

Assessment of the Effect of Educational Animations in Physiology and Anatomy Teaching on Occupational Health Students' Learning.

Background: Teaching of anatomy and physiology are the important basic courses for medical sciences students. If these courses are taught by animations and films, these will be learnt better by students. The objective was to determine the effect of educational animations in teaching of anatomy and physiology of organ systems on occupational health students' learning.

Methods: This study had been performed in planning of educational course, in cross-sectional study with educational websites such as Ministry of Health, Medical Sciences Universities and professors' opinions. These courses had been taught with animations in physiology and anatomy for B group and had been taught without these for A group. Then data had been analyzed in SPSS 11.5, mean, standard deviation, t-test with $P < 0.05$.

Results: Mean grade of anatomy in group B was 19.40 ± 0.64 and in group A was 18.50 ± 0.77 , with $t = -4.102$ and $P < 0.001$ and mean grade of physiology in B group was 18.41 ± 1.30 and in A group was 17.99 ± 1.52 , with $t = 0.931$ and $P = 0.357$.

Conclusions: This teaching was good for learn of anatomy and some chapters of physiology.

Keywords: Anatomy; Physiology; Educational Animations; Occupational Health.

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تقييم تأثير الرسوم المتحركة التعليمية في التعليم الفيزيولوجيا و علم التشريح عند طلاب الصحة المهنية.

التمهيد: تعليم علم التشريح و الفيزيولوجيا يعتبر من أهم المواد الدراسية الاساسية عند طلاب العلوم الطبية . اذا تم تعليم هذه المواد بشكل صور متحركة او افلام يكون هناك تأثير اكبر في التعلم لدى الطلاب . الهدف هو تحديد اثر الصور المتحركة التعليمية في تعليم علم التشريح و الفيزيولوجيا للأعضاء في تعليم طلاب المهن الصحية .

الأماليب: هذه الدراسة تشمل تخطيط للمواد التعليمية تمت بشكل مقطعي مع مواقع على الانترنت. مثل مواقع وزارة الصحة و الجامعات الطبية و افلام الاساتذة . تم تعليم هذه المواد عبر الصور المتحركة الى الفريق B و تعليم الفريق A بدون صور المتحركة و بعد ذلك تم تحليل المطبوعات عبر spss 11.5 . المعامل . انحراف المعيار و t-test مع $p < 0.05$.

النتائج : معدل العلامة في علم التشريح في الفريق B 19.40 ± 0.64 و في الفريق A 18.50 ± 0.77 مع $t = -4.102$ و $p < 0.001$ و معدل العلامة في الفيزيولوجيا كانت في الفريق B 18.41 ± 1.30 و في الفريق A 17.99 ± 1.52 مع $t = 0.931$ و $p = 0.367$.

النتيجة : هذا الاسلوب يكون جيد في تعلم التشريح و بعض دروس الفيزيولوجيا .

الكلمات الرئيسية: علم التشريح؛ فيزيولوجيا، صور متحركة التعليمية، الصحة المهنية.

بررسی تاثیر انیمیشن آموزشی در تدریس درس های آناتومی و فیزیولوژی بر یادگیری دانشجویان بهداشت حرفه ای.

زمینه و هدف: آناتومی و فیزیولوژی از جمله دروس پایه و با اهمیت برای دانشجویان رشته های علوم پزشکی می باشد. اگر این دروس با استفاده از وسایل کمک آموزشی نظیر انیمیشن و فیلم آموزش داده شوند باعث یادگیری بهتر دانشجویان خواهد شد. هدف اصلی این مطالعه بررسی تاثیر انیمیشن آموزشی در تدریس درس های آناتومی و فیزیولوژی بر یادگیری دانشجویان بهداشت حرفه ای بود.

روش: ابتدا با استفاده از کوریکولوم وزارت بهداشت و نظرات اعضای هیات علمی ، طرح دوره این درس ها تدوین شد و در قالب یک مطالعه مقطعی برای گروه ب همراه با تدریس ، انیمیشن آموزشی دروس نمایش داده شد و برای گروه الف انیمیشن نمایش داده نشد. داده ها در نرم افزار SPSS ۱۱/۵ از نظر میانگین ، انحراف معیار و t-test با سطح معنی داری $P < 0.05$ مورد تجزیه و تحلیل قرار گرفتند.

