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Intervention in the learning process of second year medical students

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Abstract

BACKGROUND: It has been demonstrated that educational programs that focus on study skills could improve learning strategies and academic success of university students. Due to the important role of such supportive programs aimed at the fresh students, this survey was carried out to investigate the effectiveness of an optional course of learning and study skills on learning and study skills of second year medical students.

METHODS: This quasi-experimental research was performed on 32 eligible medical students in Isfahan University of Medical Sciences, who chose the optional course of learning and study skills. Both of intervention and control groups completed Learning and Study Strategies Inventory (LASSI) at the beginning and the end of semester. Students in the intervention group studied different components of reading and learning skills using team working. Their final scores were calculated based on written reports on application of study skills in exams (portfolio), self-evaluation form and their progress in LASSI test. The mean differences of scores before and after intervention in each of ten test scales were compared between two groups.

RESULTS: The results showed that the mean difference scores in attitude, time management, information processing, main ideas selection, study aids and self-testing scales were significantly higher in the intervention group ($p < 0.05$ for all).

CONCLUSIONS: This optional course successfully improved learning strategies in the corresponding classroom activities. However, there was no improvement in the motivational scale which is tightly related to the educational success. Therefore, the implementation of educational programs with an emphasis on meta-cognitional aspects of learning is recommended.

KEYWORDS: Study skills, Curriculum, Learning and study strategies inventory, Medical student.

There have been reports on increasing rates of abandoning university in recent decades, which have caused financial and psychological losses for both students and educational institutions.[1] Perhaps many of these students had the required abilities to be successful in their academic careers. Therefore, several universities have designed some supportive programs to help the students overcome educational obstacles. It has been shown that a positive relation between application of the learning and study skills and educational success is suspected.[2-4] That is why study skill courses have recently increased. About 81% of institutions organized some supportive

courses and 13% of the newly arrived students attended these classes annually.[5] The effectiveness of educational interventions in the practice of studying and learning techniques and improving the grades of students has been previously reported.[6-10] However, there are limited numbers of surveys investigating the study skills of Iranian students. In one study, positive results were demonstrated after a workshop of study skills aimed at helping talented students.[11] In addition, organizing such programs seems necessary for freshman students (medical students in particular) due to transition from high-school to university. Moreover, this group of students has difficulty

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in processing the information from various sources, continuous monitoring and using retention techniques.[3] Accordingly, this study was carried out to investigate the effectiveness of an optional course of learning and study skills on learning and study skills of second year medical students.

Methods

In a quasi-experimental study carried out in 2009-2010 academic year and 63 medical students from Isfahan University of Medical Sciences studying in the 3rd or 4th semester were recruited. Thirty two students who chose the optional course of learning and study skills, were selected as the intervention group, while 31 students attending the clinical physiology course were selected as the control group. Medical students who did not have an Iranian nationality were not enrolled in the study and those who did not participate in the "Learning And Study Strategies Inventory" (LASSI) before or after the course were also excluded from the study. Both groups completed the LASSI questionnaire at the beginning and end of the semester. The LASSI is a 10-scale, 77-item assessment of students' awareness about and use of learning and study strategies included attitude, motivation, time management, anxiety, concentration, information processing, selecting main ideas, study aids, self-testing and test strategies. It is both diagnostic and prescriptive. It provides students with a diagnosis of their strengths and weaknesses, compared to other college students, in the areas covered by the 10 scales. It is prescriptive in that it provides feedback about areas where students may be weak and need to improve their knowledge and skills. The "attitude" scale assesses students' attitudes and interest in college and academic success. The "motivational" scale considers students' diligence, self-discipline, and willingness to exert the effort necessary to successfully complete academic requirements. The "time management" scale assesses students' application of time management principles to academic situations. The "anxiety" scale evaluates the degree to which

students worry about school and their academic performance. The "concentration" scale appraises students' ability to direct and maintain attention on academic tasks. The "information processing" scale assesses how well students can use imagery, verbal elaboration, organization strategies, and reasoning skills as learning strategies to help build bridges between what they already know and what they are trying to learn and remember. The "selecting main ideas" scale evaluates students' skill in identifying important information for further study. The "study aids" scale assesses students' use of supports or resources to help them learn or retain information. The "self-testing" scale considers students' use of reviewing and comprehension monitoring techniques. The "test strategies" scale evaluates students' use of test preparation and test taking strategies. Each scale contains eight items except one which has five (77 items in total). For each of the 77 items, students were requested to darken the bubble containing the letter that corresponds to how well the statement describes them on a five-scale ranging from "NOT AT ALL LIKE ME" (scale: 1) to "VERY MUCH LIKE ME" (scale: 5). This questionnaire is a diagnostic tool to find out the learning problems in ten different domains, so the overall score is not calculated [12]. Validity and reliability of the Persian version were confirmed in previous studies.[13]

