

# The Use of Different Study Skills by Undergraduate and Postgraduate Students of Kerman Dental School

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## Abstract

**Background:** Different study skills have been developed and introduced, although most learners are apparently unaware of them.

**Objectives:** This study was conducted to investigate the frequency of using different study skills among undergraduate and postgraduate students.

**Method:** The study population consisted of 201 undergraduate and 45 postgraduate students of Kerman Dental School in 2016-2017, who were selected using the random stratified sampling method. A questionnaire composed of four questions used to collect data. The questionnaire was a modified version of the one used by Karpiacke et al. The frequency of using different study skills (i.e., re-studying, re-writing, using flashcards, studying in groups, memorizing, teaching content, creating headings, self-testing, highlighting, finding connections, and finding real examples) was asked in the first question. Students' preparation for exams and students' satisfaction with their study skills were asked in the next questions. Data was analyzed using the chi-square test in SPSS23.

**Results:** Of the 246 participants, 72 (35.8%) undergraduate students and 20 (44.4%) postgraduate students were male. The frequency of using different study skills was the same between the male and female undergraduate students, except for re-writing ( $P=0.024$ ), studying in groups ( $P=0.018$ ), and creating headings ( $P=0.018$ ) which were higher in the female undergraduate students. However, there was no significant difference between male and female postgraduate students in terms of the frequency of using different study skills.

**Conclusion:** The most and least commonly used strategies by the undergraduate and postgraduate students were re-studying and using flashcards, respectively. Only 30.3% of the undergraduate and 24.4% of the postgraduate students used the self-testing strategy.

**Keywords:** Study skills, study strategies, students, dental school

## Background

Studying is a mental process with its specific principles and conditions. Knowing, using or providing these principles can lead to more efficient learning and higher efficacy. In fact, effective studying depends on the student's interest in the subject and also the skillful use of study strategies (1). Study skills or study strategies are discrete techniques that can be learned and applied to all or most fields of study. Different individuals have various study skills which differ based on their interests, habits, and characteristics. Therefore, it can be claimed that each individual has a unique study skill (2). The quality and quantity of learning are also affected by the general level of intelligence, physical and mental health, and

motivation for learning (3). Previous studies in Iran have shown that problems with learning skills and unawareness of them should be considered in the academic failure of university students (4, 5). Study strategies are divided into four categories:

**1. Repetition-based:** Include the use of flashcards and keywords

**2. Cognitive-based:** Include studying with friends or in different groups

**3. Procedural:** Include time management, organizing subject matters, and study programming

**4. Metacognitive:** Include self-testing to evaluate the level of learning (6)

Study skills are substantial to academic competence, and practical study skills are associated with positive outcomes in an academic career (6).

Different study skills have different effects on increasing learning. It has been shown that highlighting, keyword mnemonics (using keywords and mental imagery to associate verbal materials), summarization, and re-reading are not highly efficient for learning. However, self-explanation, interleaved practice (implementing a study schedule that includes different kinds of materials in a single day), and elaborative interrogation (generating an explanation for why a concept is true) are proven to have moderate efficacy. Moreover, practice testing (self-testing) and distributed practice (implementing a practice schedule that expand study activities over time) have been reported to exert significant effects on learning and long-term retention of data (7). Karpicke and Blunt (8) found out that retrieval practice was superior to re-studying for making inferences and learning scientific knowledge. Clinical decision making depends on sufficient scientific knowledge, which allows retrieval of that knowledge. In a study by Karpicke et al. (9), most students read their notes or textbooks repeatedly but had relatively limited engagement in self-testing or retrieval practice while studying. Mc Andrew (10) also reported that 54.6% of the students of New York University College of Dentistry would not test themselves after reading a textbook chapter.

### Objectives

For educational researchers, one way to improve education quality is to have sufficient knowledge about how students attempt to learn. Therefore, the present study was designed to evaluate different study skills used by undergraduate and postgraduate students of Kerman Dental School.

