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Effects of flipped class based teaching in orthodontics & dentofacial orthopedics – A prospective study

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ABSTRACT

The aim of this prospective study is to evaluate the students appearing for university examination in Orthodontic dentistry. A total of 150 students enrolled in this study from two consecutive academic sessions. In Group I (2015-2016) final year graduate students of 75 students received conventional class room lectures; group II (2016-2017) final year graduate students of 75 students received flipped class room lectures. The curriculums for both the groups were approved from the department of Orthodontic Dentistry, Saveetha Dental College and Committee Members for Education, Saveetha University. At the end of each academic year marks scored out of 200 marks were obtained and subjected to statistical analysis. All the students cleared the university examination held at respective academic years for both the groups. The mean marks obtained for CCR group was 130.93 ± 9.12 and for FCR group was 150.35 ± 10.93.). Independent samples test revealed there is highly significant difference seen ($p < 0.01$). In the recent year it was found that the flipped class system has gained a significant attention amongst all educators. The characteristic feature of flipped class system is that in flipped class they have videos & clipping related to the subject. The students will be given the videos of the classes on the previous day of the class so that they can go through it & will have a better idea regarding the topic & it will even motivate them to even search & know better of the topic. The only point is such that teachers have to spend a bit more extra time is creating the video's related to the topics.

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INTRODUCTION

The word education comes from a latin word meaning "bringing up or rearing ". Education is the process of facilitating learning or the acquisition of knowledge, skills, values, beliefs, & habits (Dewey John 1944). Education is the process by which the society deliberately transmits its accumulated knowledge, skills & values from one generation to another. Education can take place either in a formal or informal settings (Christopher 2008). Various authors have proposed various reasons as the purpose of education, some authors claim that education influences the personnel development of

the student, forms a cultural identity of an individual by establishing a career or occupation. Other authors claim that the education contributes to the social development by shaping an individual into a productive member of the society, thereby promoting society's general economic development & preserving the cultural values (Examples of subjects 2009).

Education is being divided into various ways of learning such as formal, informal, quasi formal or non-formal. 1)Formal education refers to the instruction given in a formal structure where the student should learn what is pre-decided by the teacher. Informal education on the other hand is entirely different from formal education. 2) In informal education they learn themselves (ie) students when they try to find out information on their own using various means such as book shop, library, museum, online search etc. While they gather information on their own they gain better knowledge and acquire a better idea regarding the topic. 3) Non-Formal education is the type of education which belongs somewhere between the formal & informal (ie) the students are less likely controlled than those of formal education but the education system is same as informal education (Allmendinger J 1989; Horner, W., et al., 2015).

There are various changes seen over the years of time in the field of education. Learning based on the lectures heard became an old trend in the field of education (Ryback, D., & Sanders, J 1980; Strauss and Valerie 2012). Nowadays the education system involves mainly of a activity based learning, case based learning etc (Abeysekera, et al., 2015; Marco Ronchetti 2010; Greg Topp 2011).

Flipped class system is the method of education which is mostly followed. The history of flipped class system dates back to rule of Alison king in 1993 he published "From Sage on the Sage to Guide on the Side" in which he said how the class time is being used for the construction of meaning rather than the platform for the transmission of information (King A. 1993; Rahman AA, et al., 2014; Lage MJ, et al., 2000). Harvard professor Eric Mazur played a significant role in the development of flipped teaching, he used this method in teaching his students & found to be an effective method as students gained a lot of knowledge through this method. Nowadays flipped class room are being used in many fields of education from medical to engineering field. By this method the inquisitives makes the students to browse more books or articles than earlier. Various studies have proved that by the Combination of digital lecture and face to face class discussions, the flipped classroom can effectively transforms the outcomes, critical thinking and student activities it also proves that the flipped class helped to improve the content retention in students (Persky AM et al., 2017; Eddy SL, Hogan KA. 2014). But the overall effect of flipped classes implemented in dental education system is still debatable. Thus, in this study we evaluated the effectiveness of conventional class to flipped class by comparing their final year university theory exam marks in orthodontic dentistry in dental students.

MATERIALS AND METHODS

Subjects and Study design

In this study one hundred and fifty students from two consecutive batch of final year dental students were taken majoring the subject of Orthodontics Dentistry at Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences (SIMATS), Saveetha University.

