

ORIGINAL RESEARCH

EFFECTIVENESS OF PROJECT WORK AS A TEACHING LEARNING METHOD FOR TEACHING OF MEDICAL MICROBIOLOGY TO UNDERGRADUATE MEDICAL STUDENTS

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ABSTRACT

Background: This study was an interventional education research aiming to assess the effectiveness of project method of teaching when compared to traditional teaching methods in Medical Microbiology to undergraduate medical students.

Materials and Methods: A total of 162 students volunteered to get enrolled in this study. The students were broadly divided into Group A and Group B. Each of the groups was further divided into 20 small groups. Group A students worked on one topic and Group B students worked on another topic. Each project had 30 – 35 slides in Microsoft PowerPoint format. The topics assigned for project work were taught again by didactic lecture after completion and submission of projects. Assessment for the topic was conducted by MCQs and feedback from students was collected regarding their experience during the project.

Results: Out of 208 students, total of 162 (77.88%) students volunteered to get enrolled. A total of 40 projects were submitted, out of which 16 groups scored between 61 to 80 points, 19 groups scored between 41 to 60 points and 5 groups scored between 21 to 40 points. The topics for project work were taught again by didactic lecture and average marks obtained by students who participated in project were higher than students who did not participate in project. The feedback displayed that 92% of students who participated in project enjoyed being part of it and that it helped them in gaining knowledge.

Conclusion: There was significant difference in marks of students who participated in project and also attended lecture when compared to students who did not participate in project or class. The students who agreed that they enjoyed being part of project did not find any difficulty in finding material on internet, and were willing to participate in similar projects in future. To conclude, project-based teaching and learning methods

will aid in increasing interest and knowledge in the subject of Microbiology in medical students.

Keywords: Self-directed learning, Microbiology, project method of teaching, team-based learning, medical students.

INTRODUCTION

Medical microbiology is a para-clinical subject taught in second year MBBS and major part of it contains teaching through didactic theoretical lectures. This monotonous way of teaching and learning takes away the interest of students from the subject.^[1]The objectives of this study were to assess the effectiveness of project method of teaching when compared to traditional teaching methods in Medical Microbiology to undergraduate medical students. This study also intended to assess self-directed learning in Medical Microbiology in undergraduate medical students, while using internet resources and to evaluate team work in students and effective use of WhatsApp application in team building during the project work.

MATERIALS & METHODS

This study was an interventional education research aiming to assess the effectiveness of project method of teaching when compared to traditional teaching methods in Medical Microbiology to undergraduate medical students. A total of 162 students volunteered to get enrolled in this study. Consent for the study was taken by Google form online from each participant. The students were broadly divided into two groups of 81 students (Group A) and 81 students (Group B). Each of the groups was further divided into 20 small groups, 19 groups of 4 students and one group of five students. Each small group selected a group leader who coordinated with the group members for preparation of the project, research and feedback. Group A students worked on a project on “COVID 19 vaccines”; Group B students worked on a project on “Prevention of spread of COVID 19 in community”. Instructions were given to each subgroup to use WhatsApp/ mobile for communication with each other. Each group had a time limit of 1 week to complete the project and submit to the staff assigned to that group. Each project had about 30 – 35 slides in Microsoft PowerPoint format. All members in the project were strictly instructed to refrain from copy pasting from internet resources. Research for project was done on internet from relevant medical information websites and the same references were included in the power point submitted.

The power points were assessed based on content, creativity, recent updates and references. The topics assigned for the project work were taught again by traditional teaching method (didactic lecture) after completion and submission of the projects. Assessment for the topic was conducted by MCQs and each participant was scored accordingly. Feedback from students was collected regarding their experience during the project, whether they enjoyed being part of the project as a team, using online resources and recall of content after each teaching method. The students were also asked to give feedback regarding use of mobile phone and WhatsApp as a good communication tool during the project and whether they will participate in similar projects in future during their course. Results were calculated using statistical analysis by Microsoft excel and SPSS software. Ethical approval from institutional ethical committee was obtained before starting the study.

