

Introduction of new technologies in Pneumology training

Medical students can show us the way

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- Internet
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- YouTube channels

SUMMARY

BACKGROUND: Over the last years new technologies are used to enhance the quality of medical education and to improve the educational experience. Social media are becoming popular tools for augmenting the effectiveness of education in various academic aspects and, especially, YouTube has been used as an adjunctive tool in medical students' training. Aim of the study was to examine the use of YouTube videos as learning tools for Pneumology clerkship by the students and their impact in the acquisition of clinical skills and theoretical knowledge. **METHODS:** An anonymous, online survey completed by medical students attending their fourth year of studies at the Medical School, Democritus University of Thrace (six year curriculum) was conducted. The questionnaire contained demographic questions and questions about the potential benefit of YouTube channel videos in the pulmonary training of medical students. **RESULTS:** Response rate was 87%. Respondents' perception was that YouTube channels are useful as educational tools. Specifically, 41.1% of them reported getting "very much" or "much" benefit from online videos and the percentage increased to 65%, when specific videos were used as examples ($p < 0.001$). **CONCLUSIONS:** Usage of YouTube videos as adjunct educational tools has an apparent positive impact on students' comprehension of Pneumology. Therefore, their value as a potential official training method should be further tested and could be strongly considered in the future. *Pneumon 2018, 31(1):17-23.*

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INTRODUCTION

Over the last years, various new technologies have emerged and have become available to most Medical Schools in developed countries, for the purpose of facilitating and enhancing education process¹⁻³. E-learning⁴⁻⁷,

simulation based techniques⁸, virtual reality, interactive 3D software, educational video games⁹, podcast/vodcast and social media including Facebook¹⁰, Twitter¹¹, WhatsApp and YouTube¹², are all used in order to increase the quality of medical education offered and to improve the educational experience of medical students¹³. These technologies have introduced a whole new era into medical education, addressing to the rapidly expanding knowledge¹⁴.

However, not all universities have the financial capability to experiment with the previously mentioned technologies, nor they can afford the burden of incorporating those in their curriculum¹⁵⁻¹⁷. Greece is one of the less privileged countries, due to the ongoing financial crisis that started in 2010. As expected, Greek Medical Schools were not able to make significant changes in the traditional ways of training young doctors. It is obvious that the necessity of curriculum modernization appears imperative¹⁸; however it is conflicting with the lack of funding to the Greek Universities. Thus, less expensive methods to improve the quality of Greek medical education need to be used, one of which might be educational YouTube channels.

Social media are becoming very popular tools for enhancing the effectiveness of education in diverse academic areas¹⁹⁻²¹. YouTube, a web-platform that enables users to watch, post, share, like/dislike and discuss videos, is the third most frequently used social media worldwide with more than 1 billion users, according to statistics available at YouTube's site. There is already some literature regarding the use of YouTube channels as adjunctive tools in training medical students and residents²² in specific fields^{23,24}. YouTube channels contain videos aiming at improving technical skills as well as at acquiring and retaining theoretical knowledge²⁵. There are studies that have already evaluated the use and effectiveness of social media, such as Twitter, in various clerkships/courses and show emerging positive results²⁶⁻²⁸.

Anatomy, for instance, is one of the courses that can significantly benefit from YouTube videos due to the complexity of understanding 3D structures and organ relationships from printed or digital atlases. Jaffar concluded that YouTube can be considered as an effective educational tool and that faculties should produce their own videos to encourage student participation²⁹.

As per November 2017, there is no published data describing or assessing the methods used by Greek medical students in understanding Pneumology. Thus, we aimed to record how often students in our Institution are using YouTube videos as a learning tool for their Clerkship

in Pneumology; which YouTube channels they mostly prefer, and which is the perceived effect of these videos in both clinical skills and theoretical knowledge acquisition.

METHODS

We conducted an anonymous, online survey among medical students attending their fourth year of studies at Medical School of the Democritus University of Thrace taking a Pneumology course. The questionnaire addressed 16 questions: certain ones were of demographic type, some involved the general medical education experience so far and others were concerned with the potential benefit of viewing YouTube channel videos in the Pulmonary training of medical students.