This prospective study happened in two batches (2015-2016, 2016-2017). Informed consent was obtained from all the students. The study design is such that it had two groups. In Group 1- 75 students received Conventional Class Room (CCR) for 2 hours per week which includes lecturing and question and answer session (2015-2016), in Group II- 75 students received Flipped Class Room (FCR), where the flipped class was given one day prior and students were asked to report the next day, the session held was two hours where lecture, discussion and question and answer session took place (2016-2017). Both the batches of the students received either form of lectures from 15 staff members (6 Professors, 4 assistant Professors and 5 Senior lecturers).

The curriculum design for the lectures was formed by the Department of Orthodontic Dentistry and was implemented after getting approval from Head of the Department and Director of Academics, Saveetha University.

The classes were scheduled for the CCR group & the topics for the CCR group was given to them a day prior to the lecture, the next day the lectures were taken continuously for two hours followed by question and answer session weekly once by the respective faculty member. At the end of the class the student were given assignment and asked them to submit within a week time.

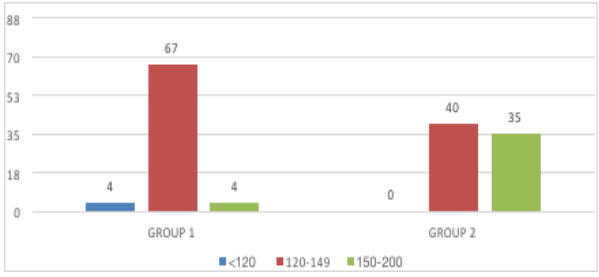

Figure 1: Students appeared for the university exams

Table 1: Distribution of marks

Marks	<120	120-149	150-200
Group I	4	67	4
Group II	0	40	35

Table 2: Academic year details, Mean and standard deviation for all groups

Groups	Name	Academic Year	Students	Mean ±SD
Group I	Conventional Class Room (CCR)	2015-2016	75	130.93 ± 9.12
Group II	Flipped Class Room (FCR)	2016-2017	75	150.35 ± 10.93

Table 3: Independent t test

	Groups	95% Confidence interval	t	Sig (p Value)
Pair	Group I Group II	-16.071	-11.813	.000*

statistically significant p<0.05

The class were scheduled for FCR group, the flipped class video was given a day prior and the student were asked to view. The next day a brief lecture regarding the topic was given by the faculty for 20 minutes. To encourage & to make the flipped class session lively the students were divided into 15 per team. Each team were given an unsolved question for in class discussion. After 20 minutes, one representative from each team was asked to present the answers and it was discussed for about 15 minutes per team. In the end of the class, the faculty completed the lecture by solving the tough questions raised by the students for 20 minutes.

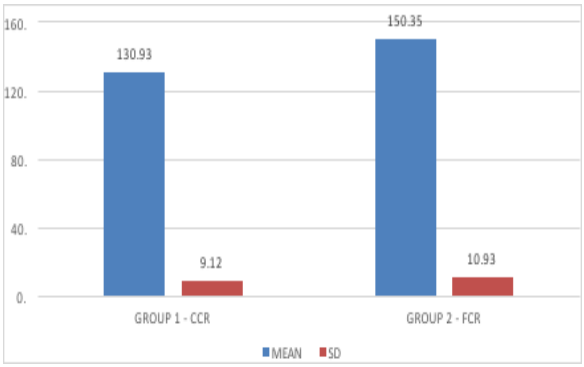

Figure 2: Distribution of marks based on class obtained

Data Collection and analysis

At the end of the year university exams were conducted for the students for 200 marks (100 marks for theory and 100 marks for practical) for both the groups, 75 per group respectively.

The marks obtained were then statistically analysed for independent samples test using SPSS 23 (SPSS Inc, Chicago, IL, USA).

RESULTS

A total of 150 students were enrolled for this study, 75 members in each group, group I CCR - 75 students (batch 2015-2016) and Group II FCR- 75 students (batch 2016-2017) for the subject on Orthodontic Dentistry. The class attendance for both groups was 100%. All the students in conventional class room group completed the assignments in the stipulated time by the instructor. In the flipped class room group the students have watched the video and read the supplementary class materials assigned by the instructor. The response rates for both the groups were 100%. All the students appeared for the university exams (Figure 1).

At the end of the academic year for respective groups university examination was conducted which includes theory and practical examination. The distribution of marks based on class obtained: second class, first class and distinction categorized (Table 1). The marks obtained were analysed statistically. The mean marks obtained for CCR group was 130.93 ± 9.12 and for FCR group was 150.35 ± 10.93 (Table 2), (Figure 2). Independent samples test revealed there is highly significant difference seen (p <0.01) (Table 3).