RESULTS

Out of 208 students in the second year MBBS batch, a total of 162 (77.88%) students volunteered to get enrolled in this study. Consent for the study was taken by Google form online from each participant. The remaining 46 (22.11%) students who did not consent for the project stated various reasons for not participating in the study. A total of 40 projects were submitted by the students and were evaluated based on a checklist created by the various faculty of Microbiology in our institute. The power points were scored out of 100 points based on content, creativity, recent updates and references. Out of the forty groups, 16 groups scored between 61 to 80 points, 19 groups scored between 41 to 60 points and 5 groups scored between 21 to 40 points.

The topics assigned for the project work were taught again by traditional teaching method (didactic lecture) after completion and submission of the projects. Out of 208 students studying in the second year, 157 (75.48%) attended the lecture and the remaining 51 (24.51%) students did not attend the lecture. A MCQs test for 20 marks was conducted as assessment for all the students on the topics given for the project and they were scored accordingly. Out of 208 students in the second year batch, 188 (90.38%) attended the test and the remaining 20 (9.61%) students did not attend the test. The students who did not attend the test included 13(65%) male students and 7(35%) female students and were scored as zero. These students were not included for analysis of the results obtained. Fifty percent (10 marks) was considered as pass marks in the test. Ten members (5.31%) out of the 188 students scored 100% (20/20) marks in the MCQs test.

The marks obtained in the MCQs test of all 188 students were compared considering participation in project and attendance for lecture. Out of 188 students who took the test, 151 (80.31%) participated in the project, 23 (12.23%) students attended only lecture and did not participate in project and 14 (7.44%) students did not participate either in project nor attended the lecture class. Among the 151 students who participated in project, 126 (83.44%) students attended the lecture class and 25 (16.55%) students missed the lecture class.

The average marks obtained by students who participated in project only and who participated in project and attended the lecture are 16.17 and 16.67 respectively. The average marks obtained by students who attended only lecture and students who did not participate either in project nor lecture are 14.36 and 10.05 respectively as displayed in Table 4. The students who participated in the project and attended the lecture class scored better than the other students. The ten students who scored 100% marks in the MCQS test took active part in the project and attended the lecture class as well.

The comparison of assessment marks of the four groups of students; the students who participated in project only, the students who took part in project and attended lecture class, the students who attended only lecture and the students who did not participate in project nor attended class showed significant difference (P value <0.05) as demonstrated in Table 5. There was significant difference in marks of students who participated in the project and also attended lecture class when compared to students who did not participate in project or class. These students also scored better than the other groups of students.

Feedback from 162 students was collected regarding their experience during the project, whether they enjoyed being part of the project as a team, using online resources and recall of content after each teaching method. The students were also asked to give feedback regarding

use of mobile phone and WhatsApp as a good communication tool during the project and whether they will participate in similar projects in future during their course. The students were asked to mark a Google form to give their feedback to various questions and they had to choose between “yes”, “no” and “maybe” as their answers. Based on the feedback of the students who participated in the project, Wilcoxon signed ranks statistical analysis was performed. The students who agreed that they enjoyed being part of the project also did not find any difficulty in finding material on the internet, and were willing to participate in similar projects in the future.

The students who agreed that they liked to be a part of a team also said that they found the project work useful in gaining knowledge about the subject. The same students also gave feedback that they found whatsapp and mobile phone as a good communication tool in this project.

