Efficacy and perceived utility of podcasts as a supplementary teaching aid among first-year dental students

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RESEARCH

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Abstract

Background

The advent of newer technology and students' growing familiarity with it has enabled information providers to introduce newer teaching methods such as audio podcasting in education. Inclusion of audio podcasts as a teaching aid for undergraduate medical or dental students could serve as a useful supplement to make reviewing more convenient and to enhance understanding and recall of the subject matter.

Aims

1. To assess the efficacy of podcasts as a supplementary teaching and learning aid for first-year dental students of Manipal.
2. To study students' attitudes towards audio podcasts and perceived utility of podcasts.

Method

This study was conducted at the Manipal College of Dental Sciences, India. The participants were first-year dental students. Live lecture classes were conducted for the students (n=80). The students were then divided randomly into two equal groups of 40 each. Group 1 students (n=40) had a study session followed by a multiple choice question (MCQ) test. This was followed by a podcasting session. Group 2 students had a study session along with an opportunity to listen to a podcast, followed by the test. Following this both groups completed a feedback form intended to assess their perceived utility and attitude towards podcasts. The performance score was analysed using SPSS and an independent sample *t* test was used to test the significance of differences in the mean score between the two groups.

Results

Our analysis revealed a significant difference ($p = 0.000$) in the mean score between the two groups. Group 1 scored a mean of 7.95 out of 13 and group 2 scored a mean of 6.05 out of 13. Analysis of the feedback forms showed that 91.3 per cent of the students found the podcasts useful, as they could listen to lecture content repeatedly and at their own convenience. Sixty-three per cent of the students, however, felt that the absence of images and diagrams in podcasts was a disadvantage.

Conclusion

Students benefited when podcasts were used to supplement live lectures and textbook content. This was indicated by better student performance in the podcast group. Also, students showed a favourable attitude for podcasts being used as a supplementary teaching and learning aid.

Key Words

Audio podcasts, dental students, student attitude

What this study adds:

Studies on student attitude towards podcasts have been done earlier. Podcasts have been successfully implemented in several universities around the world. This study specifically aims at finding whether lectures supplemented with audio podcasts enhance student performance. We objectively assessed and compared the performance of the podcast group with a control group. Extensive student feedback was taken, including their opinion on podcasts and their assessment of the utility of podcasts.

With this study we intended to assess the feasibility of introducing podcasts as a supplementary teaching and learning aid for the dental students of our university.

Background

Teachers constantly strive to find new ways to effectively deliver information to students. As students are becoming increasingly familiar with information technology, many information providers are using newer techniques for efficient and convenient information delivery. Podcasting is one such simple and user-friendly technique.[1] In podcasting, information is first recorded digitally using audio recording software. The recorded MP3 file is then uploaded to a website or published through programs like iTunes and made accessible to students. The file can then be played on a computer or some other digital player.

As students have easy access to podcasts, they can choose to listen to it a week, month or a year after the actual lecture was taken. Also, students can go through the podcast at their own pace backing up and reviewing material from the podcast. This is especially useful for exam revision.[2] Podcasts allow anytime access to information and can be used by the student at his or her convenience.

Many studies have assessed the efficacy of podcasts as a teaching and learning aid. One study concluded that podcasts enhance the learning process.[3] It has been observed that undergraduate students find podcasts to be better for revision than reading their textbooks.[3] The flexible nature of podcasts may mean that it is easier for learners to actively engage with material than when reading.[3] Another study observed that 87 per cent of undergraduate students agreed that podcasts support or enhance their learning.[4] Ninety-one per cent of students regularly listened to the lecture podcasts.[5] However, one other study showed that students perceived podcasts to be inferior to live lectures in terms of their presentation and content.[6] Students had a tendency to prefer live lectures over podcasts suggesting that podcasts can only supplement and not replace live lectures.[6] Many universities have made their entire set of lectures available on the university intranet as downloadable MP3 files.[7] Evidence-based dentistry podcast series are already being used for higher education.[8]

The present study was aimed at evaluating the efficacy of podcasts as a supplement to live lectures. We intended to do so by assessing the performance of the students who underwent a podcasting session following a live lecture and comparing it with performance of students who did not receive podcasts. The other purpose of the study was to assess students' attitudes towards podcasts and the perceived utility of podcasts.

