Medical Education in Infectious Diseases. Using Smartphone Apps for Active Learning

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Technology has become an important element in the practice of medicine. In addition to its use in diagnostics and EMRs, its application in medical education is broad and still not fully acknowledged. We can teach using e-learning with the use of different applications that allow active learning.
It is now well recognized that emerging technologies are likely to have an impact on learning, teaching, and creative inquiry in education. Likewise, recent studies are showing that the use of smartphones offers new opportunities for medical education improving the performance of medical students and residents.
Several universities worldwide have adopted this new trend in the use of mobile applications to improve the learning of medicine in undergraduate students, such as Harvard and Stanford schools, among others.
Different mobile Apps have been used in Medical Education. We learned about Socrative (initially used as an audience response system) during a Meet the Professor Session in 2014. Dr. Brian Schwartz gave a talk on "Technology enhanced learning for the ID Educator". Since then we have been using Socrative not only as an audience response system, but as a way of creating interactive tests for our students and residents.
WhatsApp Messenger is a freeware and cross-platform instant messaging service for smartphones, and it has been previously used as a medical education tool.
Our objective is to describe our experience using Socrative and WhatsApp as medical education tools and to share the opinions of our students using such active learning methods.

Methods

Study Participants: We assessed two groups of students.
Fourth year Medical students (MS) from the Universidad de Ciencias Aplicadas Medical School (UPC) participating in the Infectious Diseases (ID) course. The class had 48 MS.
Interns and residents (I&Rs) training at the British American Hospital (BAH).
Mobile Applications used: Socrative and WhatsApp. Both are available free.
All medical related questions were elaborated by one of us.
Socrative use: During the UPC ID course, Socrative was used in the following ways.
1) As an audience response system during 4 of the 32 lectures. Questions were based on clinical scenarios related to the topic given during the lecture.
2) Voluntary homework questionnaires (student paced). After answering each question, the right answer was shown in addition to a comment on the wrong options.
At the BAH Socrative was used similarly, during some noon lectures (audience response system) and through voluntary homework questions (student paced) like for the UPC students. In addition we used Socrative for the interns baseline exam and for the Rs mid-year exam. Exam answers were individually discussed afterwards.
WhatsApp use: At the BAH. During 4 months we sent questions/pictures from Monday to Friday. I&Rs answered individually via WhatsApp to the mentor in charge. The right answer was given the next day. Questions using WhatsApp dealt with recent cases seen at the BAH Wards or at the outpatient clinic. Questions were designed so that the I&Rs had to do quick literature searches in order to provide the right answer.
Mobile Apps Impact on Medical Education survey
A survey was prepared assessing each mobile App used. It was administered using Survey Monkey. We used a Likert scale to assess responses.
Invitations to answer the survey were sent using WhatsApp and social media (class delegates). Participation was voluntary and anonymous.

Table 1: Questions Regarding the use of Socrative in Medical Education	Strongly Agree	Agree	Neutral Indifferent	Disagree	Strongly Disagree
Have you previously used Socrative for Medical Education?	12 (29.3%)				29 (70.7%)
Do you think the voting system during lectures helped your learning?	26 (63.4%)	14 (34.2%)	1 (2.4%)		
Do you think the use of a voting system in class encouraged participation?	29 (70.7%)	10 (24.4%)	1 (2.4%)	1 (2.4%)	
Would you recommend the use of Socrative in other lectures of your ID/medicine course?	28 (68.3%)	8 (19.5%)	4 (9.8%)	1 (2.4%)	
Would you like more courses/lectures to use voting systems like Socrative using smartphones?	26 (63.4%)	9 (22%%)	5 (12.2%)		1 (2.4%)

Table 2: Questions Regarding the use of Whatsapp for Medical Education	Strongly Agree	Agree	Strongly Disagree
Have you previously used Whatsapp for Medical Education?	6 (37.5%)		10 (62.5%)
Do you feel the use of daily questions helps your learning?	13 (81.3%)	3 (18.8%)	
Do you think using the App motivated you in investigating in search for the answers?	14 (87.5%)	2 (12.5%)	
Would you recommend the App use for teaching purposes in Medicine?	13 (81.3%)	3 (18.8%)	
Do you think that the fact that you could answer the questions when you felt you had the time was convenient?	14 (87.5%)	2 (12.5%)	

Actual Sample cases sent to our BAH Interns and residents, answers were received individually and the correct answer was given the next day using WhatsApp. We also show a screenshot of a student paced Socrative question

You can access Socrative Student (download free from App Store or Android Market). For the purpose of the Poster presentation and the following weeks we have created an English version with the cases shown above and other teaching cases.
Type the Room Name used in the example: IDWKMEDPE1 or IDWKMEDPE2 or ID……3
You can contact us at luisma.valdezfb@gmail.com

Results

Forty-one MS/Rs answered the survey on Socrative use, 25 of 48 (52%) MS (UPC) and 16 (89%) Interns/Rs from the BAH. Twenty nine (71%) had never used Socrative.
Forty (97%) believed using Socrative had helped their learning (63% strongly agreed and 34% agreed), while one was indifferent.
With regards to class participation 71% strongly agreed it encouraged participation, and 24% just agreed. One was indifferent and one disagreed it encouraged participation. Thirty six (87.8%) would like to have Socrative used in other ID lectures and 35 (85%) in other courses. (Table 1)
Only one person voted against Socrative use in courses or lectures, while around 10% were indifferent to its use in the ID lectures or other courses.
With regards to WhatsApp use 16 MS/Rs from BAH answered the survey. Six (38%) had used WhatsApp previously as a teaching tool. All agreed the methodology was definitively useful for learning and promoting reading and would recommend this methodology to be used also for teaching purposes in medicine. The fact that they could answer the questions at their own pace was considered convenient by all. (Table 2)

Discussion

Active Learning using smartphone technology can be implemented as a tool for teaching medical students (MS) and residents (Rs). The use of this technology can increase participation and enhance student learning by engaging them in solving ID clinical case scenarios.
Most of our students (MDs and MS) clearly felt the use of Socrative and Whatsapp did enhance their learning and promoted class participation. Although we did not discriminate in the survey regarding the use of Socrative as an answer response system or whether it was used student paced, most MS/Rs agreed in recommending its use, not only in lectures but in other courses.
Whatsapp use was somewhat more demanding as questions had to be prepared on a daily basis based on a review of the cases the I&Rs were seeing on the wards or on cases seen by one of us in the outpatient clinic. In addition we answered individually to each of the I&Rs giving them some feedback whether the answer was good enough or some more info was requested. It was worth the effort as all I&Rs Agreed its use was beneficial, convenient and motivated them.
One limitation of our survey is that we did not differentiate between MS and I&Rs when assessing Socrative. However, from the small percentage who disagreed or were indifferent to its use, we feel there may not have been a big difference. . Another limitation of the survey is that perception of better learning does not imply actual improved learning. We are currently preparing a protocol using a pre and post test to assess if Socrative (student paced homework) does improve learning outcomes. Regarding the mobile apps use, one has to consider that preparing the educational material and incorporating it into the App can sometimes be time consuming, especially when there is no IT support.

Conclusion

Technology can enhance learning, and the use of mobile applications like Socrative and WhatsApp can be used for teaching ID to MS/Rs. Most MS/Rs who were surveyed recommended the use of such methods in their education and felt it did helped learning and participation.

The image shown is a Peruvian Khipu or Qhipu, a set of knots used by the Incas to keep numerical records. Some have argued that far more than numeric information is present and that quipus can present non numeric concepts. (Science 2005; 309(5737):1065-7.) It may also had been used as a teaching tool.