More specifically, the general questions were referring to gender and age information. In addition, students were asked to report the number of courses not yet taken from previous semesters along with frequency of attending lectures. Furthermore, we specifically asked the students about subject matter in the Pneumology posing conceptual difficulty and about certain weak parts in their physical examination skills that lead them to search online for explanatory YouTube videos. They were also asked to report the frequency of searching online videos, the impact of these videos and the effectiveness that a specific YouTube channel, may have on their understanding of the material. In order to capture the frequency/intensity of responding to the above questions, we used a quantitative scale from 1 to 5, with 1 representing "never/not at all" and 5 "always/very much".

RESULTS

The survey was anonymously answered by 114 (from a total number of 130, response rate 87%) medical students attending the Pneumology class during the second semester of the academic year 2016-1017. About half of the participants (50.9%) were female, aged between 21 and 26 years, with the vast majority being younger than 24 years old. Age distribution was as follows: 21 years (19.3%), 22 years (33.3%), 23 years (35.1%), 24 years (3.5%), 25 years (5.3%), and 26 years (3.5%).

The number of previous semester courses that students needed to take again ranged between 0 and 17. The median was 2 courses.

Frequency of lecture attendance by the students was as follows: 21.1% (n=24) of them reported "always attending", 40.4% (n=46) "frequently attending", 26.3%

(n=30) declared “sometimes attending”, 10.5% (n=12) “rarely attending” and 1.8% (n=2) “never attending”, as demonstrated in Figure 1.

An attempt was made to investigate possible association between the reported lecture attendance frequency and the number of courses that need to be retaken. More specifically, the objective was to discover whether students attending lectures at a low frequency (response ranging between never and sometimes), need to retake more courses compared to students attending classes at a high frequency (response ranging between frequently and always); however, no such association was revealed. Nevertheless, students attending lectures at the highest frequency appeared to have retaken very few courses.

According to students’ replies, the most difficult parts of the Pulmonary course are considered to be respiratory physiology and pathophysiology, acid base disorders, interstitial lung diseases and lung cancer. Additionally, students reported difficulties in reading chest CT scans. However, the latter particular skill should mostly be developed during the Radiology course.

Our students were also asked to rate the level of comprehension of Pneumology-related material via the existing educational methods. The responses are shown in Figure 2.

We used a scale from 1 (very poor) to 5 (excellent). Data suggest that our students do not gain the maximum out of their Clerkship, since there is undoubtedly room for improvement.

The majority of students (87.7%) search online for videos related to the Pneumology course in order to better comprehend the material and prepare for the final

exam at the end of the semester. Four students (3.5%) reported doing this every time they study, 24 students (21.1%) almost always, 40 students (35.1%) frequently, 32 students (28.1%) rarely and 14 students (12.3%) never.

In order to qualitatively assess whether watching medical videos on YouTube has already helped our students comprehend difficult chapters and concepts in Pneumology we used the scale from 1 (not at all) to 5 (very much). More specifically, 18 students (16%) stated that they were benefiting very much, 28 students (25%) much, 46 students (41%) fairly, 12 students (11%) slightly and 8 students (7%) not at all.

In order to assess whether lecture attendance frequency correlates to students’ response to the questions about effectiveness of YouTube videos in studying during Pneumology rotation and preparing for the exam, we divided the students into two groups. The first group consisted of students who attended lectures at a high frequency (answers given: very frequently or always) and the second group consisted of students attending lectures at a low frequency (answers given: never, rarely or sometimes).

Out of the 70 students with increased lecture attendance frequency, 36 answered with high scores (4 or 5) in the video effectiveness question as well. From the 44 students who reported low lecture attendance, only 10 ranked high (with 4 or 5) the potential effectiveness of YouTube videos. In other words, 51% of students attending lectures with high frequency believe that YouTube videos can help them comprehend Pneumology better, whereas only 23% of students not attending lectures have similar point of view.

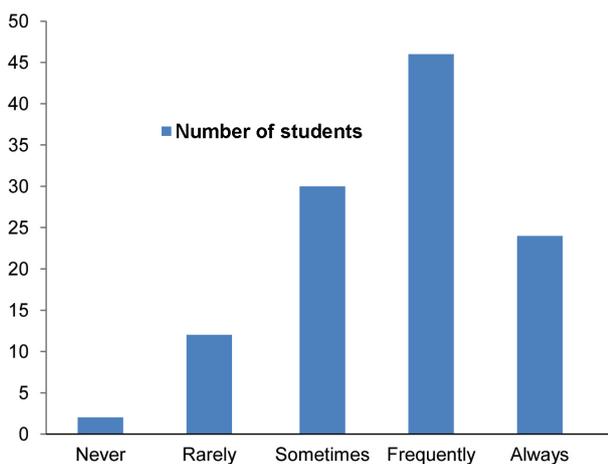


FIGURE 1. Self reported frequency of attending lectures.