Method

Preparation of podcasts

Three physiology department faculty members prepared the podcast content and one faculty did the voice recording. Recording was done using a laptop in a quiet environment using Audacity software downloaded from the internet (download.cnet.com). There were five audio clips in the podcast, each lasting for approximately two minutes.

Preparation of questionnaire and its validation

Ten statements of the study were e-mailed to six physiology department faculty members to validate the questions. Modifications of the statements were incorporated in the final questionnaire. Using a differential grading procedure, Likert-type statements were scored, from 1 (strongly agree) to 5 (strongly disagree) for negative items (statements numbered 3, 5, 7, 9 and 10), and for positive items (numbered 1,2,4,6 and 8), from 1 (strongly disagree) to 5 (strongly agree).

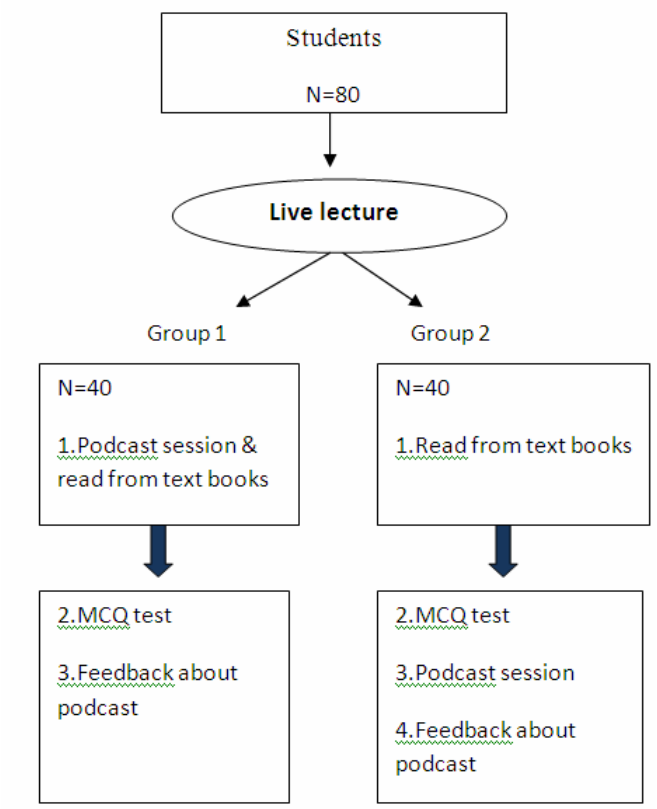
Inclusion criteria of subjects

Out of the 101 students enrolled in the first year dental course curriculum, 80 students were present on the day of the study and agreed to participate in the study. Participation for the study was voluntary.

Study design

The study was conducted in the Dental College after obtaining ethical clearance from the Institutional Ethics Committee. This cross-sectional study was conducted in March 2013. Students were informed in detail about the study four days in advance and the purpose of the study was explained to them. The study was conducted in the lecture halls of the Dental College. Out of the 80 students who volunteered to participate in the study, 60 were females and 20 were males. Informed consent was obtained from them. All of the students (n=80) in the study attended a single 30-minute live lecture in one classroom (as given in the flow chart). The topics taught were classification of receptors, physiological basis for classification and physiology of ascending sensory pathways. These topics were not covered in earlier classes and handouts of the above topics were not given to the students prior to the lectures. An overview of study design has been shown in Figure 1.

Figure 1: Study design in flow chart showing student activities in the two groups



A faculty member from the physiology department gave the live lecture class using a PowerPoint presentation to all the 80 students. After the lecture the 80 students were assigned randomly to groups 1 or 2, with each group consisting of 40 students. The two groups were then seated in separate lecture halls. The 101 dental students who were originally supposed to take part in the study had already been assigned serial numbers in the beginning of the dental course. For the purpose of our study we decided to allocate every even serial numbered student to group 1 and every odd serial numbered student to group 2. The first physiology sessional exam scores of the students were available in the records. The average scores for the two groups were analysed before the study was conducted and no significant difference in the average sessional scores between the two groups was found.