For the intervention group, different components of strategic learning like attitude, motivation, time management, anxiety, concentration, study aids, etc. were taught during the semester in two-hour weekly sessions (16 sessions in total). The course was held as a workshop and all the students actively participated in the program. At the beginning of each session, the students presented written and oral reports about the application of the learning strategies which were introduced in the previous discussion. In each session, students learned one study skill by team working, lecture and discussion. The lecturer provided some explanation about the subject by an example and then, a discussion was held about

the importance of using the learning guidelines. Since the students were aware of each session's topic and had to do some study about the topics before each session, they actively participated in the discussion. The lecturer had to provide the information and data during the discussion and conclude the topic at the end of each session while defining the assignments and resources for the next session. In the second session of the course, each student was informed about his pre-course score and became aware of his/her weaknesses. In the control group, students attended clinical physiology lectures and case presentations presented by a physiology professor.

Monitoring and evaluation

Students were evaluated based on a portfolio, self-evaluation questionnaire and their progress in LASSI test. Portfolio was consisted of monitoring forms about the implementation of each skill in their current studies during the last week and written reports about the practice of ten study skills in preparing for midterm and final exams. Finally, the students' efforts during the term were evaluated by self-evaluation form via a questionnaire of seventeen questions. This questionnaire considered different domains like being on time and active in the classroom, doing homework, participat-

ing in the discussions, etc. The final scores were calculated based on their portfolio, monitoring forms, written reports of recruitment of the strategies in mid-term and final exams, classroom activity and their progress in the LASSI test.

Data Analysis

Demographics, the pre- and post course LASSI scores as well as self-evaluation questionnaire scores for each of the seventeen questions were presented as mean ± standard deviation. The range of LASSI scores for each scale was from 1 to 5. The range of self-evaluation scores for each question was from 0 to 5. Kolmogorov-Smirnov test was employed to make sure the normal distribution of the data. Demographic data from the two groups were compared by t-test to find out if they were similar. Mean LASSI scores before and after the courses were compared by paired t-test while mean difference of LASSI scores before and after intervention were compared between two groups by t-test. Data analysis was done by SPSS software (ver. 16) and P-value less than 0.05 was considered as statistically significant.

Results

Considering the exclusion criteria, the data from 26 students in the intervention group and

Table 1. Learning and study strategies inventory (LASSI) scores in each 10 scales before and after intervention.

Items	Intervention Group			Control Group		
	Pre-course	Post-course	P-value	Pre-course	Post-course	P-value
Attitude	3.68±0.67	3.90±0.59	0.006	3.90±0.42	3.90±0.44	0.50
Motivation	2.90±0.77	3.20±0.58	0.012	3.10±0.61	3.20±0.69	0.50
Time Management	2.66±0.59	3.01±0.72	0.001	2.90±0.58	2.90±0.54	0.63
Anxiety	3.50±0.67	3.70±0.72	0.27	3.40±0.57	3.30±0.76	0.89
Concentration	3.10±0.68	3.40±0.91	0.006	3.20±0.60	3.30±0.83	0.45
Information Processing	3.30±0.74	3.60±0.61	0.005	3.50±0.59	3.40±0.83	0.10
Selecting the Main Idea	3.60±0.60	3.60±0.76	0.41	3.80±0.51	3.50±0.59	0.006
Study Aids	2.60±0.61	3.30±0.65	0.00	3.07±0.75	2.90±0.81	0.40
Self-testing	2.60±0.81	2.90±0.69	0.006	2.80±0.66	2.70±0.77	0.20
Test Strategies	3.50±0.84	3.70±0.71	0.09	3.70±0.55	3.66±0.73	0.70

The results are expressed as Mean±Standard Deviation (SD).

