Electronic Learning in Undergraduate Medical Education

Mezuniyet Öncesi Tıp Eğitiminde Elektronik Öğrenme

Beyza Özçınar[1] , Aykhan Abbasov[2] , Alper Öztürk[3] , Firat Tutal[4] , Leyla Şener Türker[5] , Nihat Aksakal[1] , Melih Kara[6] , Özgür Albuz[7] , Yeşim Erbil[4]

[1]Department of General Surgery, Istanbul Medical Faculty, Istanbul University, Istanbul, Turkey
[2]Department of General Surgery, Liv Hospital Ulus, Istanbul, Turkey
[3]Department of General Surgery, Biruni University Medical Faculty, Istanbul, Turkey
[4]Erbil Endocrine Clinic, Istanbul, Turkey
[5]Department of Biophysics, Istanbul Medical Faculty, Istanbul University, Istanbul, Turkey
[6]Department of General Surgery, Haydarpasa Numune Research and Training Hospital, Istanbul, Turkey
[7]Department of General Surgery, Beytepe Military Hospital, Çankaya, Ankara, Turkey

ORCID ID: B.Ö. 0000-0002-2385-141X; A.A. 0000-0001-5875-7629; A.Ö. 0000-0001-5184-7699; F.T. 0000-0002-5755-1706;
L.Ş.T. 0000-0002-7317-9086; N.A. 0000-0002-1323-6587; M.K. 0000-0002-9974-4426; Ö.A. 0000-0002-8534-1781; Y.E. 0000-0001-8651-4130

ABSTRACT

Objective: This study was designed to assess the impact of electronic education on students' learning levels and to compare the video-based electronic learning with text-based learning among medical faculty students.

Materials and Methods: This study was conducted as a single center, cross-sectional study. All of the volunteers were fourth year students of the medical faculty. All students were randomly divided into two groups. Each group had 100 students. In group 1, all students were educated by video-based electronic learning about wound healing, and in group 2, all students were educated by standard lectures from textbook. Both groups were evaluated according to their correct response rates.

Results: The video-based learning increased the correct response rates by 25 fold for more than five questions (OR: 25, p=0.0001) and increased the correct response rates by 10 fold for more than seven questions (OR: 10, p=0.0001).

Conclusion: In this study, video-based learning was found more successful than the text-based learning as a learning method.

Keywords: Video-based learning, text-based learning, success, medical education, correct response rate

ÖZ

Amaç: Bu çalışma, tıp fakültesi öğrencileri arasında elektronik eğitimin öğrencilerin öğrenme düzeyleri üzerindeki etkisini değerlendirmek ve video tabanlı elektronik öğrenmeyi metin tabanlı öğrenme ile karşılaştırmak için tasarlanmıştır.

Gereç ve Yöntem: Bu çalışma tek merkezli, kesitsel bir çalışma olarak yapılmıştır. Gönüllülerin tamamı tıp fakültesinin dördüncü sınıf öğrencileridir ve tüm öğrenciler rastgele iki gruba ayrıldı. Her gruba 100 öğrenci dahil edildi. Grup 1'de tüm öğrencilere yara iyileşmesi hakkında video tabanlı elektronik öğrenme ile eğitim verildi ve 2. gruptaki tüm öğrenciler ders kitabından standart derslerle eğitildi. Her iki grup da doğru yanıt oranlarına göre değerlendirildi. **Bulgular:** Video tabanlı öğrenme, beşten fazla soru için doğru yanıt oranlarını 25 kat arttırırken (OR: 25, p=0.0001) yediden fazla soru için 10 kat arttırdığı tespit edilmiştir (OR: 10, p=0.0001). **Sonuç:** Bu çalışmada video temelli öğrenme, bir öğrenme yöntemi olarak metin temelli öğrenmeye göre daha başarılı bulunmuştur.

Anahtar Kelimeler: Video temelli öğrenme, metin temelli öğrenme, başarı, tıp eğitimi, doğru yanıt oranı

INTRODUCTION

There are 2 main factors in students' motivation to learn, which are described by Sobral (1) as intrinsic and extrinsic factors. Intrinsic factors, in other words autonomous factors, are basically the student's learning motivation and learning styles while extrinsic factors are controllable factors, with teaching methods being one of these factors.

