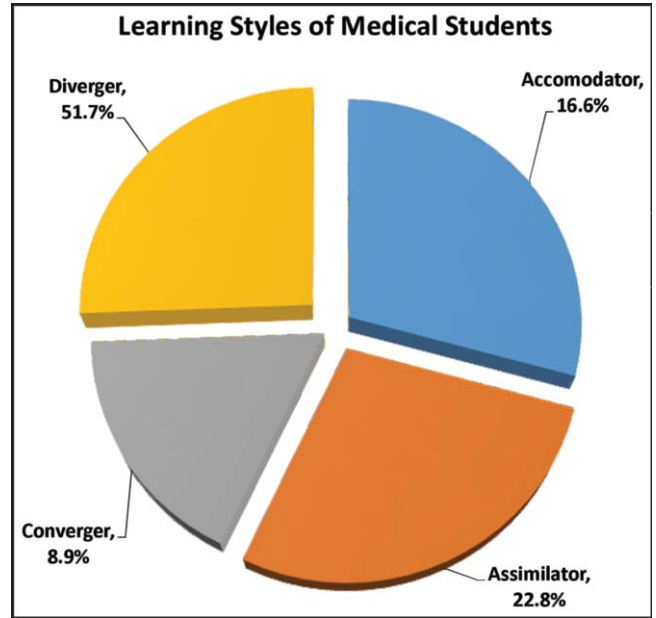


Figure: Learning styles of medical students.

310(59.3%) were females. The overall mean age was 21.5±1.69 years (range: 17-28 years). Both traditional and PBL methodologies were preferred by 187(35.8%) students, while 106(20.3%) preferred PBL and 52(9.9%) preferred traditional methodologies (Table-1).

Of the 523 questionnaires answered, 518(99%) were

Table-2: Learning Styles by gender and academic year.

Variables (n=518)	Accommodator	Assimilator	Converger	Diverger	Total	p
Male	35(16.8)	50(24.0)	21(10.1)	102(49.0)	208(100%)	0.724
Female	51(16.5)	68(21.9)	25(8.1)	166(53.5)	310(100%)	
1st Year	13(18.8)	15(21.7)	11(15.9)	30(43.5)	69(100%)	<0.001
2nd Year	14(16.3)	28(32.6)	7(8.1)	37(43.0)	88(100%)	
3rd Year	37(21.5)	27(15.7)	10(5.8)	98(57.0)	172(100%)	
4th Year	22(13.0)	46(27.2)	12(7.1)	89(52.7)	169(100%)	
5th Year	Nil	2(9.1)	6(27.3)	14(63.6)	22(100%)	

Table-3: Preferred methods by learning styles.

Preferred Methods	Kolb's Learning Styles (Agree + Strongly Agree)				Total	p
	Accommodator	Diverger	Converger	Assimilator		
Interactive Lecture	43+12 (50%+14%)	103+31 (38.4%+11.6%)	19+13 (41.3+28.3%)	40+22 (33.9%+18.6%)	208+80 (39.8%+15.3%)	0.013
Problem Based Learning	39+16 (45.3%+18.6%)	115+46 (42.9%+17.2%)	13+12 (28.3%+26.1%)	47+24 (39.8%+20.3%)	217+100 (41.5%+19.1%)	0.380
Small Group Discussion	38+11 (44.2%+12.8%)	89+63 (33.2%+23.5%)	8+14 (1.4%+30.4%)	39+28 (33.1%+23.7%)	177+117 (33.8%+22.8%)	0.039
Demonstration on Models	35+19 (40.7%+22.1%)	90+66 (33.7%+24.7%)	15+8 (32.6%+17.4%)	42+26 (35.6%+22%)	183+121 (35.1%+23.1%)	0.831
Self-Study	38+14 (44.2%+16.3%)	102+54 (38.1%+ 20.1%)	13+14 (28.3%+30.4%)	36+21 30.5%+17.8%	193+103 (36.9%+19.7%)	0.032
Lab Work	28+14 (32.6%+16.3%)	76+47 (28.4%+17.5%)	13+9 28.3%+19.6%	37+21 31.4%+17.8%)	154+93 (29.4%+17.8%)	0.185
One Way Lecture	33+19 38.8%+22.4%)	80+45 (30.4%+17.1%)	9+7 (20%+15.6%)	31+24 (26.5%+20.5%)	153+95 (29.7%+18.2%)	0.233
Student Presentation	30+17 (34.9%+19.8%)	87+70 (32.5%+26.1%)	14+7 (30.4%+26.1%)	33+21 (28%+17.8%)	167+116 (31.9%+22.2%)	0.077

