RESEARCH

Is Learning Medical Terminology Facilitated with Visual Materials?

Fatma Öz[1], Nihan Katayıfçı[2], Bircan Yücekaya[3], İsmail Uysal[4], Hasan Hallaçeli [5]

[1] Department of Anatomy, Faculty of Medicine, Hatay Mustafa Kemal University, Hatay, Turkey
[2] Department of Physiotherapy and Rehabilitation, Faculty of Health Sciences, Hatay Mustafa Kemal University, Hatay, Turkey
[3] Department of Physiotherapy and Rehabilitation, Faculty of Health Sciences, Ondokuz Mayıs University, Samsun, Turkey
[4] Elderley Care Program, Health Care Services, Fethiye Vocational School of Health Services, Muğla Sıtkı Koçman University, Muğla, Turkey
[5] Department of Orthopedics and Traumatology, Faculty of Medicine, Hatay Mustafa Kemal University, Hatay, Turkey

ORCID; 0000-0001-5747-9989, 0000-0002-1218-3831, 0000-0002-2015-2744, 0000-0001-9821-2180, 0000-0002-3325-3990

Abstract: The aim of this study was to observe the effects of visual materials with technology in anatomical terminology learning and short- and memorize. A total of 187 students enrolled and divided into two groups, 95 students (17.89± 0.06 years, 63 F, 32 M) were in group A and 92 students (17.94±0.05 years, 67 F, 25 M) were in group B. Group A received a document containing anatomic terms supported with visually (ex. pictures, shapes, cartoons) and Turkish meanings of terms, which uploaded to the phones of students. A text that contains anatomic terms and Turkish meanings of terms was given to students in Group B. Students studied these documents in their spare time. During semester three routine quizzes were conducted to the students. First exam was performed one week after documents were given, second exam was 1 month, and third exam was three months after. The content of all exams was the same. All exams were held without prior notice to assess learning skills and self-study request. There was a significant difference between three exams ($p<0.001$). Examination scores was significantly higher in second and third exam comparing with first exam. Also second exam score was significantly higher than third exam ($p<0.001$). There was a significant difference in examination scores between and within groups ($p<0.001$). Examination scores was significantly higher in group A than group B at three exams. The study shows that more visual education with technology can be a useful tool if well designed and integrated into current anatomy teaching methods and the curriculum.

INTRODUCTION

Suffiency in medical terminology is a crucial competence of physicians and the other health professionals which requires reliable and unambiguous communication in education term and everyday clinical practice [1,2]. Adequate medical terminology is required both in the diagnosis, treatment, and follow-up of the prognosis of the patient and in communicating with other physicians especially during consultation. The terminology, forms the basis of anatomy education, contains Latin and Greek words and is far from the native language of the students, which making difficult to memorize and learn terms as well as anatomy [3].

With developing technology, teaching approaches and techniques are verified help both educators and students in anatomy education. Computer technology is becoming dramatically important in medical education and significantly changes teaching and learning methods [4]. In previous studies, computer-assisted, video-aided online education and voice recording system-assisted anatomy education were reported [5,6,7]. Also, students learn and process information in many ways. There is much argument about appropriate methods of presenting information in terminology [3]. Quinn et al. stated that there was a remarkable lack of knowledge and study on learning style preferences of medical faculty undergraduate students in basic anatomy courses [8].

The notion that rote learning of anatomical terminology is educationally ineffective, supported in the literature [1,2]. Instructors are faced with the periodic memorization problem in students to varying degrees, which affects anatomical learning. This situation creates a need for a non-memorizing perspective in education [9]. The most appropriate methods conditions are those that include intense visual and auditory stimuli in nowadays. However, there is no sufficient study on visual aided anatomy

Received : 25.02.2021
Received in revised form : 21.03.2021
Accepted : 30.03.2021
Available online : 03.05.2021

Keywords:

Anatomy
Terminology
Medical education
Visual techniques
Memory

Corresponding Author:
Fatma Öz
E-mail; fatmaoz22@hotmail.com
http://dx.doi.org/10.29228/jamp.50146

Int J Acad Med Pharm,
2021; 3 (2); 178-180

terminology education and memorization of terms in literature. The present study aimed to observe the effects of visual materials with technology in anatomical terminology learning and memorize.

