

# Impact of Students' Class Attendance on Recalling Previously Acquired Information

Camellia Hemyari<sup>1</sup>, MA; Kamiar Zomorodian<sup>2</sup>, PhD; Ali Sahraian<sup>3</sup>, MD; Zahra Mardani<sup>4</sup>, MD; Bahador Sarkari<sup>5</sup>, PhD; Nastaran Ahmadi<sup>6</sup>, MA

<sup>1</sup>PhD candidate of Clinical Psychology, Department of Psychiatry, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran

<sup>2</sup>Professor of Medical Mycology, Basic Research in Infectious Diseases Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

<sup>3</sup>Professor of Psychiatry, Research Centre for Psychiatry and Behavioral Sciences, Shiraz University of Medical Sciences, Shiraz, Iran

<sup>4</sup>Student Research Committee, Shiraz University of Medical Sciences, Shiraz, Iran

<sup>5</sup>Professor of Immunoparasitology, Basic Research in Infectious Diseases Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

<sup>6</sup>PhD candidate of Clinical Psychology, Yazd Cardiovascular Research Center, Afshar Hospital, Jomhourri Boulevard, Yazd, Iran

## Abstract

**Background:** In recent years, availability of class material including typed lectures, the professor's Power Point slides, sound recordings, and even videos made a group of students feel that it is unnecessary to attend the classes. These students usually read and memorize typed lectures within two or three days prior to the exams and usually pass the tests even with low attendance rate. Thus, the question is how effective is this learning system and how long the one-night memorized lessons may last.

**Methods:** A group of medical students (62 out of 106 students), with their class attendance and educational achievements in the Medical Mycology and Parasitology course being recorded since two years ago, was selected and their knowledge about this course was tested by multiple choice questions (MCQ) designed based on the previous lectures.

**Results:** Although the mean re-exam score of the students at the end of the externship was lower than the corresponding final score, a significant association was found between the scores of the students in these two exams ( $r=0.48$ ,  $P=0.01$ ). Moreover, a significant negative association was predicted between the number of absences and re-exam scores ( $r=-0.26$ ,  $P=0.037$ ).

**Conclusion:** As our findings show, the phenomenon of recalling the acquired lessons is preserved for a long period of time and it is associated with the students' attendance. Many factors including generation effect (by taking notes) and cued-recall (via slide picture) might play a significant role in the better recalling of the learned information in students with good class attendance.

**Keywords:** STUDENT, MEMORY, LONG-TERM, RECALL, ABSENTEEISM, LEARNING

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## Introduction

For years, students' presence in the classes

\*Corresponding author: Nastaran Ahmadi, MA of Clinical Psychology, Yazd Cardiovascular Research Center, Afshar Hospital, Jomhourri Boulevard, Yazd, Iran.

Phone/Fax: +98 (35) 35231421

Email: kzomorodian@gmail.com

and its association with their educational performance has been a major dilemma for educational systems. About 50 years ago, Baum and Youngblood reported a higher presence rate of students when attendance was compulsory (1). In recent decades, we have been facing a remarkable decline in the presence of students' in classes. This phenomenon is

a multi-factorial feature that might be due to intrinsic (individual) factors such as level of interest in a subject, motivation, influence of peers, and students' social life or extrinsic (course-related) factors including class time, complexity of materials, type and style of teaching, availability of course material, perceived impact on examination performance, and socio-economic conditions (2-6).

