

Learning Style and Attitude toward Computer among Iranian Medical Students

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Abstract

Background and purpose: Presently, the method of medical teaching has shifted from lecture-based to computer-based. The learning style may play a key role in the attitude toward learning computer. The goal of this study was to study the relationship between the learning style and attitude toward computer among Iranian medical students.

Methods: This cross-sectional study included 400 medical students. Barsch learning style inventory and a questionnaire on the attitude toward computer was sent to each student. The enthusiasm, anxiety, and overall attitude toward computer were compared among the different learning styles.

Results: The response rate to the questionnaire was 91.8%. The distribution of learning styles in the students was 181 (49.3%) visual, 106 (28.9%) auditory, 27 (7.4%) tactual, and 53 (14.4%) overall. Visual learners were less anxious for computer use and showed more positive attitude toward computer. Sex, age, and academic grade were not associated with students' attitude toward computer.

Conclusions: The learning style is an important factor in the students' attitude toward computer among medical students, which should be considered in planning computer-based learning programs.

Keywords: LEARNING STYLE, ATTITUDE, COMPUTER, MEDICAL STUDENT, ANXIETY, ENTHUSIASM

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Introduction

According to the revolution of medical education from lecture-based learning to computer-based and the rise of web-based and distance learning medical universities, computer has become the key instruments in this education area. Medical-related software, personal electronic instruments, and on-line databases in the field of medicine are widely used worldwide. This phenomenon allows medical students to access materials every time they need at a less cost, with the best outcomes for deep education (1, 2). However, it was found that students across the globe are

not using this technology equally (1). Identification of the factors that influence the tendency to use this technology is essential as it provides appropriate strategies to maximize computer-based learning. The role of computer was identified to be for social and personal use, which depicts the attitude toward computer that influences the acceptance and use by users (3). Regan et al. (4) believes that positive attitude toward an object plays an important role in its use, like for computer. Feeling nervous, embarrassed, worried, or distress to use computerized data or a negative reaction to computerization is described as computer anxiety that results in a negative attitude toward computer, which in the opposite of enthusiasm for computer use (5).

On the other hand, it was shown that participation of students in computer-based learning is related to their learning style (6). The learning style enhances the learning

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potential through which a learner gains and processes information. It has a predominant role in the improvement of learners' attitude and prediction of success in university tasks (7, 8). It was advised to consider learning style while developing computer-based learning (9, 10); however, the reports that convey association between the learning style and attitude toward computer-based learning are limited (11). To the best of our knowledge, no such study has been conducted among medical students. In Iran, computer-based learning is growing, but several students are still not sufficiently familiar with this method of learning. Therefore, we decided to execute an exploratory study. This exploratory study was designed to examine the possible association between the learning style and attitude toward computer among Iranian medical students.

Methods

A total of 400 medical students of the Tehran University of Medical Sciences (TUMS) were selected by stratified random selection as subjects in this cross-sectional study conducted in April 2010. The students were asked to answer on two instruments: Barsch learning style inventory and a questionnaire on the attitude toward computer.

The attitude toward computer questionnaire (3.2b series) was developed in 1998 by Knezek and Christensen and it consisted of seven subsets (12). However, we used only the first two subsets (enthusiasm for computer use and computer-related anxiety) to meet our study requirements. An overall attitude toward computer was calculated by combining the two subsets of anxiety and enthusiasm.

The questions in this questionnaire applied a scale from 1 to 5, with a score of 1 depicting strong disagreement and a score of 5 depicting strong agreement. Because questions associated with anxiety issue were negatively worded, the scoring was reversed to avoid any bias. For example, the mean score of 5 for anxiety, enthusiasm subsets,

and/or the overall attitude could be interpreted as the least anxiety and the highest enthusiasm and/or the most positive overall attitude, for example, "learning about computer is interesting". Permission to use the modified attitude toward computer questionnaire was provided by Dr. Rhonda Christensen.