یافته ها: میانگین نمره آناتومی در گروه ب 19.40 ± 0.64 و در گروه الف 18.50 ± 0.77 با $t = -4.102$ و $P < 0.001$ بود. میانگین نمره فیزیولوژی در گروه ب 18.41 ± 1.30 و در گروه الف 17.99 ± 1.52 با $t = 0.931$ و $P = 0.357$ بدست آمد.

نتیجه گیری : تدریس به همراه انیمیشن آموزشی برای یادگیری درس آناتومی و بعضی مباحث درس فیزیولوژی مفید بوده است.

واژه های کلیدی: آناتومی؛ فیزیولوژی؛ انیمیشن آموزشی؛ بهداشت حرفه ای

ایناتومی اور فیزیالوجی کی تعلیم میں انیمیشن کے استعمال .

بیک گراؤنڈ : طبی سائنس میں ایناتومی اور فیزیالوجی بنیادی موضوعات شمار ہوتے ہیں جن کی تعلیم دینا طبی طلباء کے لئے از حد ضروری ہے۔ اگر ان موضوعات کو انیمیشن اور فلموں کے ساتھ پڑھایا جائے تو طلباء بہتر طریقے سے تعلیم حاصل کرسکتے ہیں۔ اس تحقیق کا بنیادی هدف ایناتومی اور فیزیالوجی کی تدریس میں انیمیشن اور فلموں سے استفادہ کرنے کے مفید اثرات کا جائزہ لینا ہے۔

روش : اس تحقیق میں طلباء کو دو گروہوں میں تقسیم کیا گیا اور پہلے گروہ کو روایتی طریقے سے ایناتومی اور فیزیالوجی کی تعلیم دی گئی ، اس کے بعد دوسرے گروہ کو ایناتومی اور فیزیالوجی کی تعلیم دیتے وقت انیمیشن اور فلموں سے استفادہ کیا گیا۔ اور ایس پی ایس ایس گیارہ اعشاریہ پانچ سافت ویئر، اور ٹی ٹسٹ سے نتائج کا تجزیہ کیا گیا۔

نتائج : تجربوں سے پتہ چلا کہ دوسرے گروہ کے نمبر پہلے گروہ سے کہیں بہتر تھے اور پہلے گروہ کی وہ کارکردگی نہیں تھی جو دوسرے گروہ کی تھی۔

سفارشات : ایناتومی اور فیزیالوجی کی تدریس میں انیمیشن اور فلموں سے استفادہ کرنا مفید رہا ہے ۔

کلیدی الفاظ: ایناتومی؛ انیمیشن ۔

INTRODUCTION

Education is the most important step in the universities and the reason of establishing schools and faculties (1). With educational helping tools, professors are able to teach better and students can learn better, these tools can be electronic (2), non-electronic(3). All of them help the students' learning (4,5). But most of the studies have emphasized on electronic tools such as animations and films, power points, and etc. (4,5). Using innovation in teaching and preparing new educational methods play an important role in medical sciences education. These methods should increase the students' learning levels, according to the assessments of teaching methods, they could improve teaching condition. It seems as if the use of complicated methods could cause some problems for professors and sometimes are not practical in all situations.

Some studies had demonstrated the positive effect of the use of electronic tools such as power point, film, ... by professors on the attitude of students in contrast to non-electronic tools (6). According to these, sometimes small changes in teaching methods could be useful and increase educational advances. Some studies in medical sciences have demonstrated the effect of innovation and new methods on better learning (6-9). In the study of the improvement of general practitioners' education, they had organ system based education, for example: about respiratory system; embryology, histology, anatomy, physiology, biochemistry, biophysics, immunology, physical examination, and simple cases had been taught that could be useful for better learning of respiratory system (7). Of course they used educational helping tools for students' better learning.