### Methods

The present descriptive cross-sectional study was conducted in 2016-2017 on the students of Kerman Dental School. Based on the literature (5) and Cochran's formula with 0.05 level of precision, 204 undergraduates, and all the postgraduate students (n=65) of Kerman Dental School were selected using stratified random sampling. Accordingly, 34 undergraduate students were selected from different years of entrance by randomly selecting student numbers. Data collection was carried out with the use of a questionnaire consisting of four questions, which was a modified version of the one used by Karpicke et al. (9). Test-retest reliability was calculated using intraclass correlation coefficient (ICC). Ten dental students completed the questionnaire. Then, the copies of the questionnaire were coded, and after three weeks, the same students completed the questionnaire (ICC=0.94). Eight different dental specialists and two medical education specialists completed the questionnaire to evaluate its validity. Finally, two questions were revised, and the questions were deemed appropriate concerning their content.

The first question was open-ended, asking the students to select their favored study skills from the list of 11 study skills (re-studying, re-writing, using flashcards, studying in groups, memorizing, teaching content, creating headings, self-testing, highlighting, finding connections, and finding real examples) and order them in terms of frequency of use. In addition, they also had the option to list a strategy not found on the list.

In the second question the students were told to imagine reading a chapter of their textbook for an exam. They were then asked to choose one of the following options after they studied the chapter once:

- a) I go back and re-study the whole chapter or some specific parts of it.
- b) I try to continue by self-testing (with the possibility of referring to the book again).
- c) I use other study techniques.

This closed-ended question aimed to determine whether the students were inclined to use conventional study strategies or more modern strategies.

The third and fourth questions asked the students' opinions about their satisfaction with their study skills and their interest in participating in new study skill courses.

The researcher distributed anonymous questionnaires among the students after one of the noon classes. The researcher provided explanations about the study and its purpose, and asked the students to participate in the study voluntarily. Other random numbers replaced students who did not want to participate in the research. Moreover, all the subjects were reassured that the questionnaire data would remain confidential. Data analysis was performed using a chi-square test in SPSS version 23, and a significant level of 0.05 was considered. The study was confirmed by the Ethics Committee of the Kerman University of Medical Sciences (Code IR.KMU.REC.1395.470).

### Results

The total number of the students was 246, consisting of 201 (81.7%) undergraduate students and 45 (18.3%) postgraduate students. Three copies of the questionnaire completed by the undergraduate students were excluded from the study because they were erroneous, and 20 postgraduate students were not willing to participate in the research.

Of the 246 participants in the study, 72 (35.8%) undergraduate students and 20 (44.4%) postgraduate students were male. The frequency of using study strategies by the students and their first priorities are shown in Table 1. The male and female undergraduate students used almost the same study strategies, except for re-writing notes (P=0.024), studying in groups (P=0.018), and creating headings (P=0.018). The percentage of using the three aforementioned strategies was significantly higher in the female undergraduate students compared to their male counterparts (Table 2). However, there was no significant difference between the male and female postgraduate students in terms of the frequency of using different study skills (P>0.05).

The most and least commonly used strategies by the undergraduate and postgraduate students were re-studying and using flashcards, respectively. Moreover,

30.3% and 24.4% of the undergraduate and postgraduate students used the self-testing strategy, respectively.

**Table 1.** The frequency of the study strategies and their selection as the first priority in the undergraduate and postgraduate students

Study strategies	Frequency(%) of those using this strategy		Total samples Frequency (%)	Frequency(%) of those choosing this strategy as the first priority		Total samples Frequency(%)
	Undergraduate students	Postgraduate students		Undergraduate students	Postgraduate students	
re-studying	179(89.1%)	40(88.9%)	219(89%)	67(33.3%)	10(22.2%)	77(31.3%)
using flashcards	29(14.4%)	8(17.8%)	37(15%)	2(1%)	0(0%)	2(0.8%)
re-writing notes	120(59.7%)	25(55.6%)	145(58.9%)	10(5%)	1(2.2%)	11(4.5%)
studying in groups	93(46.3%)	9(20%)	102(41.5%)	8(4%)	0(0%)	8(3.3%)
memorizing content	139(69.2%)	26(57.8%)	165(67.1%)	19(9.5%)	3(6.7%)	22(8.9%)
teaching content	60(29.2%)	11(24.4%)	71(28.9%)	2(1%)	1(2.2%)	3(1.2%)
highlighting important points	139(69.2%)	39(86.7%)	178(72.4%)	26(12.9%)	15(33.3%)	41(16.7%)
finding real examples	84(41.8%)	34(35.6%)	100(40.7%)	7(3.5%)	3(6.7%)	10(4.1%)
self-testing	61(30.3%)	31(24.4%)	72(29.3%)	1(0.5%)	0(0%)	1(0.4%)
finding connections	84(36.8%)	26(31.1%)	88(35.8%)	4(2%)	0(0%)	4(1.6%)
creating headings	6(31.3%)	31(40%)	81(32.9%)	4(2%)	0(0%)	4(1.6%)