Group 1 students were taken as the intervention group. This group of students received the audio podcast for 12 minutes. The podcast contained only the highlights of the topics that were covered and not the entire lecture content. The podcast was played from the faculty laptop connected to the classroom's sound system. The podcast was not uploaded to the internet to prevent dissemination to the control group (group 2) so as not to affect the results. During the podcasting session the students were also given the opportunity to access their text books if necessary. After the podcasting session, this group underwent the MCQ test for assessment. MCQ test consisted of 13 multiple choice questions which were based on the topics covered in the live lecture. Group 1 students completed a Likert-type questionnaire consisting of 10 questions, which were used to assess the perceived usefulness of podcast and students' attitude towards the podcast. Student anonymity was ensured. Table 2 gives the questionnaire.

Group 2 students were taken as a control group. After the live lecture they were given 12 minutes to review the topics covered in the live lecture class from their own textbooks. During this time the podcast was not played. The same group then underwent a MCQ test for assessment, after which they had an audio podcasting session. They then filled the same feedback form that was give to the intervention group. The MCQs as well as feedback questionnaire was collected from all the 80 students in the study.

Data Analysis

The data entry of the MCQ scores was done using Microsoft Excel and analysed using statistics software SPSS (16.0 version). To test the significance of difference in the mean MCQ score between the two groups, an independent sample *t* test was used. Before applying the *t* test Kolmogrov-Smirnov test was applied to assess the normalcy of the mean MCQ scores.

Mean attitude scores for the questionnaire were calculated for each item. Likert-type statements were analysed in such a way that a score of less than three indicated disagreement and a score of more than three signified agreement with a positive statement and vice versa for a negative statement.[9]

Results

The average age of the students in the study was 18.2 years. The demographic profile of the students involved in this study has been shown in Table 1. Among the students of Indian origin, a majority of them were from states of Karnataka, Kerala, West Bengal and Delhi. All students enrolled in the first year dental course and involved in the study had completed their higher secondary education (class 11 and 12), the medium of instruction in all cases being English.

In the present study the total score for the MCQ test was 13 with a score of 1 given to each correct response and none for an incorrect or an absent response. Mean MCQ scores of the subjects in this study was found to follow normal distribution (Kolmogrov-Smirnov test, p= 0.097). Group 2, which did not receive the podcast, obtained a mean MCQ

score of 6.05± 2.23 and students belonging to group 1 obtained a mean score of 7.95± 2.33. Significant difference (p = 0.000) in the mean score was observed between the two groups (Table 2).

Table 1: Demographic characteristics of the students in the study

	Number of students in intervention group (n=40)	Number of students in non-intervention group (n=40)
Males	9	11
Females	31	29
Country of origin India Malaysia Kenya	 35 4 1	 34 5 1
Students who own MP3 player or some other form of digital media player	24	25
Students with internet access in computer or mobile phone	30	33

Table 2: Mean and Standard Deviation (SD) of MCQ scores for the two groups

Score	Group 1 n=40	Group 2 n=40	P value
Mean± SD	7.95± 2.33	6.05± 2.23	0.000

All the 80 students who participated in this study responded to the 10 statements in the questionnaire. An overall mean attitude score of 3.59 was obtained for the questionnaire for both the groups combined. The questionnaire as well as the mean attitude score for individual questions has been presented in Table 3. The median and quartile range of the attitude score for each statement has also been mentioned for each group separately (Tables 4 and 5). It was observed that 72.6 per cent of students felt that listening to the podcast was a good form of learning (Table 6). The students had a favourable attitude towards didactic lectures being supplemented with podcasts in their course curriculum with 73.8 per cent of them agreeing. Also, 76.2 per cent of the students believed that including podcasts in the course curriculum would help them perform better in their exams.