received duly filled and data related to them was used for subsequent analyses. Among the participants, 268(51.7%) were divergers, 118(22.8%) assimilators, 86(16.6%) accomodators and 46(8.9%) were convergers (Figure).

Gender distribution and learning styles were not significantly associated ($p=0.724$), but the year of study was significantly associated with learning styles ($p<0.001$) (Table-2).

There was a significant association between learning styles and some preferred teaching methodologies (Table-3).

Discussion

The importance of understanding the learning style preferences of students is well-documented in the context of achieving academic excellence.¹⁰ To the best of our knowledge, however, no relevant study was previously done in Pakistan to assess the preferred learning styles of medical students and their association with duration or year of study. The dominant learning style in our medical students was found to be diverging (51.7%), which is similar to that seen in other studies in the region.^{11,12} Similar studies in Turkey, Saudi Arabia and Pakistan have reported a predominance of the diverging and accommodating styles, which could be explained by cultural similarities of these countries.¹²⁻¹⁴ Likewise, a study reported divergent style to be the most preferred learning style of nursing students.¹⁵ Divergers seek knowledge through experiences and change it by employing reflective observation.¹⁶ It is a positive finding that more than half of the medical students in the current study were categorised as divergers as it indicated that they were sensitive to others' feelings. Such individuals are also known to prefer people-oriented professions, such as becoming physicians.^{16,17}

Assimilators comprised 22.8% of the participants in the current study, followed by 16.6% accommodators 8.9% convergers. In other studies using the Kolb LSI, medical students generally showed learning style characteristics similar to the current study.^{12,18}

Studies have shown that the most common learning styles reported in medical students are assimilating, converging and accommodating.^{10,19} Moreover, nursing students have been reported to predominantly have diverging learning style by a few studies.^{17,20}

The current study did not report any association between gender and learning styles. In contrast, studies have reported both these variables to be associated.^{21,22} A few other studies using earlier LSI versions did not report any gender-related differences in learning styles, which is in

line with our findings.^{23,24}

The current study showed a significant association between the year of study and learning styles of students, while one study recently demonstrated that the learning styles of medical students changed during the time period of the study.²⁵

The current study has two important limitations. First, it was carried out at a single medical college and, therefore, has limited generalisability. Second, these findings should be interpreted in the context of Pakistani medical students as the practice of medical education may differ significantly in different regions of the world influenced by various factors.^{1,26}

In the current study, the preferred teaching methodology of the students, such as interactive lectures, SGDs and self-study, which were associated with specific learning styles. Similar results were also reported earlier.²⁷⁻²⁹ However, results from other studies found no relationship between learning styles of medical students and different teaching methods.^{12,30}

Based on the findings, it is recommended that teaching methodologies of medical teachers should be diverse and aligned with the learning styles of the students. Moreover, policy-makers must take into account the variety of learning styles employed by the students in order to develop an effective curriculum of medical institutions capable of nurturing the desired excellence among the students.

Conclusion

Majority of medical students were found to be divergers, followed by assimilators. Among teaching methodologies, interactive lectures, SGDs and self-study were found to be significantly associated with learning styles as the preferred teaching methodologies, while PBL, lab and model demonstrations, one-way lectures and student presentations were not associated with learning styles. Finally, the learning styles of students were significantly associated with their year of study.

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