MATERIALS and METHODS

Participants

Totally 187 students of Health Science Faculty at Hatay Mustafa Kemal University (Group A) and Bolu Izzet Baysal University (Group B) from 1 classes were enrolled the study. All students received six hours' anatomy course education at every week for a semester from September 2017 to January 2018 in both two universities. Written informed consent was obtained from all students to participate and the study did not contain personal data of the students.

Study design

Students were divided into two groups at the beginning of the semester. Group A received a document containing anatomic terms supported with visually (ex. pictures, shapes, cartoons) and Turkish meanings of terms. This document also was uploaded to the phones of students. A text that contains anatomic terms and Turkish meanings of terms was given to students in Group B. Students studied with these documents in their spare time.

The quiz that is routinely applied within the scope of the anatomy course during the semester was used for assessment of anatomy course knowledge. Three quizzes were conducted to the students during semester. First exam was performed one week after documents were given, second exam was 1 month and third exam was three months after. The content of all exams were the same. All exams were held without prior notice to assess learning skills and self-study request. Exams consisted of 100 open-ended questions. Each correct answer consisted of 1 point and total score was100 points.

Statistical analysis

Windows-based SPSS 20.0 statistical analysis program was used (SPSS Inc., USA). Data normality was tested using Kolmogorov Smirnov/Shapiro Wilk tests. Data were expressed as mean (±SD) unless otherwise stated. Baseline characteristics of the two groups were compared using a Student t-test. Non-distributed data were expressed as median (IQR). Friedman tests were conducted to test whether there is a significant change in examination scores. The Wilcoxon test was performed to test the significance of pairwise differences using Bonferroni correction to adjust for multiple comparisons. When investigating the changes in examination scores by groups was adjusted using two-way ANOVA test. A p-value ≤0.05 was considered as statistically significant [10,11].

RESULTS

Between September 2017 and January 2018 a total of 187 students were enrolled to the study. There were 95 students (17.89± 0.06 years, 63 F, 32 M) in group A and 92 students (17.94±0.05 years, 67 F, 25 M) in group B.

There were no significant differences between groups in age and gender (p>0.05). In group A, total of 15 students could not take exams (6 second exam, 9 third exam), in group B total of 22 students could not take exams (4 first exam, 5 second exam, 13 third exam) because the exams were held without prior notice.

There was a significant difference between three exams. (Table 1, p<0.001). Examination scores was significantly higher in second and third exam comparing with first exam. Also second exam score was significantly higher than third exam (Table 2, p<0.001).

There was a significant difference in examination scores between and within groups (Table 3, p<0.001). Examination scores was significantly higher in group A than group B at three exams. (Table 3, Figure 1, p<0.001).

Table1. Comparing examination scores of all individuals

Examination score (n: 152)	Median (IQR)	χ^2	p
First exam	14 (9-21)	228.66	<0.001
Second exam	71.50 (45.25-88)		
Third exam	29 (20-42)		

Freidman test, (p<0.05)

Table 2. Comparing scores between exams

Examination score	z	p
First-second exam	-11.22	<0.001
First-third exam	-8.51	<0.001
Second-third exam	-10.47	<0.001

Wilcoxon test, p<0.05.

Table 3. Effect of different methods on examination scores.

Examination score	Group A		Group B		p
	X±SD	p	X±SD	p	
First exam	19.12 ±10.26	<0.001	13.97 ±11.26	<0.001	<0.001
Second exam	75.95 ±24.18		55.80 ± 24.19		
Third exam	35.35 ±35.35		28.87 ±13.55		

Two-way ANOVA for repeated measurements, p<0.05.