A significant percentage (63.8 per cent) did, however, feel that the lack of images in the podcast was a disadvantage. A small percentage of students felt that they would encounter technical difficulties using the podcast (16.2 per cent) and that it would be too time consuming (17.5 per cent).

Table 3: Mean attitude score of both the groups for each statement in the questionnaire

Statements	Mean attitude score (Maximum score:5.0)
1.Listening to the podcast after the lecture enabled me to understand the topic better	3.68
2. I believe that including podcasts along with lectures in the course curriculum will help me perform better in my exams	3.82
3. I might not use podcasts because they are too time consuming	3.48
4. I find the podcasts useful because it will enable me to listen to the lectures repeatedly and at my own convenience	4.16
5. Listening to podcasts alone is not a good form of learning	3.83
6. I would like didactic lectures to be supplemented with podcasts in the course curriculum	3.76
7. Podcasts are not a convenient form of learning as I might face some technical difficulties in using them	3.51
8. Supplementing podcasts with didactic lectures is absolutely necessary to understand difficult topics in Physiology	3.82
9. Didactic lectures alone will be sufficient without Podcast in the course curriculum	3.47
10. As audio podcasts provide only verbal information without any diagrams and images its usefulness as a learning tool is limited	2.41
Overall mean score	3.59

Table 4: Median and quartile attitude score for each statement in the questionnaire mentioned in Table 2 among students in group 1

Statement number	First quartile	Median	Third quartile
1.	3.0	4.0	4.0
2.	3.0	4.0	4.0
3.	3.0	3.5	4.0
4.	4.0	4.0	5.0
5.	3.0	4.0	4.0
6.	3.0	4.0	4.0
7.	3.0	3.5	4.0
8.	3.0	4.0	4.0
9.	3.0	4.0	4.0
10.	2.0	2.0	3.0

Table 5: Median and quartile attitude score for each statement mentioned in Table 2 in the questionnaire among students in group 2

Statement number	First quartile	Median	Third quartile
1.	3.25	4.0	4.0
2.	4.0	4.0	4.0
3.	3.0	4.0	4.0
4.	4.0	4.0	5.0
5.	4.0	4.0	4.0
6.	4.0	4.0	4.0
7.	3.0	4.0	4.0
8.	3.0	4.0	4.0
9.	3.0	3.0	4.0
10.	2.0	2.0	3.0

Discussion

Previous studies have been done to assess the advantages of using audio and video podcasts among students in different curricula. In the present study based on the performance of the two groups, it can be seen that students who had received the supplementary podcasting session had a significant advantage over the control group. Jhonson et al observed similar findings, where a significant increase in post-test knowledge after a podcasting session was seen when compared with the pre-test.[10] Augmented knowledge scores indicated that audio podcasts are an effective method for disseminating health information.[10]

Better performance by students who listened to the podcasts was also observed in another study by Mckinney et al.[11] When textbook reading is supplemented with podcasts it stimulates multiple sensory pathways. Studies by Scutter et al and Boulos et al have found that information that is received through one sensory pathway is not processed and stored as efficiently as information received from two, such as, for example, auditory and visual.[12,13]

Podcasts also accommodate alternate learning strategies. It is seen that, while some students prefer to review study notes taken down during a lecture for revision and others find review by active listening more beneficial. Podcasts may be very beneficial to the latter group of students. For other students active listening is the more effective form of learning and podcasts may benefit such students. Scutter et al observed that listening to the podcast during the study time may help them grasp some points which they might have missed in lecture.[12] Podcasts also enable better correlation between lecture information and textbook or notes content.

A study by Vogt et al, however, has shown no significant enhancement in student performance with podcasts.[14] The study concluded that, lack of familiarity with podcasts in the particular study group could have contributed to the demonstrated lack of knowledge acquisition.[14]

In our study most students felt that a significant advantage of the podcast was that they could listen to the lecture content repeatedly and at their own convenience. Ninety-one per cent of students pointed out this benefit of the podcast. A study by Jham et al among dental students have shown that podcasts are useful for mobile learners who can listen to it while multitasking.[15] The idea of being able to access information without being linked to a certain physical location is very attractive.[15] Using podcasts, students can listen to exactly what they want, where they want and when they want.