Learning styles have been a common concept in the literature for more than 30 years, and there are different definitions (2). Learning styles are categorized in different ways that address how individuals learn. Barbe and his colleagues classified them into 3 main categories: visual, auditory, and kinesthetic learning (3). Keefe et al. (4) described learning styles as combinations of physiological, cognitive, and emotional characteristics that

influence a student's learning. This perspective influences how a learner perceives the learning environment, how they respond to it, and how they react to it.

Dunn and Dunn have developed different teaching methods according to their learning styles. They redesigned their classes, started small group trainings, and used different teaching methods (5). In the perception of the lecturer's emotional state, both visual and auditory cues play a role. The video-based learning contains both visual and auditory stimuli and appeals to both visual and auditory learning.

The purpose of this study was to assess the impact of electronic education on students' learning levels and to compare the video-based electronic learning with text-based learning among medical faculty students.

MATERIAL AND METHODS

routine. Additionally, each group did not know that they were being compared with the other exam-lesson group. 7 days after the video-assisted and text-based lectures, all participants were examined. Groups were evaluated according to the correct response rates. Informed consent was taken from all students. Ethical approval for this study was given by the Istanbul School of Medicine Ethical Committee at Istanbul University.

Statistical Analysis

Continuous variables were analyzed in terms of normal distribution. Normally distributed variables were examined using Student's t-test, and values with non-normal distribution were examined using the non-parametric Mann-Whitney U test. The proportions were compared using χ^2 or Fisher's exact tests. Pearson's χ^2 was performed for dichotomous variables, and Student's t-test for continuous variables.

Binary logistic regression models were used to compare the impact of effectiveness of video-based learning and text-based

Table 1. Demographic features and correct response rates of both groups.

	Video-based learning group n=100	Text-based learning group n=100	p
Age (years) mean±SD (min-max)	24±4 (20-28)	23±3 (20-26)	>0.05
Female/Male	65/35	70/30	>0.05
Correct response rate mean±SD (min-max)	7.9±1.2 (5-10)	5.3±1.4 (3-9)	**<0.001**
Correct response rate for >5 questions (%)	97	41	**<0.001**
Correct response rate for >7 questions (%)	60	7	**<0.001**

Study Design

In this single-center, cross-sectional study, there were 200 fourth-year medical students of Istanbul University, Istanbul Faculty of Medicine. All students were randomly divided into two groups with 100 students in each. Group 1 (n = 100) consisted of students who got video-assisted lectures, and Group 2 (n=100) consisted of students who got lectures from a textbook.

All students had their training about wound healing. The content of the theoretical training for the two groups was exactly the same. While the training was provided to the first group of students with video assistance, the second group was given this training as text reading. This study was blind for all of the students. All medical students only knew the scope, lessons, and exams and believed that this whole process was a part of a

learning. The significant variables which were detected after χ^2 exact test were included in the binary models.

RESULTS

There were 200 students included in this study, 100 in each group. The mean age of students in group 1 was 24±4 years (20-28) and 23±3 years (20-26) in group 2. The female/male ratio were the same (3:2) for groups 1 and 2, respectively. There was no significantly detected difference between the groups in terms of gender and age (p>0.05) (Table 1).

The mean correct response rate among the students was analyzed, and in group 1, the correct response rate was significantly higher than group 2 (7.9±1.2, 5.3±1.4, respectively) (p<0.001) (Table 1). Therefore, the correct response rate was significant-

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ly and positively correlated with video-based learning group (r=0.661, p=0.001).

The evaluation of correct response rates with more than five and seven questions;

In the analysis of correct response rates with more than five questions, we have found that the students in group 1 had significantly higher rates than that of group 2 (97%, 41%, respectively) (p<0.001). The correct response rates with more than seven questions in group 1 was also associated with significantly higher rates than in group 2 (60%, 7%, respectively) (p<0.001) (Table 1).

According to logistic regression analysis, the video-based learning increased the correct response rates 25-fold with five questions (OR:25, p=0.0001) and increased the correct response rates 10-fold with seven questions (OR:10, p=0.0001).

