



## Case Report

# Team Based Revision in Competitive Manner among Medical under Graduates for Active Learning in Microbiology – A Pilot Study

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## Abstract

*There are number of learning resources available for medical undergraduates, a cluster of students needs a stimulus to engage them in active learning. The academic forum is responsible for creating an environment for active learning among students. So, a team based active learning to revise a completed module was designed to evaluate students learning through quiz competition and pre test and post test score along with feedback. A total of 78 students (both III and V semesters) were included for the study. The activity was a two day course with preparation of question in teams followed by pre-test, execution of questions to the consecutive teams in the form of quiz competition and a post-test. The marks scored in the quiz competition depended on teams integrity and there was a significant difference between pre and post test score of Group 1 and Group 2 separately. This pilot study was found to motivate the students to develop interest over active learning in teams.*

**Keywords:** Microbiology, Medical under graduates, Team based active learning, Evaluation, Quiz competition, pre test-post test.

## Introduction

In the present digital era, there are numerous learning resources like e-learning tools, available for medical undergraduates. Though active learning amongst the students is a self-driven activity, a cluster of students needs a suitable environment to engage them in active learning. Creation of such environment through academic forum helps a student to develop active learning in

and out of classrooms is by interaction among students. This activity not only enables to kindle their enthusiasm but also to recall the topics. Active learning becomes a powerful tool among medical undergraduates when competition between teams is carried out with the active learning in teams.<sup>1</sup> Such a Team-based learning (TBL), is a student centered method that includes individual learning along with teamwork and

found to be effective.<sup>2</sup> By engaging the students in team based competitive learning helps not only to arouse their competitive instincts but also to recall the information across broad range of topics. TBL is said to be a flipped classroom approach having two step approaches. First, the students obtain the knowledge in their own preparation after the teaching session. Second, to involve the students in team work during class hours under the supervision of moderator, followed by a feedback.<sup>3,4,5</sup>

Medical microbiology contains 6 sub-branches with numerous microorganism names, subtypes and technology. Students tend to mix the microorganisms names and terms due to difficulty in remembering, recalling and understanding the concepts. Therefore, there is a need to develop innovative active learning methods that increases student motivation to improve the learning followed by satisfaction through achievements. At the end of completion of a module, a revision session was planned to make the student comfortable with the subject. In the present study, revision session on General microbiology was carried out in the form of team-based revision (TBR), a modified form of TBL. This method consists of framing questions for competition within team and conduction of competition between teams was developed to consolidate the previously learned information across a broad range of topics. The objectives of the study includes (a) To evaluate the students learning outcome through quiz competition in teams and the pre test –post test scores separately. (b) To assess the feedback to improve the pattern of learning methods.

### Methods

This pilot study was conducted in the Department of Microbiology, JIPMER, Karaikal. About 78 Students in the III and V semesters such as Group 1, N=42 and Group 2, N=36 of II year MBBS who willing to participate in this study were included. The revision class on General bacteriology was informed to III and V semester students separately

before 10 days of the session. Their anonymity was always maintained in the study by removing all the personal identity from the data. The revision session was carried out in two days with day 1 for preparation of questions and day 2 for execution of question to the consecutive teams. It was informed to the students to bring laptop and textbook of Microbiology to prepare for the quiz to be held on next day. On day 1, in the given period of 3 hours, five teams were made randomly for III semester and four teams for V semester separately. Each team was asked to select a leader. A moderator was allotted to each team by a lot system. All the teams were instructed to prepare 10 questions in following types, namely selected response like MCQ, Recall (Fill ups, True or false, match the following, fill the gaps in mind map, Identification of picture with two relevant points, telling the similarity or difference), application and problem solving (reasoning or justification). The time given for the preparation was an hour during which every team was asked to select the question from each topic without leaving any from the module. Each team was instructed to divide the topics among each member in the team to prepare questions and to discuss with the moderator. In order to avoid repetition of questions between the teams, a meeting was held among the moderators. Finally, all the questions by each team was made separately in the power point format and sent to the respective moderator. Confidentiality was maintained throughout the preparation of question by individual team.

On day 2, with two hours duration, a pre test of objective type questions (20 MCQs) with high order thinking, developed by faculties was conducted to all students separately. Then quiz competition conducted by one group was attended by remaining four teams/ three teams in a successive order. The score was assigned for each correct answer to the respective team. Each team has an opportunity to score 10 marks for their turn, additional marks for unanswered questions of other team and 5 marks from the moderator for the team dynamics. After the quiz competition, a

post test was conducted separately to all students. Feedback with open ended questions were collected at the end of the revision session for the subjective evaluation of entire revision session. Pretest and Post test were evaluated to know the effect of revision exercises on active learning.

#### Statistical Analysis

The completed questionnaire in the feedback form using likert scale and the pre and post test score were entered into Microsoft excel and statistical analysis was done using SPSS 20. The data were presented as mean  $\pm$  standard deviation and percentage. The student's t test was used for statistical analysis, P value  $<0.05$  was considered to be statistically significant.

**Table 1:** Analysis of pre-test and post-test score between Group 1 and Group 2

Group	Test Scores	Mean	Standard deviation	95% confidence interval		p-Value
				Lower	Upper	
Group 1-III Semester	Pre	9.00	3.108	.195	1.471	.000
	Post	9.83	3.107			
Group 2- V semester	Pre	9.8056	2.79611	.07327	1.01771	.000
	Post	10.2778	2.37380			

There was a statistically significant correlation between pre-test and post-test mean scores of Group 1 and Group 2 separately (Table 1).