Although the association between students' attendance in the classes and their educational achievements has been thoroughly investigated (7-10), many questions regarding the class attendance remain unanswered. Novel accessible technologies including voice and movie recording applications in the students' gadgets, enable them to have all the data and information needed for the examination available by just a click, without their physical presence in the classes. In agreement with the above-mentioned facts, some university students in Iran so-called "Navarioon" (transcribers) periodically type and print the recorded lectures of their professors and distribute them among other students. Accessibility to these typed notes in addition to the professors' PowerPoint slides, voices, and even videos make a group of students feel that they do not need to attend classes. These students usually read and memorize the typed lecture within two or three days (so-called exam night) prior to exams and usually pass the tests, even with low attendance rate. In our previous study (10), of the 29 students (26.8%) with the absence number of more than two third of the sessions ( $\geq 10$  out of 15 sessions), only one student failed the final exam. Moreover, there was a minority group of students with low attendance rate and good exam scores (upper 25% present of class). This group of students that memorize class lessons within two or three days prior to the exam consisted of 4.6% of the students. Thus, the question is how effective is this learning system and how long one-night memorized lessons may last. On the other hand, the exam-night learning method challenges our teaching

system as well as the effectiveness of the student's class attendance and participation. Answering the above-mentioned questions might have a considerable role in designing effective educational strategies.

As mentioned above, we previously examined the effect of seating preferences of the medical students on educational achievements (10). In that study, the students' presence in the classroom was recorded by the digital camera and the relationship between their educational achievement (in terms of recalling the learned materials) and the effect of class participation was evaluated using their final exam scores over a period of time in Medical Mycology and Parasitology courses. These students, whose class participations and educational achievements were recorded previously since two years ago, were selected once again to test their knowledge about Medical Mycology and Parasitology course using the MCQ designed from their previously learned lectures.

## Methods

### *Study Design and Participants*

This research was a cohort study conducted during 2015-2017 on the medical students who had previously participated in Medical Mycology and Parasitology courses at the School of Medicine of Shiraz University of Medical Sciences (SUMS). The Medical Mycology and Parasitology course is a sophomore-level course on the pathogenesis and treatment of mycotic and parasitic infections for medical students that is offered in the fifth semester of the MD program. The sample included all 106 medical students who attended two 90-minute lectures and one two-hour laboratory session each week for 17 weeks. The lectures were presented by university professors using PowerPoint slides and included some case studies. To enhance student activities, they were asked to answer questions and participate in short discussions and dialogues. The attendance of the students was recorded using digital photos

taken during each of the 15 sessions of the course. The educational achievement of each participant was measured by MCQs at the end of the course (final exam).

After two years, 62 of the previously examined students reached their externship course and were requested to voluntarily participate in the study to assess the effect of class participation on recalling the learned lessons. For this purpose, a re-exam (pop quiz) was designed by the former corresponding professors based on the taught lessons. The re-exam included multiple-choice questions similar to those of the final exam. Reliability of the tests was measured to be 0.81 using the split-half methods. Then participants were divided into three groups (I $\leq$ 3, II=4-8, and III $\geq$ 9), based on their number of absences in the parasitology and mycology course. Informed consent was obtained from each subject and the study was approved by the Ethics Committee of Shiraz University of Medical Sciences.

