Learning style and academic achievement among students at Tabriz University of Medical Sciences, Iran

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Abstract

Background: Variations in learning styles among students could explain many differences in students' acquisition of knowledge. This study examined the association between learning styles and academic achievement among students at Tabriz University of Medical Sciences in the northwest of Iran.

Methods: This research is part of a longitudinal study entitled, "Health and Lifestyle of University Students" among undergraduate, medical, dentistry, and pharmacy students at Tabriz University of Medical Sciences who entered the university in October 2014. A self-administered questionnaire that consisted of general information and Kolb's learning style was completed by these students during the first eight weeks of their first semester. Academic achievement was assessed using grade point average (GPA) in the following semesters (1 and 2) of the academic year.

Results: A total of 452 students were included in this study with a mean age of 19.16 ±1.03. The most prevalent learning style was convergent and the second most common was accommodative. The average GPA of the students was 15.74 ± 1.57 out of a possible 20. The results of a multivariate regression showed that the effect of learning style on academic achievement, in the presence of other variables, was not statistically significant. Sex was able to predict academic progression (β=0.188, P=0.001). In addition, GPA was higher among dentistry students (β=0.128, P=0.012) and lower among nursing and medical students (β==-0.211, P=0.001; β=-0.127, P=0.015 respectively).

Conclusion: Although students' academic achievement was correlated with their learning style, the popularity of convergent and accommodative styles should be considered in that acknowledging the prevailing learning styles of students could promote academic achievement.

Introduction

There are variations in the learning process due to cognitive processing differences among individuals.[1] Further, the learning environment is different between medical and non-medical universities especially in some fields such as medicine, where students are expected to acquire a large amount of knowledge in a relatively short time. Adaptation to learning performance is influenced by learning environment.[2]

Learning styles are one characteristic of students; behaviour inputs or learning styles can be defined as a set of beliefs, preferences, and behaviours that people use to help them learn in a given situation. Learning style can help explain many individual differences in learning.[3] Understanding students' learning styles is important because if educational materials and teaching styles are in line with learning styles, this can enhance course content and promote academic achievement.[4,5] Academic achievement is very important in higher education as a means of measuring the effectiveness of the transfer

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of knowledge. Academic status refers to academic achievement or decline, and various means, such as grade point average (GPA) and the amount of passed or failed credits, are used to measure this.[6] A student's learning style is a key component of academic achievement.[7] There are studies attempt to assess learning styles among university students[8-10] as well as the association between academic achievement and learning styles.[11-13]

A review of the literature regarding students' learning style and academic achievement including students from all medical disciplines (from medicine to health sciences) is not sufficient. Previous studies often included only one group of students (for example, medical or nursing).[11,12] In a successful educational system, attention to learning styles is essential for designing and managing educational programs effectively.[7] The current study examined the association between learning styles and academic achievement of university students in all disciplines at Tabriz University of Medical Sciences using information from the first baseline data collection of a longitudinal study entitled, "Health and Lifestyle of University Students(HeLiS)," the first of its kind among medical university students, conducted in Tabriz, Iran.

Materials and Methods

This research is part of a longitudinal study entitled, "Health and Lifestyle of University Student (HeLiS)." The target population of this study consists of all undergraduate students and medical, dentistry and pharmacy students who enrolled at Tabriz University of Medical Sciences in 2014 (N = 645). The distribution of students in each discipline are listed as follows: medicine (106), dentistry (59), pharmacy (59), nursing (39), midwifery (30), occupational health (28), environmental health (26), public health (21), nutrition (24), information technology (27), anesthetics (30), radiology (44), management of health services (21), speech therapy (20), physiotherapy (22), occupational therapy (20), and operating room (26). The inclusion criteria were: age under 25 years, enrolled students, enrolled in a bachelor's degree or a medical, dentistry or pharmacy program, willingness to participate, and willingness to take part in the follow up. At the baseline, participants were asked to complete a self-report questionnaire with minimal instruction by a research team that took about 40 minutes. The study questionnaire consisted of items about their demographic and socioeconomic status, lifestyle, mental health, nutritional habits, oral health, and anthropometric measures as well as learning style items.

All registered students were invited; the participation rate was 80%. A total of 452 were included in the current study with complete information on learning style and academic achievement.