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Table 2. Learning and study strategies inventory (LASSI) scores changes
before and after intervention for each of the 10 scales

Items	Mean Difference of LASSI Scores		P value
	Intervention Group	Control Group	
Attitude	0.20±0.4	-0.04±0.3	0.01
Motivation	0.2±0.5	0.06±0.4	0.1
Time Management	0.3±0.5	-0.04±0.4	0.007
Anxiety	0.1±0.6	-0.01±0.5	0.3
Concentration	0.3±0.5	0.1±0.6	0.2
Information Processing	0.3±0.5	-0.1±0.4	0.003
Selecting the Main Idea	0.09±0.5	-0.3±0.4	0.01
Study Aids	0.6±0.6	-0.1±0.6	<0.001
Self-testing	0.3±0.5	-0.1±0.5	0.007
Test Strategies	0.2±0.7	-0.03±0.6	0.1

The results are expressed as Mean ±Standard Deviation (SD).

22 students in the control group was used in the final analysis. Mean age of the study population was 20.4 ± 2.2 years in the intervention group and 20.7 ± 0.86 years in the control group ($p > 0.05$). Before and after study LASSI scores in each of the ten scales are summarized in table 1. The before and after mean difference of LASSI scores was significantly higher in the intervention group for all the ten scales except for anxiety, test strategies, motivation and concentration scales (table 2). Mean and standard deviation scores of self-evaluation questionnaire are summarized in table 3.

Table 3. Scores of self-evaluation questionnaire (compared to maximum score 5).

Items	Score (Mean + SD)
Being on time during the course	4.10 ± 1.20
Class attendance	3.80 ± 1.09
Active participation in the classroom	3.20 ± 1.30
Doing the homework	3.30 ± 1.70
Application of the strategies in studying	3.20 ± 1.30
Active participation in practical class works	3.50 ± 1.50
Seriously considering the issue	3.60 ± 1.50
Planning	3.50 ± 1.10
Following the plan	3.30 ± 1.20
Productivity of the studies	3.60 ± 1.02
Daily studying	2.50 ± 1.30
Increasing the studies	3.20 ± 1.05
Enjoying the study	3.30 ± 1.40
Application of the retention techniques	3.60 ± 1.30
Score improvement	3.30 ± 1.10
Concentration improvement	3.40 ± 1.20
A new look at planning and studying	3.50 ± 1.20
Studying without tension	3.90 ± 1.30

Discussion

The present study investigated the efficiency of learning and study skills training course on application of the learning strategies in a population of second year medical students. Analyzing the data, we detected a significant increase in the post-course LASSI scores in six subscales (attitude, time management, information processing, selecting the main idea, self-testing and study aids scale) among the intervention group compared with the control group. Other surveys have also demonstrated the advantages of instructing application of learning guidelines in short-term and academic success in the long-term period. In West Virginia University, freshman students in a one-semester study strategies course were given individual LASSI profiles and general feedback in a group setting. Half of the students received additional individual feedback which consisted of specific training for improving performance on each pre-course LASSI score below the 50th percentile. The results indicated that students who received extended, one-on-one feedback had significantly higher scores on seven post-course LASSI subscales (attitude, motivation, time management, anxiety, concentration, selecting main ideas, and test strategies).[6] In another study in Southern California University, a new faculty coach role was introduced which included teaching at-risk nursing students to use learning and motivational strategies and self-management skills to improve academic success. Students' post-course LASSI scores demonstrated significant improvement in 5 of the 10 subscales (motivation to accept responsibility for studying, anxiety management, concentration, selecting the main idea, and test-taking skills).[8] Although in some subscales (attitude, selecting the main idea and time management) our results are consistent with these surveys,[6,8] the notable finding was that motivation improvement was not prominent in our study. Previous studies have demonstrated that Iranian students of medicine, dentistry and pharmacy have lower motivational scores compared with the American students (below the 50th percentile).[13] Furthermore, the educational interventions did not improve the corresponding score.[11] In another quasi-experimental study, 40 talented students attended a 20-hour workshop on learning and study skills with the main focus on theories of learning, cognition and metacognition, learning styles, information processing theory, effective study methods, study-planning techniques, fast reading techniques, participatory learning methods, retention patterns and exam techniques. The post-course scores were significantly improved in five scales of selecting main ideas, study aids, information processing, self-testing and test strategies scales. The mean pre-workshop scores of students in attitude, motivation, time management, study aids and self-testing scales were below the 50th percentile, which improved to over 60th percentile after the workshop, except for the motivation scale. This finding highlights the fact that Iranian students are concerned with homework and personal goals but their motivational activities are low. Tension of promoting to physiopathology stage of the academic career, difficulty in adjustment and adaptation to the new roles at the university, uncertain employment and occupational status and the stress of specialty exam seem to be the most important factors in lowering the motivations of medical students.