Table 1: Reasons for non-consent for the project

Reason for not participating in project	Number of students	Percentage
Network issues and slow internet	18	39.13%
No interest in project	6	13.04%
Need to focus on study	5	10.86%
Personal issues	5	10.86%
No specific reason	12	26.08%

Table 2: Points scored by the groups in Power Points

Points scored (Out of 100 points)	Number of Groups (40)	Percentage
0-20	0	0
21-40	5	12.5%
41-60	19	47.5%
61-80	16	40%
81-100	0	0

Table 3: Marks obtained by the students in MCQs test

Marks obtained (Total 20)	Number of students who participated in project and lecture (Total 126)	Number of students who participated in project only (Total 25)	Number of students who attended only lecture (Total 23)	Number of students who neither participated in project nor attended lecture (Total 14)
0-5	0	0	0	0
6-10	0	0	0	2 (14.28%)
11-15	11(8.73%)	5 (20%)	8 (34.78%)	4 (28.57%)
16-20	115 (91.26%)	20 (80%)	15 (65.21%)	8 (57.14%)

Table 4: MCQS test marks

	Mean	Std. Deviation
Marks of project	16.17	4.620
Marks of project with lecture	16.61	3.934
Marks of only lecture	14.36	4.872
Marks of none	10.05	7.781

Table 5: Comparison of marks of student groups

(I) Groups	(J) Groups	Mean Difference (I-J)	Std. Error	Sig. (P value)
Marks of project	Marks of project with lecture	-0.441	0.544	0.850
	Marks of only lecture	1.813	0.998	0.267
	Marks of none	6.125*	1.077	0.001
Marks of project with lecture	Marks of project	0.441	0.544	0.850
	Marks of only lecture	2.254	1.013	0.119
	Marks of none	6.566*	1.091	0.001
Marks of only lecture	Marks of project	-1.813	0.998	0.267
	Marks of project with lecture	-2.254	1.013	0.119
	Marks of none	4.312*	1.375	0.010
Marks of none	Marks of project	-6.125*	1.077	0.001
	Marks of project with lecture	-6.566*	1.091	0.001
	Marks of only lecture	-4.312*	1.375	0.010

Table 6: Feedback of students who participated in the project

Feedback from students who participated in project. (total 162)	Did you enjoy being part of this project?	Did you find this project useful in gaining knowledge regarding the assigned topics?	Did you like to work as a team?	Did you feel any difficulty in finding material on the internet?	Did you find mobile phone and WhatsApp as a good communication tool during this project?	Would you take part in similar projects in future?
Yes	149 (91.97%)	154 (95.06%)	144 (88.88%)	12 (7.40%)	143 (88.27%)	126 (77.77%)
No	2 (1.23%)	3 (1.85%)	4 (2.469%)	116 (71.60%)	9 (5.55%)	6 (3.70%)
Maybe	11 (6.79%)	5 (3.08%)	14 (8.64%)	34 (20.98%)	10 (6.17%)	30 (18.51%)

Table 7: The statistically significant feedback of students who took part in project

Feedback comparison groups		Z score	Asymp. Sig. (2-tailed) – P value
Did you feel any difficulty in finding material on the internet?	Did you enjoy being part of this project?	-9.971 ^b	0.001
Would you take part in similar projects in future?	Did you enjoy being part of this project?	-4.080 ^b	0.001
Did you like to work as a team?	Did you find this project useful in gaining knowledge regarding the assigned topics?	-2.582 ^b	0.010
Did you feel any difficulty in finding material on the internet?	Did you find this project useful in gaining knowledge regarding the assigned topics?	-10.890 ^b	0.001
Did you find mobile phone and whatsapp as a good communication tool during this project?	Did you find this project useful in gaining knowledge regarding the assigned topics?	-2.015 ^b	0.044
Would you take part in similar projects in future?	Did you find this project useful in gaining knowledge regarding the assigned topics?	-5.092 ^b	0.001
Did you feel any difficulty in finding material on the internet?	Did you like to work as a team?	-10.044 ^b	0.001
Would you take part in similar projects in future?	Did you like to work as a team?	-2.973 ^b	0.003
Did you find mobile phone and whatsapp as a good communication tool during this project?	Did you feel any difficulty in finding material on the internet?	-10.086 ^a	0.001
Would you take part in similar projects in future?	Did you feel any difficulty in finding material on the internet?	-7.702 ^a	0.001
Would you take part in similar projects in future?	Did you find mobile phone and whatsapp as a good communication tool during this project?	-3.105 ^b	0.002