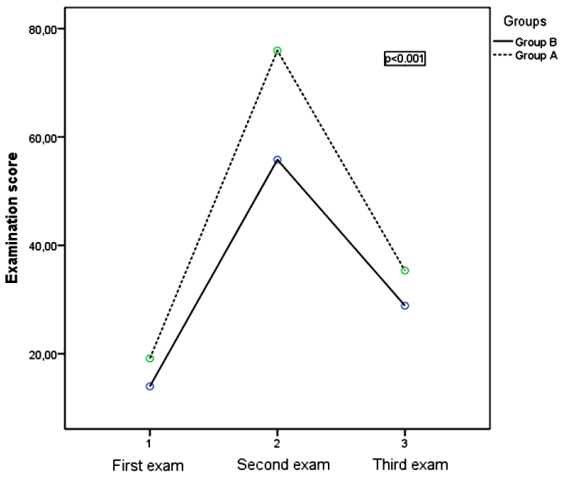

Figure 1. Changes in examination scores at three exams

DISCUSSION

The main findings of present study are 1) The highest examination score was obtained in the second exam and continued as the third and first exams respectively. 2) Visual groups' examination scores was higher at three exams.

The development of technology has also had great effects in education and training, and has led to the emergence of different training methodologies and materials in these areas [12,13]. Studies showing that downloading and presenting visual content from a mobile phone is better in mind [4]. In order to investigate the effect of using this development as an advantage in anatomy education, it was determined that the visual group was significantly more successful than the text group in present study. Hallgren et al., used a web-based tutorial and standart tutorial which assessed students with self-assessment test. The students, 30-point final exam results were

compared between the two groups (n=63 students uses visual web-based program and n=61 standart tutorial). A significant difference detechted between the two groups and the visual groups performing was better [14]. Nicholson et al., randomised, first-year (n=61) medical students to a web-based tutorial group and text group on the anatomy of the inner ear. The web-based tutorial group scored significantly higher compared with to the text group [15]. Elizondo et al., researched the end year performance of two different groups–raditional anatomy teaching group (a course textbook, anatomy atlas, 90 h of theory and 30 h of dissection) (n=365) and the multi-media laboratory with traditional education group (n=283). The computer group supported learning scores were significantly better [16]. Those results support the visual learning was better and in anatomy education, visual stimulus makes adaptation, mental bonding and feedback much easier [17].

Nowadays, the main aids currently used in teaching are textbooks or lecture notes. However, with the advancing technology, students' preferences have changed towards learning materials and this situation has brought alternative approaches to textbooks. In particular, online accessible materials attract more students' attention because they are both economical and more interesting and fun. This change in students' learning preferences should be taken into account by the instructors, and they should update their teaching styles and the materials they use. In today's conditions, the change is so fast that the interest and curiosity of the students keep pace with it, and there is a very rapid consumption [3,9]. In present study, the decrease in third exam results may be explained by the fact that the visual materials prepared lost their initial interest and students worked less on these grades. Kerfoot et al., reported that both found multi-media resources such as mobile phone program or software's plasma screens and internet access exerted a 'very-positive' influence on the tutorials in prospectively assessed two cohorts of medical students and tutors [18].

Limitations of our study are; anatomy education were given by different educators in two different universities. Although the anatomy education curriculum provided in the two universities is the same in terms of time and content, the difference of the educators may have affected the results. Students were not preferred to be at the same university due to the risk that they could give the visual materials to others and that the groups could not maintain their homogeneity. The second limitation is, since the exam is made without notice, the number of the students taking the exam differ. Exams were conducted without prior notice to the students to see how much correct answers remained in their memory. The other limitation is exam was open-ended rather than multiple choice for eliminating the possibility of memorizing questions so exam results were could be decreased.

In conclusion, the study shows that more visual education with technology can be a useful tool if well designed and integrated into current anatomy teaching methods and the curriculum. Anatomy education can be made easier and more fun by adding visual programs downloaded to the mobile phone. This may reduce the foreignness of anatomy terms and increase feedback in the brain with different game modes.

Conflict of interest

The authors declare that they have no conflict of interest.

Acknowledgements

We thanked to Dr. Seda Sertel Meyvacı who helped to study to include students at Bolu Abant İzzet Baysal University.