**Table 2.** The frequency of using three study strategies in the undergraduate students in terms of gender

Strategy	Answer	Male	Female	Total	P
Re-writing	Not used	37	44	81	0.024
		51.4%	34.1%	40.3%	
	Used	35	85	120	
		48.6%	65.9%	59.7%	
	Total	72	129	201	
		100%	100%	100%	
Studying in groups	Not used	47	61	108	0.018
		65.3%	47.3%	53.7%	
	Used	25	68	93	
		34.7%	52.7%	46.3%	
	Total	72	129	201	
		100%	100%	100%	
Creating headings	Not used	57	81	138	0.018
		79.2%	62.8%	68.7%	
	Used	15	48	63	
		20.8%	37.2%	31.3%	
	Total	72	129	201	
		100%	100%	100%	

Using the re-studying strategy was the highest priority among the undergraduate students (33.3%), followed by using the highlighting strategy (12.9%). Moreover, self-testing (0.5%) was the least used strategy as their first priority among the undergraduate students. In the group of postgraduate students, the first priority was highlighting (33.3%), followed by re-studying (22.2%). Interestingly, none of the residents chose to use study strategies, including using flashcards, studying in groups, self-testing, finding connections, and creating headings as their first priority.

Table 3 shows the percentage of students who chose re-

studying, self-testing with re-studying, or another strategy to review one chapter of their textbook before an exam.

Overall, 77.6% of the undergraduate students and 82.2% of the postgraduate students reported satisfaction with their study skills. Moreover, 59.5% of all the participants were interested in taking part in courses offering new study skills.

### Discussion

Retrieval of information from memory compared to re-studying results in more efficient learning and retention of the subject matter in memory for a longer time. This is

**Table 3.** The frequency of students choosing re-studying, self-testing (with re-studying), or other techniques as the preferred study strategy before an exam.

Question	Undergraduate students	Postgraduate students	Total	
A: I return and study the whole chapter or some specific parts of it	144(71.6%)	38(84.4%)	182(73.9%)	
B: I try to continue by self-testing (with the possibility of referring to the book again).	1: Testing for feedback	9(4.47%)	1(2.22%)	10(4.06%)
	2: Practicing to retrieve information	17(8.45%)	2(4.44%)	19(7.72%)
	3: Others	0(0%)	0(0%)	0(0%)
C: I use other study techniques	28(13.9%)	4(8.88%)	32(13%)	

called the 'testing effect' (11). Although this phenomenon was reported many years ago, great emphasis has been laid on the numerous advantages of information retrieval practice for learning during recent years (12-15).

The present study showed that the undergraduate and postgraduate students of Kerman Dental School used conventional study strategies such as re-studying textbooks and highlighting important points more than other strategies. These conventional strategies are reported to be used by students more frequently. However, strategies such as self-testing or distributed practice can improve students' success in a wide range of areas (7).

Mc Andrew et al. (10) carried out a study based on 12 variables for study strategies and showed that the most commonly used strategy was re-studying (83.3%), followed by memorizing (71.2%) and highlighting (54.5%). They also reported that using flashcards was the least commonly used strategy (9.1%). These results are similar to those obtained in the present study. Furthermore, the frequencies were similar in terms of strategies such as re-writing notes, teaching the content, memorizing, and highlighting. In another study by Karpicke et al. (9), re-studying was also the most commonly used technique. Moreover, problem-solving and using flashcards were the most commonly used strategies after the re-studying technique. However, contrary to the present study and the study by Mc Andrew et al. (10), finding real issues related to the subject was the least commonly used technique. Furthermore, regarding the self-testing strategy, the present study, and the study by Karpicke et al. (9) yielded similar frequencies. However, in the study by Mc Andrew et al. (10), self-testing was used by almost half of the students. Only 0.5% of the undergraduate students and none of the postgraduate students in our study and Mc Andrew et al.'s study (10) indicated that self-testing was their preferred strategy. A study about students' study skills in Mashhad School of Dentistry showed that 64% of the students never asked themselves a question about the study content; in this context, 28% of the students sometimes asked questions and only 6% of them always asked questions. These are consistent with the results of the present study, indicating that the majority of students do not use the self-testing strategy (2). Mehdinezhad et al. (16) reported that more than 80% of students used superficial study skills that were memory-based and result-oriented. In contrast, students are less oriented to use deep study skills for learning.