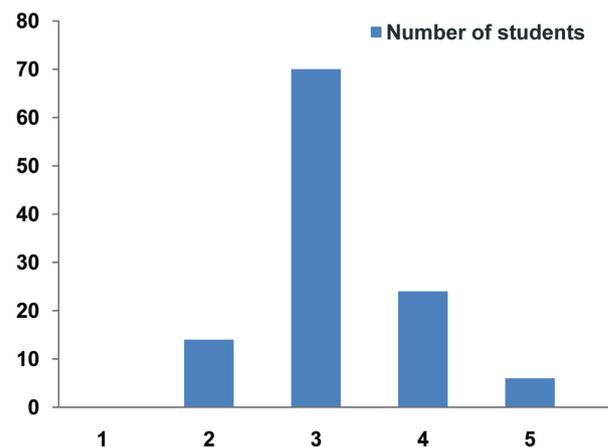


FIGURE 2. Level of Pneumology comprehension (X axis:1-very poor, 5-excellent).

An attempt to explore a possible association between the number of courses needed to be repeated and the perceived effectiveness of YouTube videos revealed the lack of any association. Specifically, the number of courses students needed to reiterate was independent of their perception of YouTube effectiveness. No significant difference was determined in perceived YouTube effectiveness between males and females participating in our study.

Additionally, we collected more information regarding the most popular YouTube channels among students from our Institution. Only 80 of the students replied to this specific question. Fifty two students did not mention using any specific YouTube channel. Among the rest of the responders (28), Osmosis was the most popular channel, followed by Dr. Najeeb lectures and Armando Hasudungan channel.

To further investigate the value of YouTube videos as adjunct learning tools we proposed a series of Pneumology related videos by Osmosis YouTube channel, which is becoming more and more popular among medical students worldwide, including Greek medical students, (367,524 subscribers and 22,442,849 views, as per November 28, 2017, according to numbers presented at Osmosis YouTube channel). Students were asked to watch these videos and comment on their effectiveness in order to understand Pneumology related topics more efficiently. Our findings are illustrated in Figure 3, which contains the rating of YouTube videos effectiveness up until students were exposed to Osmosis videos compared to the rating after watching these videos.

There was an increase in the number of respondents ranking the effectiveness of Osmosis videos with either

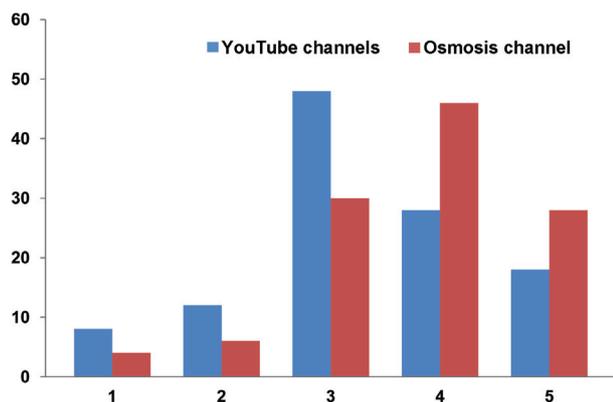


FIGURE 3. Perceived effectiveness of YouTube channels before and after watching the Osmosis videos in comprehending difficult concepts (1 for not at all, 5 for very much).

4 or 5 compared to the general question about the effectiveness of online videos in the learning process. More specifically, 36 of the students having ranked the potential effect of YouTube videos with an 1 or 2 or 3, changed their mind when they watched the Osmosis videos by choosing 4 or 5 (8 students of those that picked 2, changed to 4, 22 students of those that picked 3, changed to 4 and 6 of those that picked 3, changed to 5).

Moreover, the average rating of the perceived effectiveness of YouTube channels before watching Osmosis videos was 3.32, whereas after watching Osmosis videos the average increased to 3.77. Paired sample t-test examination revealed that this increase in average rating before and after watching Osmosis videos was statistically significant ($p < 0.001$).