DISCUSSION

Our study was conducted in a prospective manner. In this study we compared two consecutive academic sessions of final year students who were eligible in taking their final university exam in orthodontic subjects were chosen. A total no of 75 students were enrolled in this study per academic session. Group I (2015-2016) Conventional class room and group II (2016-2017) Flipped class room.

In conventional classroom students listen to a lecture and subsequently complete their required assignments which are given after the lecture, although this may not be true of every student, eventually at the end it may lure the students into a practice of memorizing the content and regurgitating the information for the examination as a result they fail to retain the information (McLaughlin JE, et al., 2014). In the modern era the students have a wider range of learning by collecting informations

on their own and even it can be applied practically with the help of computers.

Studies have shown that active learning activities, such as those in flipped classrooms, helps to increase the students involvement in preparing for the next days class and it also helped in improving their attendance (Hurtubise L, et al., 2014). In flipped classroom system small activities are being engaged therefore it improves in encouraging the students for preparing enthusiastically for the next day class in advance as a result the involve themselves in collecting information regarding the topic which aids in better understanding the subject and retention of the subject even after the examination.

In our study a total no of 48 topics were covered in 72 hours for conventional class room group and they were given assignments regarding the topics at the end of the lecture and were evaluated within the time period of one week. Whereas in Flipped class room group 48 topics were covered in 64 flipped class sessions, each topic was covered with a video less than 5 minutes were made. The flipped videos were given to the students a day prior to the class. During the class a brief discussion was given based on the topic discussed and involved in various other activities regarding the topic such as articles reading, case discussion and in class assignments were given and evaluated.

All the students who enrolled for the examination were asked to give university theory and practical examination for 100 marks each, at the end of 2016 and 2017 academic year for CCR group (2015-2016) and FCR group (2016-2017) respectively.

The university examination results for the subject orthodontic dentistry were out in two weeks time. The marks obtained were categorized into three classes such as the second class (<120), first class (120-149), & distinction (150-200). The results were such that in CCR group 4 students secured second class, 67 students secured first class and 4 students secured distinction. Whereas in FCR group none of the students secured second class, 40 students secured first class and 35 students secured distinctions respectively (Table 1). Highest Score secured by the CCR group is 156 and the highest score secured by the FCR group 183. The mean and standard deviation were calculated (table 2) & the results were found to be 130.93 ± 9.12 and 150.35 ± 10.93 for both CCR and FCR groups respectively. The independent samples test (Table 3) showed the results were highly statistically significant ($p<0.00$).

There are various studies which are in accordance to the results obtained in our study, some of the statements given by various authors showed that there is is subsequent increase in the results in flipped class system compared to the conventional class system (Tang F, et al., 2017; Yang Y, et al., 2017). Such that in a basic pharmaceutics course, given by McLaughlin et al., 2014 showed that final examination scores (out of 200 points) were higher (p50.001) during the year in which a flipped classroom (165.48, n5162) was used compared to the previous year in which a traditional lecture format (160.06, n5153) was used. Wong et al in his studies done on the pharmacology classes, he compared two groups of students a control group of students (n5105) from the previous year who received traditional class lectures for cardiac arrhythmias, to the present first-year pharmacy students (n5101) who received instruction via a flipped teaching method on comparing the exam results we found that the students who attended flipped classes had higher mean examination scores on pharmacology than those who attended conventional classes.

Recently Tang et al., 2017 did a comparative study done on ophthalmology subject in the year 2017, on comparing the results of flipped class group to the conventional class groups, it was found that the flipped class groups had better understanding of subject ($p<0.029$), it was found to be helpful in final examination ($p<0.001$),this is because of increased learning motivation towards the subject ($p<0.012$) was found in flipped class groups compared to traditional learning group respectively .

In 2017 Yang et al., 2017 did a study on ophthalmology subject in china the result were found that the students who attended the flipped class for the discussion in ocular trauma showed better results. Implementation of the fully flipped class in preclinical physiology had better understanding, satisfaction of lectures and improved performance in examination when compared to previous years where the curriculum was on conventional lectures.

CONCLUSION

In the recent year it was found that the flipped class system has gained a significant attention amongst all educators. The characteristic feature of flipped class system is that in flipped class they have videos & clipping related to the subject. The students will be given the videos of the classes on the previous day of the class so that they can go through it & will have a better idea regarding the topic & it will even motivate them to even search & know better of the topic. The only point is such that teachers have to spend a bit more extra time is creating the video's related to the topics.

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