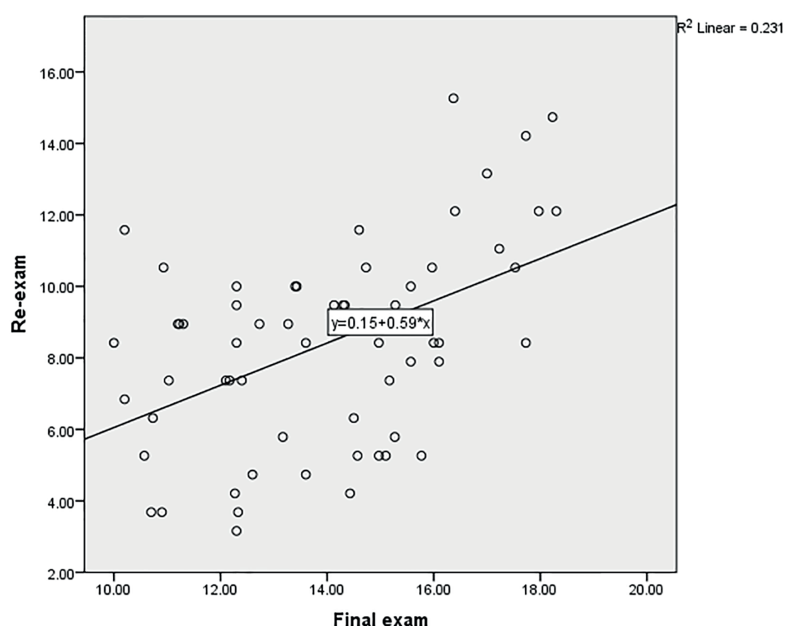
### Statistical Analyses

Pearson and Spearman's correlation was used to extract the possible associations between the continuous variables. One-way analysis of variance (ANOVA), the independent samples

*t*-test, and the nonparametric Mann-Whitney U test were applied to test differences in means among the groups. Post-hoc analysis was used to determine how specific groups differ significantly from one another. Furthermore, the chi-square test was used to test the associations between categorical variables. For the statistical analysis, the significance level was set at 0.05. IBM SPSS software, version 22.0, was used to perform all the statistical analyses.

## Results

Of the 93 previously examined students, 62 students voluntarily participated in this study. Twenty-eight (44.4%) of the students were men and the rest (n=34, 55.6%) were women. The final exam score of the students in Mycology and Parasitology courses and re-exam were  $13.97\pm 2.29$  (Range 10-18.3) and  $8.4\pm 2.81$  (Range 3.16-15.26), respectively. As shown in Figure 1, a statistically significant association was found between the re-exam scores of the students at the end of the externship and their corresponded final scores ( $r=0.48$ ,  $P=0.01$ ) in Medical Mycology and Parasitology courses. The average re-exam score in male students



**Figure 1:** The association between the re-exam scores of the students at the end of the externship and their corresponding final scores

was  $8.96 \pm 3.18$ , whereas it was  $7.94 \pm 2.42$  in female students. Using t-test, no significant difference was observed between the scores of male and female students ( $P=0.26$ ).

The frequency of students' absences in the Medical Mycology and Parasitology courses is shown in Table 1, where significant negative associations are seen between a number of absences and re-exam scores ( $r=-0.26$ ,  $P=0.037$ ). When dividing the students into three groups based on the number of absences (I  $\leq 3$ , II 4-8, and III  $\geq 9$ ), there were significant differences in an average of re-exam score between the groups by one-way ANOVA ( $F=4.26$ ,  $df=2$ ,  $P=0.019$ ). The post-hoc comparison of means by LSD method revealed significant differences in re-exam score between group I with groups II and III.

## Discussion

In recent years, due to the availability of podcasts, class slides and professors' voice recordings, the attendance rate of students' in some classes has reached a problematic level. Even though colleges and universities spend ample amount of money to use novel technology for enhancing the educational

achievements and satisfaction of students (11), the results and implications of these technologies are still controversial. Few authors believe that using technology-rich class might have induced more effective and efficient learning and consequently resulted in a better performance (12-18). On the other hand, others did not find a positive correlation between the integration of technology into classes and students' educational achievements (19-22). In this regard, Hutchens (11) showed that a lower performance rate is achieved in technology-rich classes compared with traditional ones. He suggested that one reason for the lower performance of the students in technology-rich environments might be due to the availability of class materials and lack of note-taking act, which might have negated a phenomenon known as the generation effect. According to this phenomenon, the information one generates is better remembered compared with just reading (23,24). In the present study, the Mycology and Parasitology class participation was significantly associated with recalling the thought lessons. Since many of the students in this class take notes during the lecture, especially from those parts emphasized by the professors, they might be benefited from the