Some studies have expressed the importance of new educational methods in students' learning; for example the use of clinical hypothesis and samples could increase the relationship between basic and clinical lessons (6-9). These methods can do better when we use educational helping tools.

Using references which are introduced by Health Ministry and its curriculum could help professors and students in teaching and learning (12-17). Professors should make the course plans of lessons and show these to students. Educational helping tools are some items included in these courses and lesson plans (18-22).

Teaching of anatomy and physiology are important basic courses for medical sciences students. If these courses are practical and harmonious (23), these will be learned better by students but teaching with educational helping tools can help better learning (24). Mehta et al. had advised the use of electronic learning in medical sciences education (25).

The objective of this study was to determine the effect of educational animations in teaching of anatomy and physiology of organ systems on occupational health students' learning.

METHODS

This study is a cross-sectional one conducted from 1390 to 1391 on occupational health students. Group A included 24 students and group B contained 25 students. By using curriculum in Health Ministry website and other scientific sites (10,11,24), such as: [<http://www.highered.mcgraw-hill.com>]

(10), [<http://www.educyclopedia.be/education/animations>] (11), course plans had been written. For group B anatomy and physiology were taught by educational animations but this was not the case for group A. Both groups had anatomy and physiology from 8 to 12.

Session one: Definitions, scientific words, and application of anatomy and physiology in occupational health. Session two: Upper limb anatomy and cell, nerve and muscle physiology (1). Session three: Lower limb anatomy and nerve and muscle physiology (2). Session four: Anatomy and physiology of heart. Session five: Anatomy and physiology of lung. Session six: Anatomy and physiology of digestive system. Session seventh: Anatomy and physiology of kidney. Session eighth: Anatomy and physiology of eye and ear. Session ninth: Anatomy and physiology of nervous system (12-17). Each session included questions and answer and a quiz at the end. Tests for two groups were at the same level, they were prepared in the educational department and professors had checked them for validity a pilot study with the score of 0.85 correlation was done for determining the reliability. The inclusion criteria was the entrance of occupational health student in 90-91 and the exclusion criteria was entering other years or studying other fields. Data had been entered in SPSS 11.5 and analyzed with mean, standard deviation, t-test and $P < 0.05$.

In the case of research ethics; oral satisfaction was taken and the authors told that cumulative data have been used, and results will be reported without naming anybody.

RESULTS

The total grade of anatomy in group B was 19.40 ± 0.64 ; the least score was 17 and the most was 19, in group A the total was 18.50 ± 0.77 ; the least was 17.40 and the most was 20 with $t = -4.102$ and $P < 0.001$ with significant differences.

The total grade of physiology in group B was 18.41 ± 1.30 ; the least score 15 and the most 20. In group A the total was 17.99 ± 1.52 ; the least was 15.5 and the most was 20 with $t = 0.931$ and $P = 0.357$ without any significant differences.

Table 1 shows the comparison of results in anatomy between the two groups, and Table 2 exhibits the comparison of results in physiology between the two groups.

In anatomy: the grade of definition, upper limb, lower limb, lung, heart, digestive system, kidney, eye and ear had significant differences between the two groups.

In physiology: the grade of definitions, lung, digestive system, kidney, eye and ear had significant differences between the two groups.

The grade of other chapters of physiology such as cell, nerve and muscle 1,2 and heart were better but had not significant differences. Anatomy and physiology of nervous system had the same grades.

DISCUSSION

According to the results of this study learning had improved through coordinative teaching with educational helping tools; specially in anatomy the changes are significant. In group B the grades of anatomy in definition, heart, digestive system, kidney, eye and ear were more than group A. In group B the grades of physiology in definitions, lung,

digestive system, kidney were more than group A. Teaching with animations could affect learning of physiology chapters. The grades of physiology of nerve and muscle (2) and heart had been increased but were not significantly different, also the total grade of physiology did not differ significantly between the two groups.