DISCUSSION

This study was performed to compare the effectivity of video-based and text-based learning methods. This comparison was particularly done for the similar homogeneous groups simultaneously in different classrooms. Videos are useful for showing spoken language and moving images, plus many effects like superimposed text, slow motion clips, or animations. All audiences can observe optimally by visualizations remains visible (6). Moreover, video can potentially overcome the shortcomings that simple printed illustrations have. Also, presenting videos to students before starting the course helps to encourage a kind of "blended learning" (7).

When teaching methods are adapted to audiences' learning styles, motivation and performance increase (8-12). Similarly in our study, we found that correct response rates with more than five questions was significantly higher in group 1 (97%) than in group 2 (41%) (p<0.001). Additionally, we found that the rate with more than seven questions was also significantly higher in group 1 (60%) than in group 2 (7%) (p<0.001). We think that, particularly for surgical education, video-based learning is a crucial factor for students' motivations. According to publications in the literature, active learning strategies end with better learning, and active learning reaches all kinds of students (13-15). Therefore, active learning strategies cause reasoning while thinking, develop problem-solving abilities, and can also be used in large classrooms with activities like collaborative learning exercises, simulations, role play, games, and discussion (13). These activities increase motivation and encourage group working.

Recent neuroscience studies have also shown that meaningful developments in learning can be achieved if the learning environments conform to dominant learning styles, a concept known as the "network hypothesis" (16). The most common unimodal selection is kinesthetic, after which visual, auditory, reading, and writing are listed (17). Students who learn kinetics

prefer hands-on learning and enjoy learning that has a connection with reality (18,19). Kinesthetic learners should pay more attention to experience to be better informed. They more frequently select simulations of practical applications, examples, exhibitions, photographs, "real-life examples", role play, and applications that facilitate their understanding of principles and advanced concepts (20).

According to research conducted by Kharb et al. at a medical university in India, 61% of the students preferred the multimodal VARK (Visual, auditory, read/write and kinesthetic). 39% of the participants preferred unimodal learning, 41% bimodal, 14% trimodal, and 6% quadrimodal learning (18). We believe that the bimodal learning sytem, video-based learning style, is more successful than other unimodal learning styles. In another study, Slater et al. (21) reported that Wayne State University's first-year medical students, consisting of both male and female participants, preferred to utilize multiple sensory modalities over unimodal learning. Although visual preference was common for both genders, it was not statistically significant. We also didn't find any significance between both genders (p>0.05). Age has been accepted as a factor in the learning method shifting from one to another (22). However, as age increased, there were significant differences in visual and reading/writing learning style preferences. In this study, it was found that as the subjects got older, their preferences for kinesthetic and auditory modalities increased and their visual and reading/writing presentation preferences decreased in the same model (10,23).

Although it is not known exactly whether the difference in learning styles is due to different levels of medical education or to increasing age, it required further research by taking both factors into account (24).

However, in this study, age was not found to be significant between both groups.

We attribute this to the close distribution of the age between the 2 groups.

In a study conducted by Samarakoon and et al.(25), while first year medical students preferred auditory and reading/writing learning strategies, multimodal learning styles were preferred by senior students. According to logistic regression analysis, video-based learning increased the correct response rates 25fold with more than five questions (OR: 25, p=0.0001) and 10fold with more than seven questions (OR: 10, p=0.0001).

While the video includes both visual and auditory perceptions, the text-reading just includes visual perception. Moreover, in terms of the text-reading, this visual perception cannot include any motion or depth perception.

CONCLUSION

Visual perception is crucial in surgical education. Additionally, auditory perception is another important cornerstone. As a

result, training with videos may make a significant remarkable difference in learning surgical tissue plans. In the comparison of learning modalities between video-based (bimodal modal-

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ity) and text-reading (unimodal modality) lectures in medical faculty students, our study showed that video-based learning was more successful than the text-based learning as a teaching method in medical faculty training.

Ethics Committee Approval: Ethical approval for this study was given by the Istanbul School of Medicine Ethics Committee at Istanbul University.

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