The Barsch learning style inventory, developed in 1980 by Barsch, consists of 24 statements aimed to evaluate a learner's learning approach. Participants were required to assess whether they are visual, auditory, tactile, or combined learners (13) through questions such as "can you remember more about a subject through listening than reading?"

Forward-backward procedure was used to translate these two instruments. Ten specialists evaluated the validity of the study instruments, which then eliminated nine questions based on attitude toward computer, to finally give a 21-item questionnaire. The Barsch learning style inventory was applied without any changes.

Reliability analysis showed satisfactory results: Cronbach's α coefficient for Barsch Inventory=0.89, for anxiety subset=0.8, enthusiasm subset=0.95.

The study data was analyzed by using the SPSS software (version 16). The students were grouped based on their learning style into four groups. One-way analysis of variance (ANOVA) test was used for comparison among enthusiasm for computer use, computer-related anxiety, and the overall attitude toward computer between the different learning style groups. Bonferroni correction was applied for multiple comparisons. Spearman correlation was performed for the evaluation of association among the age, grade of education, and enthusiasm for computer use, or computer-related anxiety, or the overall attitude toward computer. Student's T test was applied for comparison of enthusiasm for computer use, computer-related anxiety, and the overall attitude toward computer in males and females. $P < 0.05$ was considered to be statistically significant.

Results

Among the 400 selected medical students, 367 participated in this study (response rate=91.8%). Students were studying in grade 1–8 semesters. Mean (\pm SD) age of students was 20 ± 2 years. Of the total, 259 patients (80.4%) were female.

A total of 180 (49.3%) students were visual learners, 106 (28.9%) were auditory learners, 27 (7.4%) had a tactual learning style and 53 (14.4%) students had a combined learning style.

In all students, the mean (\pm SD) score for enthusiasm for computer use was 3.59 ± 1.1 , computer-related anxiety score was 3.79 ± 0.9 , and the attitude toward computer score was 3.64 ± 0.8 . In each learning style group, the

enthusiasm for computer use, computer-related anxiety score, and the overall attitude toward computer score were measured (Table 1). In students with visual learning style, computer-related anxiety score was the highest (the anxiety scores were reversed), and the overall attitude toward computer and enthusiasm for computer use was greatest in comparison with the other three learning styles. Enthusiasm for computer use, computer-related anxiety, and the overall attitude toward computer were similar among male and female students (Table 2).

The age of students was not significantly correlated with the scores of enthusiasm for computer use ($r=0.08$, $p=0.09$), computer-related anxiety ($r=-0.02$, $p=0.78$), and the

Table 1. Comparison of enthusiasm for computer use, computer-related anxiety, and the overall attitude toward computer among different learning style

	Visual N=181	Auditory N=106	Tactual N=27	Combined N=53	p value
Enthusiasm for computer use	4.12 \pm 1.0	3.02 \pm 0.9	2.83 \pm 0.8	3.30 \pm 1	<0.001
Computer related anxiety	4.29 \pm 0.7	3.26 \pm 0.7	2.92 \pm 0.9	3.59 \pm 0.7	<0.001
Overall attitude toward computer	4.13 \pm 0.6	3.09 \pm 0.6	2.84 \pm 0.9	3.47 \pm 0.6	<0.001

overall attitude toward computer ($r=0.05$, $p=0.3$), respectively.

The grade of education was not related to the scores of enthusiasm for computer use

($r=-0.08$, $p=0.1$), computer-related anxiety ($r=0.04$, $p=0.4$), and the overall attitude toward computer ($r=-0.04$, $p=0.4$).

Table 2. Comparison of the enthusiasm for computer use, computer-related anxiety, and the overall attitude toward computer based on gender

	Male (n=72)	Female (n=295)	p value
Enthusiasm for computer use	3.54 \pm 1.1	3.61 \pm 1.1	0.69
Computer related anxiety	3.87 \pm 0.9	3.76 \pm 0.9	0.43
Overall attitude toward computer	3.66 \pm 0.8	3.64 \pm 0.8	0.82

Discussion

The main finding of this investigation was the significant difference noted among computer-related attitudes of different types of learners. Visual learners showed the most positive overall attitude toward computer use; they experienced less anxiety compared to others.