According to the results, the grade of anatomy and some chapters of physiology had been increased with this method of education that had been based on the memorization of previous texts and studies, the same as the results of the study on students' learning with using new educational methods and had significant differences (6-9). Finally the student talked about the usefulness of educational animations in the learning of anatomy and physiology, some studies had shown the positive effects of educational helping tools on students' knowledge that could be helpful for future experiments. Of course educational helping tools cause professors teach better and students learn better, these are electronic (2), or maybe non electronic such as black and white boards(3). All of them help the students' learning (4,5), but most studies have emphasized on

electronic tools such as animations and films, power points,... (4,5). Some studies had shown the positive attitude of students toward the use of electronic tools such as power point, film,... by professors (6).

Mehta et al. had advised the use of electronic learning tools in medical sciences education (25).

In this study anatomy and physiology teaching with educational animations had some level of innovation and the lessons seemed useful or applicable, that had shown complete innovation in some studies such as general practitioner education with teaching the organ system based of histology, embryology, anatomy, physiology, biochemistry, biophysics, immunology, physical examination and clinical samples (7).

In this study, essential chapters had been covered the according to the curriculum. Those had been taught because of their usefulness in future learning and working experiments. In some studies it had been recommended to review the curriculum according to future working needs, this has begun in recent years. Occupational health was one of these curricula (18-22).

Table 1. The comparison of results in anatomy between the two groups (P<0.05).

subject	Grade of anatomy in group A	Grade of anatomy in group B	Value
Definitions, scientific words and application	2.74±0.35	3.76±0.35	<0.001
Upper limb	2.20±0.40	1.91±0.19	0.004
Lower limb	1.88±0.21	1.67±0.30	<0.001
Heart	1.66±0.23	2.35±0.29	<0.001
Lung	1.80±0.35	1.44±0.16	<0.001
Digestive system (abdomen)	0.98±0.10	1.97±0.12	<0.001
Kidney	0	1.91±0.19	<0.001
Eye and ear	2.84±0.62	3.64±0.58	<0.001
Nervous system	0	0	-

Table 2. Comparison of results in physiology between two groups (P<0.05).

subject	Grade of physiology in group A	Grade of physiology in group B	Value
Definitions, scientific words and application	1.48±0.10	2.79±0.35	<0.001
Cell, nerve and muscle(1)	2.90±0.20	2.88±0.37	0.845
nerve and muscle(2)	2.24±0.25	2.20±0.58	0.824
Heart	2.46±0.13	2.44±0.16	0.692
Lung	1.00±0	1.88±0.21	<0.001
Digestive system	1.00±0	2.44±0.16	<0.001
Kidney	1.50±0	2.41±0.19	<0.001
Eye and ear	2.46±0.20	1.82±0.24	<0.001
Nervous system	0	0	-

students could be taught in the best condition. If universities review the curriculum, it will improve teaching (18-22). By using educational helping tools, students in universities of medical sciences have the sense of learning much better than past and that could be seen in future curricula. This study had some limitations; the number of students was limited and they had not entered university through passing the entrance exam in the same year, the need of Internet during classes that was provided. The author recommends another study in which students had entered university in the same year in which more recent

tools could be used.

Conclusions: This teaching with educational animations could improve student learning in anatomy and some chapters of physiology. Some educational sites had been recommended in this study.