The target population in Mc Andrew et al.'s (10) study was second-year dental students. Students of different

majors were also involved in the study conducted by Karpicke et al. (9). Therefore, it might be claimed that different study populations and different study fields should be considered while comparing results.

Due to the ease of using the re-studying technique, students might suppose that they have reached the required efficiency of the subject matter, which is above what they have really learned or memorized. However, the information retrieval technique (self-testing) requires more efforts, and the learner's mind is more intensely involved in the process of studying. Thus, students become more aware of their weaknesses and can plan studies accordingly (9). Previous studies have shown that self-testing can deeply enhance students' learning. Testing in the form of a quiz by the instructor in the classroom results not only in the promotion of learning, but also in more profound learning, better retention of information in mind, and further focus on weak points (9, 10, 17).

Unfortunately, only a small number of undergraduate students and even fewer postgraduate students in our study used the self-testing strategy as their first priority. It appears that the students did not believe that self-testing could promote profound learning, or that they were unaware of its potential in leading to success. In fact, dedicating a long time to review and re-study the subject matter(s) and sending them to memory per se cannot improve learning (20). It should be pointed out that using flashcards is somehow classified as a component of the self-testing technique, although students can passively have access to answers (7). However, in the present study, using flashcards was the least frequent technique among all the study techniques for all the subjects.

In a study by Shetty and Srinivasan (19) in India, 43.1% of students always highlighted important information. However, in the present study, the rate of using the highlighting technique was 69.2% by the undergraduate students and 86.7% by the postgraduate students. This rate was higher in our study than in Shetty and Srinivasan's study, which might be due to the academic year of the students, which was different in the studies. Based on available knowledge, highlighting and underlining cannot significantly boost performance and are not efficient for use in high-level tasks requiring inference making (7).

Based on a study by Romanelli et al. (20), the mnemonic strategy had a good effect on studying and promoted the retrieval of essential information. In our study, 36.8% of the undergraduate students and 31.1% of the postgraduate students used the mnemonic strategy. However, in studies

by Mc Andrew et al. (10) and Karpicke et al. (9), 25.8% and 13.5% of subjects used this strategy, respectively. It should be noted that this strategy is currently seldom used by students and instructors. The reason is that the implementation of this strategy requires training and development of keywords, whether by teachers, students, or textbook designers (7).

Regarding the second question about preparing for the exam after reading the relevant content once, 71.6% of the undergraduate students and 84.4% of the postgraduate students selected re-studying the content. However, in studies by Karpicke et al. (9) and Mc Adrew et al. (10), only 48.8% and 25.8% of students selected this strategy, respectively. This indicates the possible role of the field of study and educational level on strategies used for studying. Students' characteristics can also influence their choice of study strategies. For instance, younger students, compared to more advanced students, might have different studying options.

In the present study, 4.47% and 2.22% of the undergraduate and postgraduate students, who selected self-testing in response to the second question, respectively used this strategy to receive a feedback, and only 8.45% and 4.44% of them respectively used it to practice recall. Based on the results of the present study, a majority of students are not familiar with the memory-strengthening advantages of this technique.

In this study, 77.6% of the undergraduate students and 82.2% of the postgraduate students were satisfied with their study skills, and 42.3% of them were not interested in participating in study skill courses. This indicates that a considerable amount of students assume that they use proper learning strategies.

### Conclusion

The students in the present study used study strategies, which result in efforts to retrieve information from memory less frequently than conventional techniques such as re-studying and highlighting. University instructors are suggested to make greater efforts to introduce study skills that rely on information retrieval practice. This can result in better learning as well as better retention of subject matters in students' memory.

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