Researchers have observed that most students accessed podcasts very frequently or frequently.[16,17] Walmsley et al observed that dental students find podcasts an acceptable method of learning and one-quarter of students used the podcast for examination review.[18] In a study by Pilarski et al 89 per cent of students agreed that audio and media site recordings reduced levels of stress and anxiety.[16] A study by Meek et al observed significant course satisfaction among nursing students following podcast sessions.[19]

Lyles et al observed that 91.2 per cent of students regularly listened to lecture podcasts and questionnaire survey suggested that the audio podcast was a useful tool for enhancing teaching and learning.[5] In the same study, testimonials provided by three students revealed that podcasts helped them to prepare master notes.[5]

In this study the MCQ test was conducted for the intervention group immediately after the podcasting session. The results revealed a positive impact of podcasts

on student performance in the intervention group. However, the effect of podcasts on long-term retention and recall of information could not be assessed in this study. For this, another MCQ test on the same topic could have been conducted after a certain gap of time. However in our study plan there was no scope for monitoring the study habits of the students for a longer duration of time. The discrepancy in the study habits of the students during this time leading to dilution of the results of the student performance was a possibility.

Based on favourable student feedback and better student performance observed with podcast supplementation, we are of the opinion that introduction of podcasts for dental students is a feasible option. It would serve as a beneficial supplementary learning aid for the students in addition to class lectures and textbook reading. Evaluation of student performance and opinion needs to be done again, after introducing podcasts, to assess their utility on a long-term basis. Also further multi-centeric studies needs to be done with alternative study design to objectively assess student performance. This would also pave the way for introducing podcasts for other courses.

Conclusion

The findings of this study were that: 1. first year dental students perceive audio podcasts as an effective aid for review before exams and to have the scope for enhancing student performance; 2. acceptability and perceived utility of podcasts is good among students. Introduction of podcasts for first-year dental students will be a good option which will offer the students a lot of flexibility in learning, with regard to place and time.

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PEER REVIEW

Not commissioned. Externally peer reviewed

CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

ETHICS COMMITTEE APPROVAL

Institutional Ethics Committee Manipal (No.79/2013)

Table 6: Percentage of the students in both the groups who responded to each statement in the questionnaire with agree, disagree or can't say respectively

Sl.Number of statements in the questionnaire	Percentage of students (absolute numbers) who "Agree/strongly agree"	Percentage of students who "Disagree/strongly disagree"	Percentage of students who "Can't say"
1.Listening to the podcast after the lecture enabled me to understand the topic better	67.5 (54)	7.5 (6)	25 (20)
2. I believe that including podcasts along with lectures in the course curriculum will help me perform better in my exams	76.2 (61)	3.8 (3)	20 (16)
3. I might not use podcasts because they are too time consuming	17.5 (14)	57.5 (46)	25 (20)
4. I find the podcasts useful because it will enable me to listen to the lectures repeatedly and at my own convenience	91.3 (73)	3.7 (3)	5 (4)
5. Listening to podcasts alone is not a good form of learning	6.2 (5)	72.6 (58)	21.2 (17)
6. . I would like didactic lectures to be supplemented with podcasts in the course	73.8 (59)	8.8 (7)	17.4 (14)
7. Podcasts are not a convenient form of learning as I might face some technical difficulties in using them	16.2 (13)	55 (44)	28.8 (23)
8. Supplementing podcasts with didactic lectures is absolutely necessary to understand difficult topics in Physiology	71.2 (57)	8.8 (7)	20 (16)
9. Didactic lectures alone will be sufficient without Podcast in the course curriculum	12.5 (10)	52.5 (42)	35 (28)
10. As audio podcasts provide only verbal information without any diagrams and images its usefulness as a learning tool is limited	63.8 (51)	17.4 (14)	18.8 (15)