An additional finding was that medical students in our Institution refer to YouTube videos for enhancing their clinical skills required in Pneumology and their knowledge about routinely used interventions in clinical practice. We specifically asked the students about certain parts of physical examination and some of the most frequently used interventions in clinical medicine. Our findings are summarized in Table 1.

Lastly, we inquired about any perceived improvement in the level of technology incorporation into the medical curriculum and medical education, since the beginning of the medical studies of our study group, four years ago. Our students' perspective is presented in Figure 4.

DISCUSSION

The results of our study contain valuable messages that should be carefully interpreted. One of the most important findings is the feeling of our students that

TABLE 1. Students' search on YouTube channels for videos helping in improving performance of the following clinical skills.

Clinical skills	Number of students	Percentage (%)
History taking	10	8.8
Lung palpation	20	17.5
Lung percussion	28	24.6
Lung auscultation	84	73.7
Venous blood sampling	30	26.3
Arterial blood gas sampling	44	38.6
Placement of thoracic drainage	30	26.3

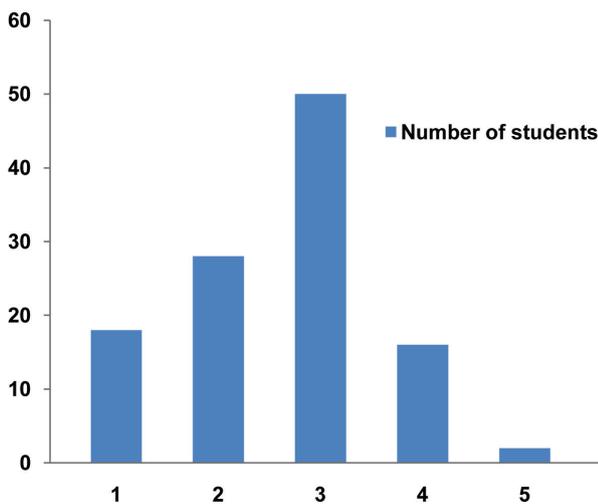


FIGURE 4. Perspective of students about improvement in technology incorporation during the past 4 years. (1 for not at all, 5 for very much).

they have accomplished only an intermediate level (3 in a scale from 1 to 5) of comprehension of Pneumology course with the existing teaching methods. The above finding may have various etiologies, but it is obvious that there is room for improvement regarding the educational experience offered.

One of the many ways to upgrade medical education that has been proven effective even since the 80s⁴¹, is to assimilate new media and technologies into traditional teaching.

YouTube hosts a great variety of educational channels with numerous medical topics accessible by medical students and graduates all over the world, provided that there is an internet connection. Most channels offer at least part of their video collection at no cost, so they constitute a good solution for all those having a limited budget. There are many different kinds of videos offered, some contain graphics and text, others animation, others recorded lectures or drawings. Thus, medical information can be taught in a more creative and understandable way compared to traditional teaching methods³⁰. Additionally, incorporation of social media, and, particularly YouTube videos, in medical education can trigger students' interest about the topic³¹, motivate them to engage more actively in the learning process^{32,33} and keep them concentrated for longer periods. However, we should not ignore the fact that the quality of these videos varies, depending, among other factors, on the source³⁴. Thus, not all channels should be blindly trusted. More specifically, there are

three types of videos hosted on YouTube:

- Videos uploaded by individuals that are not part of an official educational process
- Videos uploaded by channels created to provide education such as official Medical School channels, Medical Organizations, Health care related companies
- Videos uploaded by channels related to educational sites. An example under this particular category is FOAMed (Free Open Access Medical education), a network of free, online educational services and resources, such as blogs, podcasts, tweets, Google hangouts, online videos, text documents, photographs, Facebook groups and many more. The main goal is to provide means to enhance traditional education. It is self-sponsored or supported by advertisements and does not require a registration fee from the user. Osmosis videos belong to the same category, since they are linked to a website that offers educational material, mnemonics, quizzes, question banks and reference articles. The videos are part of the open access content, but there is also the option to purchase a plan after a free trial.

Furthermore, information shared on the Internet is not strictly regulated, which is a major drawback when considering the possibility of using social media in medical education and learning. Apart from this, policies about the professional use of social media need to be clearly set and taught by the Institution, given the continuous alterations in the social media environment³⁵⁻³⁸.