DISCUSSION

Out of 208 students in the second year MBBS batch, 162 (77.88%) students volunteered to get enrolled in this study. The remaining 46 (22.11%) students who did not consent for the project stated various reasons for not participating in the study; network and internet issues (18, 39.13%) being the most cited reason. Twelve (26.08%) students did not state any specific reason for not consenting to the project work.^[2]

A total of 40 projects were submitted by the students who participated in the project work and were evaluated based on a checklist created by the various faculty of Microbiology in our institute. The power points were scored out of 100 points based on content, creativity, recent

updates and references. Out of the forty groups, 16 groups scored between 61 to 80 points, 19 groups scored between 41 to 60 points and 5 groups scored between 21 to 40 points.^[2]

The topics assigned for the project work were taught again by traditional teaching method (didactic lecture) after completion and submission of the projects. Out of 208 students studying in the second year, 157 (75.48%) attended the lecture and the remaining 51 (24.51%) students did not attend the lecture. A MCQs test for 20 marks was conducted as assessment for all the students on the topics given for the project and they were scored accordingly. Out of 208 students in the second year batch, 188 (90.38%) attended the test and the remaining 20 (9.61%) students did not attend the test. The students who did not attend the test included 13(65%) male students and 7(35%) female students and were scored as zero. These students were not included for analysis of the results obtained. Fifty percent (10 marks) was considered as pass marks in the test. Ten members (5.31%) out of the 188 students scored 100% (20/20) marks in the MCQs test. The assessment of students in another study was done by comparison of pretest and posttest scores and the posttest marks of the team based learning group were better compared to the self-study group. This co-relates with our study showing the significance of team based learning in project work.^[4]

The marks obtained in the MCQs test of all 188 students were compared considering participation in project and attendance for lecture. Out of 188 students who took the test, 151 (80.31%) participated in the project, 23 (12.23%) students attended only lecture and did not participate in project and 14 (7.44%) students did not participate either in project nor attended the lecture class. Among the 151 students who participated in project, 126 (83.44%) students attended the lecture class and 25 (16.55%) students missed the lecture class.^[5-10]

There was significant difference in marks of students who participated in the project and also attended lecture class when compared to students who did not participate in project or class. The students who participated in project also scored better than the other groups of students. The scores of two groups was highly significant statistically in a study conducted by Suman Singh et al where they used application based learning through hospital projects for teaching microbiology and the group which participated in the project work scored better.^[11-13] This is consistent with our study where the average marks of students who took part in project work was 16.67 compared to 10.05 of students who did not take part in project.

Feedback from 162 students was collected regarding their experience during the project, whether they enjoyed being part of the project as a team, using online resources and recall of content after each teaching method. The students were also asked to give feedback regarding use of mobile phone and WhatsApp as a good communication tool during the project and whether they will participate in similar projects in future during their course. The students were asked to mark a Google form to give their feedback to various questions and they had to choose between “yes”, “no” and “maybe” as their answers.

The students who agreed that they enjoyed being part of the project also did not find any difficulty in finding material on the internet, and were willing to participate in similar projects in the future. The students who agreed that they liked to be a part of a team also said that they found the project work useful in gaining knowledge about the subject. The same students also gave feedback that they found whatsapp and mobile phone as a good communication tool in this project. In a similar study, majority of the students gave feedback

that they enjoyed the project and such projects increases the interest in the subject of Microbiology.^[8]

CONCLUSION

The comparison of performance in assessment shows that students who participated in project and attended lecture class performed better than the students who did not participate in the project. The feedback responses of the participants displayed that 92% of the students who participated in the project enjoyed being part of it and also found that the project work helped them in gaining knowledge regarding the topic. More than 70 % of students did not find any difficulty in finding material on the internet and more than 80% found that mobile phone and WhatsApp aided as a good communication tool during this project. To conclude, project based teaching and learning methods will aid in increasing interest and knowledge in the subject of Microbiology in medical students.

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