



# INTERNATIONAL JOURNAL OF RESEARCH IN PHARMACEUTICAL SCIENCES

Published by JK Welfare &amp; Pharmascope Foundation

Journal Home Page: <https://ijrps.com>

## Flipped classes and its effects on teaching oral and maxillofacial surgery

Deepak Nallaswamy V\*, Abhinav, Subha M

Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamil Nadu, India

### Article History:

Received on: 06.07.2018  
Revised on: 12.12.2018  
Accepted on: 15.12.2018

### Keywords:

Flipped class,  
Maxillofacial Surgery,  
Dental students

### ABSTRACT

The aim of the study was to compare the outcomes of the traditional method of teaching to the flipped classes' method of teaching in the subject of Oral and Maxillofacial Surgery among undergraduate dental students. A total of 150 students pursuing their Bachelor in Dental Surgery were included in this study over a period of two years. 75 students were part of the traditional teaching group and 75 were part of the flipped class group. The final examination marks were collected and statistical analysis was done. The mean marks secured by the students in the traditional teaching group was  $116.69 \pm 8.49$  and for the flipped class group was  $128.72 \pm 10.34$ . The results were statistically significant. ( $p < 0.05$ ). The flipped class method of teaching improved the performance of the students in the exams. The usage of these flipped classes in medical education is advocated.



### \* Corresponding Author

Name: Dr. Deepak Nallaswamy.V  
Email: [Dir.acad@saveetha.com](mailto:Dir.acad@saveetha.com)

ISSN: 0975-7538

DOI: <https://doi.org/10.26452/ijrps.v10i1.1902>

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### INTRODUCTION

The current educational techniques are starting to become obsolete. Gone are the days where the lecturers used to take classes from the podium. The chalk and talk method have now become the point and talk method. The drawbacks of conventional lectures include the difficulty to hold a student's concentration for a longer time, the inability to adapt the pace of a lecture to all students and the difficulty in teaching application and analysis-based topics through lectures. Despite all these, the traditional forms of lectures are the mainstay in education strategies in higher education.

The educational environment is rapidly changing as educational reformists and researchers search for newer techniques and methods to change the way education is presented. The use of technology has revolutionized the teaching process. Some of

these technologies have been integrated with teaching methods to help advancing the education system. For example, the incorporation of power point presentations into the system was a revolution in education at the time. Audio-Visual aids helped the students to visualize complex structures and mechanisms and this in turn increased their ability to perceive them and increased their overall performance (Leicht, R. M. *et al.*, 2012). But having said all this, the student still needs to memorize the slides and the notes, which does not increase the students classroom engagement (Ahlfeldt, S., *et al.*, 2005). These power point presentations, though informative and visually appealing, do not guarantee the undivided attention of the students. This is where the concept of Flipped class comes in.

The flipped classroom was developed and introduced by Jonathan Bergmann and Aaron Sams (Bergmann, J., & Sams, A. 2012). Flipped classes are being advocated by a host of researchers and educational reformers in higher education. The flipped classes appear to address several downfalls seen in traditional teaching methods. It allows for increased usage of classroom time for solving closed ended analytical problems. Flipped class is basically a reversed class, where the students are given the materials in the form of videos and interactive notes to read before the class, like a pre-class

homework. So, this gives added time in the classroom for teacher guided discussions and problem solving. The advantages of these flipped classes include reduction in lecture time, increased time for problem solving, active student engagement is better, the students can learn at their own pace and also gives the teachers an opportunity to assess the students performance. (Gilboy, M. B., *et al.*, 2015; Betihavas, V., *et al.*, 2015).

Oral and maxillofacial surgery is a branch of dentistry which specializes in treating many pathologies, injuries and defects in the head and neck region. The Aim of the study was to compare the outcomes of the traditional method of teaching to the flipped classes method of teaching in the subject of Oral and maxillofacial surgery among Undergraduate dental students.

## MATERIALS AND METHODS

The subject of Oral and maxillofacial surgery, a part of the Bachelor of Dental Surgery (B.D.S.) course at Saveetha dental college and hospitals, Tamil Nadu, India was selected for the study. The study was conducted between the academic years from October 2015 to October 2017. The subject was taught over a period of ten months culminating with an evaluation for the subject. We took two groups of students over a period of two successive years. The first group comprised of students who were taught using traditional teaching methods and the second group consisted of students for whom flipped classes were implemented. At the end of the academic year, the performance of the students was evaluated through examinations comprising of multiple choice based questions, essays, short notes and a practical clinical exams. All students included were first time takers of the subject. Only students who did not have any history of arrears were included in the study

### Traditional class methods

The class comprised of 75 students in their final year BDS course. All students had a total of 480 hours of in-class time per month for a total of 10 months. A total of 20 topics were covered in each session lasting 120 minutes per week. After the completion of the days lecture, the remaining time will be utilized for discussion or JIGSAW based problem solving or by taking in-class quizzes. Weekly assignments were given to the students. The students are supposed to read textbooks and take quizzes.