**Table 1:** The frequency of absence number of the students in Medical Mycology and Parasitology course

No. of absence	No. of student	Percentage (%)	Cumulative Percentage
0	3	4.8	
1	1	1.6	6.5
2	7	11.3	17.7
3	2	3.2	21.0
4	9	14.5	35.5
5	5	8.1	43.5
6	5	8.1	51.6
7	4	6.5	58.1
8	6	9.7	67.7
9	6	9.7	77.4
10	5	8.1	85.5
11	2	3.2	88.7
12	3	4.8	93.5
13	1	1.6	95.2
14	2	3.2	98.4
15	1	1.6	100.0
Total	62	100.0	

generation effect to recall the learned lessons. Attention, comprehension, and recalls are the main key elements of effective learning in the perspective of educators. The university professors usually use different techniques and facilities such as PowerPoint for drawing the attention of students to a lesson, facilitating understanding the information being presented, and increasing the recall rate of the learned lessons. Although few authors (24) found no differences in the grade earned for the course or students' attendance with PowerPoint access and students without access, others (25-27) reported that lower attendance rate when the course materials are available before or after the lectures. On the other hand, incorporating technology into classes might have a direct positive effect on students' learning abilities and performance and nullify the negative effects of attendance rate. For example, Traphagan and colleagues, studied the influence of class lecture webcasts on students' attendance and performance and found a positive association between the implication of technologies and educational achievements; even though they have adversely affected the students' attendance (17). Similarly, in the Medical Mycology and Parasitology courses, the students have access to all class broadcasts and written notes that sequentially might affect both their participations (attendance) and performances.

Once the lesson was understood, the student should remember it for further use. This step, also known as recall, is a process of retrieving individual words or pictures elements from memory. As mentioned by Tulving and Pearlstonel (27), there are two ways of recalling, including "free recall" and "cued recall". In free recall, students remember the information without any clues and stimuli. In the cued recall, on the other hand, information initially is presented in association with stimuli (picture, diagram, etc.), and then acts as a cue to stimulate recall. In a review by Levie and Lentz (28), they concluded that comprehension level was consistently better when texts are

used along with pictures, compared with text alone. The slides used in Medical Mycology and Parasitology course were almost all rich in clinical cases and microscopic pictures to help the students toward a better understanding of the mycotic and parasitic diseases. Hence, the well-attended students might have a better visual imagination of diseases and benefit from the cued recall of diseases by the previously learned clinical and microscopic pictures.

On the other hand, students with better class attendance usually have a higher motivation and passion for learning in comparison to their classmates and learn the lessons more deeply than the others. Although the re-exam scores of the students' declined in comparison with their final exam, the scores were still significantly associated with their previous exam scores and class participations. As shown in post-hoc analysis, the difference between re-exam scores of the students' was due to the differences between the exam scores of group I with the others. It has been previously shown that these students sit in front rows and have more passion for learning than their classmates (10).

Overall, as our findings show, the phenomenon of recalling the learned material persists for a long period of time and is directly associated with students' attendance. Many factors might play a role in the better recall of the learned lessons in those with good class attendance including generation effect (by taking note), cued-recall (via slide picture), and motivation. Our results showed that the class attendance has a positive impact on memorization and recalling of the learned lessons, shortly prior the exam-night, and after a relatively long time.

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## Conflict of Interest

The author declares no conflict of interest.