REFERENCES

1. Aziz MA, McKenzie JC, Wilson JS, Cowie R, Ayeni SA et al. The human cadaver in the age of biomedical informatics. *The Anatomical Record. Part B, The New Anatomist.* 2002; 269 (1): 20–32.
2. Khalil MK, Paas F, Johnson TE, Payer AF. a. Interactive and dynamic visualization in teaching and learning of anatomy: a cognitive load perspective. *The Anatomical Record. Part B, The New Anatomist*. 2005; 286B:8–14.
3. Seidlein AH, Bettin H, Franikowski P, Salloch S. Gamified E-learning in medical terminology: the TERMInator tool. *BioMed Central Medical Education*. 2020; 20 (1): 1-10.
4. Tam MDBS, Hart AR, Williams S, Heylings D, Leinster S. Is learning anatomy facilitated by computer-aided learning? A review of the literature. *Medical Teacher.* 2009; 31(9): 393-396.
5. McNulty JA, Sonntag B, Sinacore JM. Evaluation of computer aided instruction in a gross anatomy course: A six year study. *Anatomical Sciences Education*. 2009; 2(1): 2-8.
6. Doubleday EG, O'Loughlin VD, Doubleday AF. The virtual anatomy laboratory: Usability testing to improve an online learning resource for anatomy education. *Anatomical Sciences Education*. 2011; 4(6): 318-326.
7. Bacro TRH, Gebregziabher M, Ariail J. Lecture recording system in anatomy: Possible Benefit to Auditory Learners. *Anatomical Sciences Education.* 2013; 6(6); 376-384.
8. Quinn MM, Smith T, Kalmar EL, Burgon JM. What type of learner are your students? Preferred learning styles of undergraduate gross anatomy students according to the index of learning styles questionnaire. *Anatomical Sciences Education.* 2018; 11(4): 358-365.
9. Miller SA, Perrotti W, Silverthorn DU, Dalley AF, Rarey KE. From college to clinic: reasoning over memorization is key for understanding anatomy. *The Anatomical Record: An Official Publication of the American Association of Anatomists*. 2002; 269(2): 69–80.
10. Hayran, M. Sağlık araştırmaları için temel istatistik [Basic statistics for health research]. Ankara: Omega Publishing, p. 49-94; 2011.
11. Sümbüloğlu, K. ve Sümbüloğlu, V. Biyoistatistik [Biostatistics]. Ankara: Hatiboğlu Publishing, p. 31-58; 2002.
12. Falah J, Khan S, Alfalah T, Alfalah SF, Chan W, Harrison DK et al. Virtual Reality medical training system for anatomy education. In: Science and information conference. IEEE, p. 752-758; 2014.
13. Kinskey C, King H, Miller CL. Open educational resources: an analysis of Minnesota State Colleges and Universities student preferences. *Open Learn.* 2018; 33(2): 190–202.
14. Hallgren C, Parkhurst PE, Monson CL, Crewe NM. An interactive, web-based tool for learning anatomic landmarks. *Academic Medicine.* 2002, 77.3: 263-265.
15. Nicholson DT, Chalk C, Funnell WRJ, Daniel SJ. Can virtual reality improve anatomy education? A randomised controlled study of a computer-generated threedimensional anatomical ear model. *Medical education*. 2006; 40: 1081–1087.
16. Elizondo Omaña RE, Morales Gómez JA, Guzmán SL, Hernández IL, Ibarra RP, Vilchez FC. Traditional teaching supported by computer assisted learning for macroscopic anatomy. *The Anatomical Record Part B: The New Anatomist: An Official Publication of the American Association of Anatomists*. 2004; 278(1): 18-22.
17. Qayumi AK, Kurihara Y, Imai M, Pachev G, Seo H, Hoshino Y. Comparison of computer-assisted instruction (CAI) versus traditional textbook methods for training in abdominal examination (Japanese experience). *Medical Education.* 2004; 38:1080–1088.
18. Price Kerfoot B, Masser BA, Hafler JP. Influence of new educational technology on problembased learning at Harvard Medical School. *Medical Education.* 2005; 39 (4): 380–387.