### Flipped Classes

The second group was taught using flipped class technique. The students were given the course materials in advance and were expected to go through them the day before class. The students were given

i-books, a format developed by Apple Inc., catering to the particular topic to be taken which included video lectures in them. Each lecture video was for an average of 5 minutes and each topic had about 3-4 videos. The videos would be played at the beginning of the i-books followed by the lecture notes in a simplified manner with appropriate images. The videos had animated content, Flow charts, diagrammatic representations and general content and the voiceover was provided by the teacher. To cover the subject content, the classes were split into 3 modules, each module having 5 classes and a total time of 600 hours of in class hours per module. A total of 45 videos were created for the modules and a total of 15 i-books were prepared. During the class hours, the teacher gives a short presentation on the topic for about 15 minutes and then the students and the teachers discuss clinical scenarios based on POGIL, have discussions based on models and have in-classes quizzes.

### Data collection

The final examination marks of both the group of students were collected

### Statistical analysis

All statistical analyses were conducted using SPSS® version 18 software. An Independent t-test was done to determine the level of significance. The level of significance was set at  $p \leq 0.05$  (two-tailed).

## RESULTS

A total of 75 students were included in each group in the study. The mean scores in the final exams are shown in table 1. The highest score in the traditional class method was 137 and for the flipped class method was 155. The lowest score was 103 in the traditional class group and for the flipped class method was 109. (Table 1)

**Table 1: Mean scores of the two groups and their significance**

Group	Mean±SD
Traditional class	116.69±8.49*
Flipped Class	128.72±10.34*

\* P value  $\leq 0.05$

## DISCUSSION

Richard Pierce and Jeremy Fox, in 2012, implemented the flipped classroom model for renal pharmacotherapy and found that its improved student performance and had a favorable reception among the students (Pierce, R., & Fox, J. 2012). McLaughlin *et al.*, in 2013, flipped a first year pharmaceuticals course and concluded that the class attendance and learning increased following the adoption of the flipped class model (McLaughlin, J.

E., *et al.*, 2014). Mason, Shuman and Cook compared the traditional classroom to a flipped classroom and found the format to be satisfactory and effective (Mason, *et al.*, 2013). H. Hung also described the flipped class technique helping the students attain better learning outcomes and attitudes towards learning (Hung, H. 2015). Missildine *et al.* suggested that interactive classroom activities can result in improved learning but not the students satisfaction.

The subject of oral and maxillofacial surgery requires an in-depth understanding of the head and neck anatomy. A number of different procedures are present and each one is a unique in its own way. This is where the understanding of the subject is very important. A Conventional teaching class would only teach the theoretical aspects of the topic and by the end of the lecture, there is no time to explain the practical aspects of the topic. This is where the flipped class technique worked out well. as the students read the class topics beforehand, the time taken to teach the theoretical part is lesser and the increase in class activities such as role playing, POGIL, Jigsaw have increased. The students are much more confident after we switched over to the flipped class technique

Each Flipped class video was for a maximum of 5 minutes. The videos were created using Keynote software, developed by Apple Inc. The video seminar would contain all the basic information required for the class, classifications, surgical procedure videos and images, animated projections of procedures and techniques. The videos were prepared and narrated by the teacher. The videos were 45 in number. They were embedded in to the i-books which were given to them. The i-books had the entire lecture notes and videos and in the end they had a self-evaluation page consisting of multiple choice questions. They also had interactive images embedded in the i-books. All the materials were given to the students a week prior to the class and they were asked to go through them.

Flipped classes incorporate the use of problem solving in a progressive manner which is aimed at engaging the students in assessing and solving complex problems (Kuhlmann DO, Ardichvili A 2015; Schmidt HG, *et al.*, 1990). Flipped classes help in the comprehensive recall and transfer of skill sets necessary for the subject (Mc Gaghie WC, *et al.*, 2009). These classes help in getting the skills necessary to apply in the clinical setting are obtained in a classroom setting. Transfer of simpler and non-complicated problems to the pre-class study sessions can help in increasing the complexity of the tasks in the classroom setting through active learning (Persky, A. M., & McLaughlin, J. E. 2017).

The principal disadvantage of employing these flip classes involve the lack of technological facilities available to the students to access the reading materials (Bergmann. J. & Waddell, D. 2012). The flipped classes may or may not be suited for the students learning style. They may choose not to view the videos given to them (Moore, Cary & Chung, Chia-Jung. 2015). The benefits of the flipped class may not be of much help for struggling students who need more attention to get the required knowledge. The students can also get frustrated when their queries cannot be addressed immediately during a video lecture (Johnson, G. B. 2013).

## CONCLUSION

The flipped classroom has created a significant change in the dynamics of teaching. It represents a shift from the use of traditional teaching techniques to the optimal use of technologies at hand. The biggest advantage of these classes is the increase in class time for interaction between the teachers and the students. The use of flipped class in medical education is advocated by us following our study and after assessing the student's performances

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