In another similar study, 1st and 2nd year university students attended a study skills course during one semester, gaining knowledge about learning skills, retention techniques, time management, etc. However, no significant improvement was observed in attitude, motivation, concentration and time management scales. The author believed that such courses may improve the processing and data organizing abilities of the students in the classroom, but they have no significant effect on motivation enhancement.[7] In the long-term, educational interventions affect the academic success, attrition rate and grade point improvement.[8-10] The students who attended the course in our study, mentioned in self-evaluation form that their grades, learning rate and learning efficiency were improved due to this intervention, while,

lack of investigating long-term consequences of our intervention may be considered as a weakness. Also this course was optional and students selected it based on their interests. So we could not use randomization to divide participants in two groups.

The educational programs comparing the successful and unsuccessful students revealed that learning and study skills application was significantly different between the two groups. Moreover, motivation and attitude were the two main factors of academic success,[3,4,14,15] which intensifies the importance of educational interventions with a focus on motivation improvement. Fifty-one articles on the subject of efficiency of educational interventions in learning skills were investigated in a meta-analysis. SOLO taxonomy (a hierarchical model for learning outcome) was used to investigate the complexity of intervention structure, which is divided into four stages consisted of uni-structural stage (which includes a simple change such as stress reduction), multi-structural stage (to learn a set of independent methods and strategies such as a study skills package), relational stage (which is centered on metacognitional and affective interventions such as academic success as a result of self-regulation) and extended abstract.[16] Considering this taxonomy, we included the different stages of cognition and metacognition in the survey which is a strong point in performance, monitoring and evaluation of our report which were consisted of different parts like portfolio, self-evaluation questionnaire and LASSI test.

In another study, a mandatory course of learning and study skills was designed in four metacognitive stages: knowledge, evaluation, planning and monitoring. It was shown that after the training course, the enrolled students were able to apply the learning strategies and manage their learning process with a high motivation.[17] Despite our attention to cognitive and metacognitive aspects of learning, there was no improvement in students' motivation which notifies the strength of social factors. In terms of study population, freshman [17] or pre-university students [18] were enrolled in most of the surveys like our study. Such interventions are planned as study aid programs by means of needs assessment for higher year students,[19] unsuccessful or at risk students [8] and even higher levels of education such as residency programs.[20] Various topics including interpersonal communication skills, friends finding, presentation skills, evaluation principles and strategies, self-directed lifelong learning, personal and professional development, confidence growing, strengthening mechanisms of memory, critical thinking, problem solving, etc. are presented according to various stages of academic career and student demands.[18-20]

In conclusion, our study demonstrated that the optional course of learning and study skills effectively improves the application of the corresponding techniques in second year medical students. The most prevalent effect of this course was on classroom activities (time management, information processing, selecting main ideas and self-testing), but it had no influence on motivation scale because of the social and occupational related stress. By analyzing the post-course self-evaluation questionnaire, it was figured out that participants in our study believed that attending the course improved their planning and performance abilities and the final term grades. For the future studies, we suggest examining the long-term effects of such educational interventions in academic success, admission to higher education and improvement of average final term grades. In addition, the structure of future courses could be focused on self-guidance enhancement. Then, the self-guided students learn the ability to manage their learning process automatically. Even though, such interventions are mostly planned for the freshmen (during the high school-university transition), but they could be organized for students in other fields of medical sciences, unsuccessful students or higher grade students according to related and demanded topics.

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Conflict of Interests

Authors have no conflict of interests.

Authors' Contributions

FH carried out the study, participated in the design of the study and acquisition of data. AS participated in the design of the study, performed the statistical analysis and wrote the manuscript. All authors read and approved the final manuscript.

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