David Kolb's experiential learning model, which is known as the cognitive learning style, was used to assess learning styles in this study.[14] In this model, four-stage cyclic learning is depicted, consisting of concrete experiences, reflective observation, abstract conceptualization, and active experimentation; these learning styles are formed by combining: convergent, divergent, accommodative, and assimilative.[2] The questionnaire included 12 multiple-choice questions on learning styles.[2] The validity and reliability of this questionnaire has been confirmed in Iran.[15] The respondents were asked to indicate with the highest score (4) the choice that best matched them. The remaining choices were ranked with a 3, 2, or 1. Each choice represented one of the four main learning methods including concrete experience, reflective observation, abstract conceptualization and active experimentation. The sum of the scores for each choice of the 12 questions referred to the respondent's overall score of four main learning methods. After subtracting the abstract conceptualization score from the concrete experience score, and the active experimentation score from the reflective observation score, two scores were obtained. The scores were put on coordinate axes. The point where the scores met determined as respondent's preferred learning style.[16]

Academic achievement was determined by the total GPA of the students' first 2 academic semesters in the year 2014-2015. In this study, mean GPA was used as the criterion for academic achievement.

Statistical analysis

Data were summarized using means ± standard deviation (SD) for continuous variables and counts and percentages for categorical variables. Chi-square tests and student's t tests or ANOVA were used to determine bivariate differences for categorical and continuous variables, respectively. Multiple linear regression was used to identify the association between learning style and GPA after controlling for selected variables such as age, sex, and program discipline. The β coefficient, the standard error and the P value are reported with the multiple regression model. The analysis was performed using SPSS 21 (IBM SPSS Statistics for Windows Version 21.0. Armonk, NY: IBM Corp.).

Results

A total of 645 students who enrolled in the first semester of 2014 were eligible at the baseline phase of the HeLiS; the participation rate was (80%), of whom 452 who had a completed learning style questionnaire were included in this analysis. The average age of respondents was 19.16 ± SD1.03 (range: 18-25). For sex, 149 (31.5%) were male, and 303 (64.1%) were female. The average GPA was 15.74 ± SD 1.57 (range: 10.85-19.10). When examined by percentile range, 23.8% of students had GPA within the range of 17.0-20.0, 63.3 % had GPAs within the range of 14.0-16.9, and the rest had GPAs of less than 14.

Figure 1 shows the distribution of different learning styles from the scores given in the learning style questionnaire
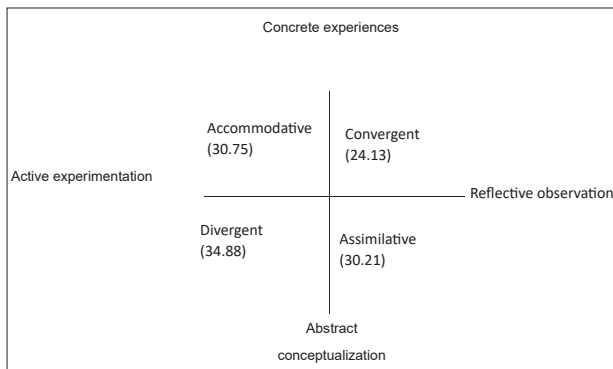
Figure 1. Distribution of Kolb's learning style average among undergraduate, medical, dentistry and pharmacy students at Tabriz University of Medical Sciences, 2014.

options. The learning style that scored the highest was the convergent style (34.6 ± 88.77), followed by the accommodative style (30.7 ± 75.58), then the assimilative style (30.6 ± 6.67) and, last, the divergent style (24.13 ± 6.83).

The findings of the study showed that among the four types of learning style, the most prevalent was the convergent style and the second was the accommodative style (Table 1).

The average GPA of male students across 2 consecutive semesters was 15.34 ± 1.58, and that of female students was 15.96 ± 1.52. The difference in average GPA between men and women was statistically significant ($P = 0.001$). The learning style was different between men and women: female students tended to use a more accommodative style and male students tended to use a more convergent style ($P = 0.04$). The results of a one-way ANOVA showed that academic achievement did not differ based on learning styles ($P = 0.17$).

Table 1. Comparison of students' academic achievement (GPA) based on learning styles among undergraduate, medical, dentistry and pharmacy students at Tabriz University of Medical Sciences, 2014

Style	Average GPA	SD	Minimum	Maximum
Convergent	15.26	1.56	11.75	17.90
Assimilative	15.76	1.52	10.85	18.73
Divergent	15.91	1.63	11.68	19.10
Accommodative	15.66	1.43	11.59	19.04

A linear regression was conducted to test a predictive model for academic progression (GPA) and learning style with controlling for sex and study discipline. The overall model was significant ($r^2 = 0.117$, $F_{(11, 364)} = 11.88$, $P = 0.001$). Gender and discipline variables accounted for about 11% of the variance of the academic achievement variables. Learning style was a predictor of academic achievement while gender was able to predict academic progression ($\beta = 0.188$, $P = 0.001$) that implies that GPA was higher among female students. In addition, dentistry students ($\beta = 0.128$, $P = 0.012$) showed a positive effect and nursing and medical students showed a negative effect ($\beta = -0.211$, $P = 0.001$; $\beta = -0.127$, $P = 0.015$ respectively) in predicting academic achievement (Table 2).