With a predesigned questionnaire, feedback was collected using likert scale. The feedback of the student was considered as positive if they mark agree or strongly agree. Responses to question were analyzed collectively. 87% of the students agreed/strongly agreed that this study was informed before 10 days. 77% of the student agreed / strongly agreed that the learning objectives were clear. Low proportion (51%) of students agreed the team activity facilitated active learning and 88% informed about the interaction with all the members in the team. This team based revision motivated 72% of them to prepare for the subject, enabled 69% to share module related information to the members in their team and 65% to get module related information from members of their team. Overall, the positive feedback for optimal session duration was 72% and for usefulness of the session was 73%. Suggestions

#### Results

A total of 78 / 100 students from both semesters were present for the two day revision classes. The preparation of question in team for quiz competition was effective for all students. In the quiz competition, different teams in the Group 1 (III semester (N=42), scored marks such as 15.75 (Team A), 15.25 (Team B), 9.5 (Team C), 8.5 (Team D), 13.75 (Team E). In Group 2 (V semester (N=36), the Team A-12, Team B-9.5, Team C-13.25, Team D-16 are the marks scored by different Teams.

were also recorded for improvement of the module in the comment section.

In response to open ended comment section, most of the students appreciated group activity for better understanding of the module and time management. Majority students said that this quiz competition made them to realize that in depth preparation is needed to get better scores in the exam. Suggestions for improvement made by students include incorporation of more exam oriented type questions with clinical history, and to keep such programs after internal assessment test.

#### Discussion

With the competency based curriculum, there is a shift in teaching of systematic didactic lecture as the per the text book order to synchronized modules with vast expansion of information and technical background which is arduous task to learn. So, in the present study, to know the impact of active learning, a team based revision was

carried out amongst teams in the group in competitive manner.

The team based revision was a two day course to assess their performance in short term. The preparation of questions and participation in quiz competition would not only arouse interest and curiosity in a topic, but also to assess the extent of the students' knowledge. In the present study, while preparing for quiz competition in teams, they would indirectly orient to read General bacteriology topics with critical and focused mind. By motivating the teams to prepare questions along with answers made them to share their knowledge and helped them to understand the important concepts.<sup>6,7</sup> Moreover, the question preparation, conduction and scoring in the competition effectively was observed in those team which got involved, engaged, and interested in the team activity with group dynamics. The skills of group dynamics include planning together, segregating the topics for preparation followed by questioning, listening, responding and explaining. These skills provide the basis for the development of teamwork and collaborative learning.<sup>8</sup> Team work stimulated the students to utilize scientific knowledge acquired during team discussion to frame questions and to answer them. This process would not only enable them to learn but also to locate and manage information. On the other hand, students generate reasonable answers to the questions and provide support for their conclusions. All these were evidence for fostering active learning which would help medical students to improve their learning skills, analytical skills, and refine their decision making abilities.<sup>9</sup>

Collaborative learning takes place when the participants are mutually dependent, they share responsibilities, and strive together to achieve a common goal thereby improves their communication skills.<sup>9</sup> Hence during the preparation session, moderators were present near the team for clearing doubts and correcting the framed question. A meeting amongst the moderators enable to correct the repeat question framed between the teams.

In the present study, the questions framed by faculties for pretest-post test design helped to analyze the students learning outcomes through team discussion and competition. The study started with a pretest in order to presensitize the students with thought provoking questions followed by quiz competition. The results of pre test-post test mean score revealed that there was a significant difference for Group 1 and Group 2 separately. This showed that team based active learning was helpful in improving their performance. Lund et al reported that students who had self-involvement with higher initial level of knowledge have a narrower range of improvement in score than others with a lower initial level and therefore they might achieve less improvement.<sup>10</sup> Shadish et al<sup>11</sup> postulated that the significance of the mean test score is easier when pretest mean score is lower, than the posttest mean score which is a mere amplification effect and not the creation of totally artificial effect.

The feedback will help to streamline the learning methods adopted and revise the content, duration and implementation.<sup>12</sup> Therefore, in the present study, the students were satisfied with prior information, clear objectives and dissatisfied with carrying out such program before their internal assessment. Only 51% were agreed that team activity facilitated active learning. This showed that there was less interaction between the members of a team or those students were self-motivated and like to have own reading. However, 88% agreed that team activity helped in interacting with members. In addition, team based revision motivated 72% of the students to prepare, and 65%-69% to get and share information related to module with the members in the team. The students felt that team should be made into small groups for team activity as some members in the team were not involved. Some students told that time were maintained whereas some wanted more time for preparation. The learning outcomes of the student are mainly based on the two day team based revision in spite of prior information 10 days before. Though it was found that learning

with competition improved the student's performance in the post test score, it was not reflected in the academic performance. However, students got engaged and enjoyed during the entire session. Thus, our findings were consistent with the previous study, wherein increased student engagement with higher quality communication processes, resulted in significant improvement in the students' acquisition of knowledge during the learning process.<sup>13</sup>

The present study had some limitations. There was a selection bias which made non-equivalent members in a team due to the random allocation. Therefore, one team was with high achievers and in other team with low achievers resulting to non-equivalence. Moreover, smaller sample size allowed limited interpretation of results. In future, a combination of high and low achievers in a team along with some more time of interaction for team activity and presenting an exam oriented clinical history based questions will help to improve our learning outcomes.

### Conclusion

Team based active learning helps to widen their knowledge by sharing the key concepts and also to develop their communication skills. This pilot study was found to be resource efficient method to develop the confidence among students over the subject.

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**Conflict of Interest:** None.

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