It is common practice that medical students utilize social media such as YouTube videos to obtain medical knowledge and cultivate their current skills³⁹, but there is limited amount of literature reporting this attitude and evaluating the impact on medical students' performance. According to the results of the present survey, we concluded that the utilization of YouTube videos may help medical students obtain a better understanding of concepts taught in the Pneumology course, especially if the videos are oriented toward course objectives. However, it is obvious that quality and content of the videos of each YouTube channel influence their impact on the learning experience.

According to our findings, there is a clear difference in perception regarding effectiveness of YouTube videos in studying during Pneumology rotation and in exam preparing among students that regularly attend lectures compared to those that do not. This fact may have various possible explanations and needs further investigation.

Furthermore, the aforementioned finding should be

assessed taking into account a study from the literature suggesting that students' opinions about the efficiency of social media as learning tools vary between preclinical and clinical years. Particularly, students' perspective may be dependent upon the academic year attending⁴⁰.

To conclude, utilization of social media, like YouTube, in medical education is very promising in terms of enhancing the learning and educational experience, but certain aspects of this new trend need further investigation. In

our study, which comprised a relatively small sample of medical students, Osmosis channel appears to be more helpful and effective in self-learning than other channels. All these findings should be taken into account by Administrators of Medical Schools in Greece, which have been in the process of reforming the curricula in an attempt to approach a more technologically up to date level, while facing continual financial problems that considerably influence the available solutions.

ΠΕΡΙΛΗΨΗ

Εισαγωγή νέων τεχνολογιών στην εκπαίδευση στην Πνευμονολογία - Οι φοιτητές της Ιατρικής μας δείχνουν το δρόμο

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Εισαγωγή: Νέες τεχνολογίες γίνονται διαθέσιμες τα τελευταία χρόνια και χρησιμοποιούνται για την αναβάθμιση της ποιότητας της παρεχόμενης ιατρικής εκπαίδευσης και τη βελτίωση της εκπαιδευτικής εμπειρίας των φοιτητών. Τα μέσα κοινωνικής δικτύωσης χρησιμοποιούνται ολοένα και περισσότερο για το σκοπό αυτό και πιο συγκεκριμένα, κανάλια του YouTube έχουν ήδη αξιοποιηθεί ως συμπληρωματικά εργαλεία στην εκπαίδευση των φοιτητών. Στόχος μας ήταν να καταγράψουμε τη συχνότητα χρήσης βίντεο του YouTube από τους φοιτητές στο μάθημα της Πνευμονολογίας και να αξιολογήσουμε την επίδρασή τους στην απόκτηση κλινικών δεξιοτήτων και θεωρητικών γνώσεων. **Μέθοδοι:** Οι τεταρτοετείς φοιτητές του Τμήματος Ιατρικής του Δημοκρίτειου Πανεπιστημίου Θράκης συμπλήρωσαν ένα ανώνυμο, διαδικτυακό ερωτηματολόγιο. Το ερωτηματολόγιο περιείχε γενικές ερωτήσεις δημογραφικού περιεχομένου και εξειδικευμένες ερωτήσεις σχετικά με την επίδραση της χρήσης των βίντεο του YouTube στην εκπαίδευση των φοιτητών στην Πνευμονολογία. **Αποτελέσματα:** Απάντησε το 87% των ερωτώμενων φοιτητών. Οι φοιτητές αναφέρουν ότι τα κανάλια του YouTube είναι χρήσιμα ως εκπαιδευτικά εργαλεία στην Πνευμονολογία. Αναλυτικότερα, το 41,1% αναφέρει ότι επωφελείται «πάρα πολύ» ή «πολύ» από την παρακολούθηση διαδικτυακών βίντεο και το ποσοστό φτάνει το 65% όταν χρησιμοποιούνται συγκεκριμένα βίντεο ως παράδειγμα ($p < 0.001$). **Συμπεράσματα:** Η χρήση βίντεο στο YouTube ως συμπληρωματικών εκπαιδευτικών εργαλείων έχει θετική επίδραση στην κατανόηση του μαθήματος της Πνευμονολογίας από τους φοιτητές. Η αξία τους ως συμπληρωματικών μέσων εκπαίδευσης θα πρέπει να μελετηθεί περαιτέρω.

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Λέξεις - Κλειδιά: Διαδίκτυο, Ιατρική Εκπαίδευση, Πολυμέσα, Πνευμονολογία, Μέσα κοινωνικής δικτύωσης, Κανάλια YouTube

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