Discussion

This study aimed to assess learning styles and to determine the association between learning style and academic achievement among students at Tabriz University of Medical Sciences in the academic year of 2014-2015.

The findings of this study showed that the most common learning style was the convergent style, and the second most common was the accommodative style. Our results were similar to studies conducted in Iran by Valizadeh et al,[15] Ahadi et al,[17] and Meyari et al[18] and in other countries[19] which confirmed that most students use the convergent style. The high percentage of the convergent style in this study may be related to obtaining information through the simulation of experience and working with abstract concepts and ideas. Convergent learners can apply ideas in practice. Although the mean scores of the convergent style and the assimilative style were high, the academic performance of students according to their learning styles did not significantly differ. Our results were in line with other studies in Iran, such as Hosseini et al,[20] Kalbasi et al,[21] Sarchami and Hossaini,[22] and reports from other countries[23-25] which showed that there was no significant statistical association between learning style and academic achievement in university students. However, some studies[17,26] reported a significant difference between learning styles and total and average scores of practical lessons. Lynch et al[27] reported that the performance of medical students was related to their learning style, and those with the abstract conceptualization style were more

Table 2. Regression model predictor variables among undergraduate, medical, dentistry and pharmacy students at Tabriz University of Medical Sciences, 2014

Order of predictor variables in figure	Raw coefficient		Standardized coefficient	T	P value
	B	Standard error	β		
Fixed value	15.56	0.147	---	105.78	0.001
Female students	0.606	0.164	0.188	3.693	0.001
Nursing faculty	-1.06	0.255	-0.211	4.165	0.001
Dentistry faculty	0.797	0.315	0.128	2.529	0.012
Medicine faculty	-0.526	0.215	-0.127	2.444	0.015

successful compared to those with other styles. Piane et al[28] also found that students with the assimilative learning style had higher scores on theoretical tests than students with the other three styles. This disparity in the results of studies might be explained by heterogeneity in the study population; previous studies mostly included only one group of students, for example, medical or nursing,[11,12] and the instrument used to assess learning style.[24]

The results of this study showed that female students had higher academic achievement compared to male students, which is consistent with the results of other studies[29,30] that showed academic performance of female students was higher than male students. Based on the findings of Kuh and colleagues' study,[31] women's interest in education and academic achievement was higher than men's, while concerns of male students about employment after graduation negatively affected their academic performance. In explaining this finding, it can be pointed out that females more likely have many friends and acquaintances due to the ability to establish strong social associations that can provide benefits in case of difficulty. Thus females may feel more secure in critical situations and have more support, and may be less concerned with future responsibilities such as housing, managing family and life, or getting better job opportunities in the future. This indirectly leads to negative energy depletion and the disappearance of absurd thinking and finally leads to a relaxed mind for better study and also benefits other aspects of life for academic achievement.

There is a weak significant association between learning style and gender of the students, and female students were more likely to use an accommodative learning style and male students a convergent learning style. These results are in line with many studies.[6,9,32-34] However, the studies of Valizadeh et al[15] and Ranjbar & Esmaili[35] showed no association between learning style and gender among nursing and midwifery students. The heterogeneity in study population could explain the difference from results of previous studies.

This study has some strengths and limitations. The principal strength is including students from a range of different disciplines as well as a sufficient sample size. The main limitation is an incomplete questionnaire about learning styles for all participants due to the way data was collected (using a self-administered questionnaire). The second limitation was the generalizability of this study to all university students because the research was conducted among students from different disciplines of medical sciences, and these students might have different learning styles compared to students in engineering or liberal arts, etc.

Conclusion

In the current study, no association was found between learning styles and academic achievement; academic achievement was similar across all learning styles. Among the four learning styles, the most commonly seen was the convergent style; the accommodative style was second. Female students showed higher academic achievement compared to male students; the accommodative style was most likely to be seen in female students and the convergent style in male students. Finally, gender and academic discipline were seen to have significant effects on academic achievement.

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