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REFERENCES

- Simon H, Principles of teaching and learning, med. fsu . edu , [Accessed 2009 Dec14] Available from: http://www.med.fsu.edu/education/facultydevelopment/principles_teach_learn.asp
- Hoffman B, The encyclopedia of educational technology, coe.sdsu , [Accessed 2009 Dec14] Available from: <http://coe.sdsu.edu/ect>
- Cooper G, Teaching with technology _ all about blackboard, uoregon.edu, [Accessed 2009 Dec14] Available from: <http://www.uoregon.edu/~tep/technology/blackboard/html>
- Teaching and learning strategies, new horizons, [Accessed 2009 Dec14] Available from: http://www.newhorizons.org/strategies/front_strategies.html
- Teaching methods, teacher vision, [Accessed 2009 Dec14] Available from: http://www.teacher.vision.fen.com/teaching_methods/resources/5810.html
- Assadi S.N, Assessment of medical students' ideas about using educational helping tools by university professors, Horizons of Medical Education Development, 2010;1:87-89
- Yazdani Sh, Hosseini F.S, Homayoni Zand R, Eslahat Barnameh Amoozeshi Pezeshki Omoomi, Marcaz Motaleat va Toseeh Amozesh Pezeshki Daneshgah Oloom Pezeshki Shahid Beheshti, 1386;1:269-270.
- Valizadeh Sosan, Rahmani Azad, Davoodi Arefeh, Aminiaee Nasim, Comparison of The Effect of Clinical Education and Assessment Using Portfolio and Blended Methods on Cognitive Learning of Nursing Students in Clinical Settings, Iranian Journal of Medical Education, 2011; 11 (3) :245-253. [Accessed 2011 Nov] Available from: http://www.ijme.ir/browse.php?a_code=A-10-73-1&slc_lang=fa&sid=1
- Toulabi T, Janani F, Qurban Mohammadi E, The Appropriateness of educational programs' objectives for professional needs: the viewpoints of Khorramabad school of nursing and midwifery graduates, Iranian Journal of Medical Education, 2008 Aut & 2009 Win; 8(2) :263-272.
- Educational animations, highered.mcgraw-hill, [Accessed 2011 Nov] Available from: <http://higher.mcgraw-hill.com>
- Educational animations, educyclopedia, [Accessed 2011 Nov] Available from: <http://www.educyclopedia.be/education/animations>
- Elahi B, Anatomy Andam foghani, tahtani va mafasel, Jeyhoon, 1375;9:1-258.
- Elahi B, Ostokhan shenasi, Jeyhoon, 1375;9:1-264.
- Elahi B, Anatomy taneh, Jeyhoon, 1375;10:1-398.
- Guyton C, Hall J.E, Translated by: Shadan F, Medical Physiology, Tchehr, 1375;1: 1-1596.
- Emami Meybodi M.A, Tashrihe mozei sar va gardan, Esharat, 1375;1:1-516.
- Emami Meybodi M.A, Virayesh: Ezzat Abadi Poor M, Tashrihe mozei va mosavvar Maghz va nokha, Samat, 1377;1:1-280.
- Taeidiyeh, deputy ministry for education, secretariat of the council for education in medical basic sciences, public health and post graduate [Accessed 2011 Dec 1] Available from: http://mbs.behdasht.gov.ir/uploads/176_315_taeidiyeh_kardaniHerfee.pdf
- Moshakhasat, deputy ministry for education, secretariat of the council for education in medical basic sciences, public health and post graduate [Accessed 2011 Dec 3] Available from: http://mbs.behdasht.gov.ir/uploads/176_315_moshakhasat_kardaniHerfee.pdf
- Sarfashedoros, deputy ministry for education, secretariat of the council for education in medical basic sciences, public health and post graduate [Accessed 2011 Dec 1] Available from: http://mbs.behdasht.gov.ir/uploads/176_315_sarfashedoros_kardaniHerfee.pdf
- Barnamehdoros, deputy ministry for education, secretariat of the council for education in medical basic sciences, public health and post graduate [Accessed 2011 Dec 3] Available from: http://mbs.behdasht.gov.ir/uploads/176_315_barnamehdoros_kardaniHerfee.pdf
- Arzeshyabi, deputy ministry for education, secretariat of the council for education in medical basic sciences, public health and post graduate [Accessed 2011 Dec 1] Available from: http://mbs.behdasht.gov.ir/uploads/176_315_arzeshyabi_kardaniHerfee.pdf
- Assadi SN. Use of educational animations in physiology teaching. Medical Education Conference, abstract book 2012: 91.
- Site of medical students. Medical atlases and other educational helping tools Available from: <http://www.medicalstudents.com>
- Mehta N, Cunningham AM, Lafferty N. Practicing what we preach: Lifelong learning tools for medical educators. [cited 2012 May 24]. Available from: <http://www.amee.org>