The learning style, which is the way learner gains information, plays a key role in education. The academic performance of learners is better when the learning environment is appropriately matched with their preferred learning style (10, 14-16). In contrast, the appropriate learning outcome cannot be achieved if the teaching style is not compatible with the learner's preferred learning style (17). Considering the limitations of time and human resources, gain through education can be increased by focusing on the method adopted by learners to learn (18). Barsch introduced four learning styles for students: visual, auditory, tactual, and combined. Learners with the visual learning style learn when they watch or read; auditory learners learn via listening or talking; tactile learners learn by doing, touching, or manipulating objects; and the combined learners use more than one way of learning (13).

In our study, most students were visual learners. Visual learners showed least anxiety in encounter with computer and the most positive overall attitude toward computer in comparison with others, which is in concordance with the observations of a previous study (19); although, another study (11) observed no significant relationship between the learning style and perceptions of computer-mediated technology for learning. Among visual learners, learning is more meaningful through the use of diagrams, sketches, photographs, flow charts, demonstrations, and pictures. These objects are often enormously and usually applied in computer-based learning. Therefore, visual learners were less anxious in their encounter with computer-based learning and showed more positive attitude toward computer.

In recent years, computerization of the medical data and computer experience has increased among medical students. This change emphasizes more attention requirement on factors that influence computer-based learning in medical education. Computer-related attitude is an important issue in the delivery of computer-based learning (20). In our study, visual learners showed an acceptable attitude toward computer, although other learners showed more computer-related anxiety and a less overall attitude score. Therefore, it is recommended that the learning style of medical students be determined before designing any computer-based learning and, for learners apart from visual learners, appropriate educational methods should be considered. We suggest some interventions such as prerequisite computer courses, provision-blended learning, and alteration of instructional design of courses to make them more compatible with non-visual learning styles like auditory facilitations, interactive practices, and appropriate feedbacks.

In the present study, no relationship was noted between the gender and overall attitudes toward computer, like in a previous study (21). However Czaja and Sharit (5) suggested that the attitude of male and female computer users differ. Women were more comfortable using computers in their study and showed a more positive attitude as compared to men (5). On the contrary, in a Danish study (22), first-year male students showed more desire to replace the old learning materials (such as lectures and seminars) with e-learning (22). These discrepancies can be attributed to the differences in the studied population with respect to their settings, culture, basic computer knowledge, and previous experience in computer.

The results of this study showed that computer attitude is not affected by the age of learners, which is consistent with those of a previous study (5). However, in another study, age was found to be an important factor for computer-related attitudes, and older learners believed that computer limits

their opportunity to perform tasks. This feeling of discomfort may be due to lesser use of computer, which results in less positive experience among older people (23). Dyck and Smither (24) found that older computer users showed more anxiety than younger ones, but had better computer-related attitudes (24).

Conclusion

We conclude that the learning style affects computer-related attitude, which is important in computer application in medical education. In computer-based learning, consideration of the prerequisites for different learning styles is suggested. However, we did not assess these prerequisites, for which further studies are needed. The attitude toward computer was not affected by the age, sex, and grade of education in our study.

Values are mean±SD. One-way ANOVA was used to compare different learning style groups. Bonferroni's Post hoc test was used as a pairwise multiple comparison tests.

In pairwise comparisons, the enthusiasm for computer use: visual vs. auditory, tactile, or combined ($p<0.01$).

Computer-related anxiety: visual vs. auditory, tactile, or combined ($p<0.01$); tactile vs. combined ($p<0.01$).

Overall attitude toward computer: visual vs. auditory, tactile, or combined ($p<0.01$); combined vs. auditory or tactile ($p<0.01$).

Values are mean±SD. Independent sample T test for comparison was applied between genders.

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