## References

1. Baum JF, Youngblood SA. Impact of an organization control policy on absenteeism, performance, and satisfaction. *J Appl Psychol* 1975; 60(6): 688-94.
2. Devadoss S, Foltz J. Student class attendance and performance. *Am J Agr Econ* 1996; 78(3): 499-507.
3. Hubbard R. What use are lectures now that everything can be found online? *MSOR Connections* 2007; 7(1):23-25.
4. Lang M, Joyce A, Conaty F, Kelly B. An analysis of factors influencing the attendance of first year university students. In Pieterick J. et al. (eds). *Wolver Hampton, UK: Proceedings of European First Year Experience Conference; 2008. p. 141-7.* Available at: <http://aran.library.nuigalway.ie/xmlui/bitstream/handle/10379/404/Lang%20et%20al%20%282008%20EFYE%29%20An%20analysis%20of%20factors%20influencing%20the%20attendance%20of%20first%20year%20university%20students.pdf?sequence=1>
5. Massingham P, Herrington T. Does attendance matter? An examination of students' attitudes, participation, performance and attendance. *Journal of University Teaching & Learning Practice (JUTLP)* 2006; 3:82-103.
6. Van Blerkom M. Class attendance in undergraduate courses. *J Psychol* 2001; 126(5): 487-94.
7. Deane RP, Murphy DJ. Student attendance and academic performance in undergraduate obstetrics/gynecology clinical rotations. *JAMA* 2013; 310(21): 2282-8.
8. Dhaliwal U. Absenteeism and underachievement in final year medical students. *Natl Med J India* 2003; 16(1): 34-7.
9. Subramaniam B, Hande S, Komattil R. Attendance and achievement in medicine: investigating the impact of attendance policies on academic performance of medical students. *Ann Med Health Sci Res.* 2013; 3(2):202-5.
10. Zomorodian K, Parva M, Ahrari I, Tavana S, Hemyari C, Pakshir K, et al. The effect of seating preferences of the medical students on educational achievement. *Med Educ Online* 2012; 17.
11. Hutchens SA. Teaching psychology using technology: An investigation of student performance, attendance, and satisfaction. *Delta Educ J* 2004; 1(2):5-15.
12. Cronin H, Meadows D, Sinatra R. Integrating computers, reading, and writing across the curriculum. *Educ Leadership* 1990; 48(1): 57-63.
13. Funkhouser C. The influence of problem-solving software on student attitudes about mathematics. *JRCE* 1993; 25(3):339-47.
14. George G, Sleeth RG. Technology-assisted instruction in business schools: Measured effects on student attitudes, expectations, and performance. *Int J Instr Media* 1996; 23(3):239-45.
15. Luna C, McKenzie J. Testing multimedia in the community college classroom. *T.H.E. Journal* 1997; 24:78-82.
16. Sherry L, Jesse D, Billig SH. Creating a WEB of evidence of student performance in a technology-rich learning environment. *Int J E-learn* 2002; 1(1):33-42.
17. Traphagan T, John V, Kishi K. Impact of class lecture webcasting on attendance and

- learning. *Education. Tech Research Dev.* 2010; 58:19-37.
18. Traynor P. Effects of computer-assisted-instruction on different learners. *J Instr Psychol* 2003; 30(2):137-43.
  19. Avila RA, Biner PM, Bink ML, Dean RS. Course materials presentation using video-based technologies: An evaluation study of college student performance and attitudes. *Psychol Schools* 1995; 32(1): 38-45.
  20. Branton CB, Lee SP. Student learning compared through the use of student PowerPoint presentations and traditional teaching methods. *Delta Educ J* 2003; 1: 11-15.
  21. Garrett RL. Computer-assisted instruction in 2-year colleges: Technology for innovative Teaching. *CCJRP* 1995; 19(6):529-36.
  22. Guy JF, Frisby AJ. Using interactive videodiscs to teach gross anatomy to undergraduates at the Ohio State University. *Acad Med* 1992; 67(2):132-3.
  23. Jacoby LL. On interpreting the effects of repetition: Solving a problem versus remembering a solution. *J Verb Learn Verb Beh* 1978; 17(6):649-68.
  24. Slamecka NJ, Graf P. The generation effect: Delineation of a phenomenon. *J Exp Psychol Hum Learn* 1978; 6:592-604.
  25. Hunter S, Tetley J. Lectures - why don't students attend? Why do students attend? Melbourne: HERDSA Annual International Conference; 1999. p.1 - 8.
  26. Kottasz R. (Ed.). An analysis of reasons for non-attendance at lectures and tutorials: The case of marketing students at London Guildhall University. London: The Higher Education Academy; 2002.
  27. Tulving E, Pearlstone Z. Availability versus accessibility of information in memory for words. *J Verb Learn Verb Beh* 1966; 5(4):381-91.
  28. Levie WH, Lentz R. Effects of text illustrations: A review of research. *Educ Comm Tech J* 1982; 30(4):195-232.