

Effectiveness of modified seminars as a teaching-learning method in pharmacology

Dhanya Sasidharan Palappallil, Jitha Sushama, Sai Nathan Ramnath

Department of Pharmacology, Government TD Medical College, Alappuzha, Kerala, India

ABSTRACT

Context: Student-led seminars (SLS) are adopted as a teaching-learning (T-L) method in pharmacology. Previous studies assessing the feedback on T-L methods in pharmacology points out that the traditional seminars consistently received poor feedbacks as they were not favorite among the students. **Aims:** This study aimed to obtain feedback on traditional SLS, introduce modified SLS and compare the modified seminars with the traditional ones. **Settings and Design:** This was a prospective interventional study done for 2 months in medical undergraduates of fifth semester attending Pharmacology seminars at a Government Medical College in South India. **Subjects and Methods:** Structured questionnaire was used to elicit feedback from participants. The responses were coded on 5-point Likert scale. Modifications in seminar sessions such as role plays, quiz, tests, group discussion, and patient-oriented problem-solving exercises were introduced along with SLS. **Statistical Analysis Used:** The data were analyzed using SPSS version 16. The descriptive data were expressed using frequencies and percentages. Wilcoxon signed rank test, and Friedman tests were used to compare traditional with modified seminars. **Results:** The participants identified interaction as the most important component of a seminar. Majority opined that the teacher should summarize at the end of SLS. Student feedback shows that modified seminars created more interest, enthusiasm, and inspiration to learn the topic when compared to traditional SLS. They also increased peer coordination and group dynamics. Students opined that communication skills and teacher-student interactions were not improved with modified seminars. **Conclusions:** Interventions in the form of modified SLS may be adopted to break the monotony of traditional seminars through active participation, peer interaction, and teamwork.

Key words: Educational feedback, medical education, pharmacology, seminars

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INTRODUCTION

In medical education different teaching styles ranging from large group didactic lectures to small group teaching are adopted. Many medical schools, inspired by the concept of active learning environment have embraced small group learning such as tutorials, seminars, and group discussions.^[1]

Address for correspondence: Dr. Dhanya Sasidharan Palappallil, Department of Pharmacology, Government TD Medical College, Alappuzha - 688 005, Kerala, India.
E-mail: drspdanya@gmail.com

Small group learning with active interaction refines thinking, reflects attitude, and revolutionize the problem-solving mindset.^[2]

Seminar is a small group teaching-learning (T-L) session in which the participants discuss under the guidance of an expert. The instructor, the students, preparation, content, group dynamics, course coherence, and facilities are key factors in seminar learning.^[1] The participants preparing the seminar eventually develop competencies like identification of presentable information, its retrieval from the sources

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of information and organization of the presentable material. Students learn the art of communicating with peers through compact time bound presentation.^[3]

Unfortunately, majority student-led seminars (SLS) remain to be passive, with no interaction or incentive for active participation. This study was undertaken with a vision to broaden our insight on current seminar sessions in pharmacology. We introduced modifications in seminar sessions as mentioned in previous literature in the form of quiz following SLS,^[3] patient-oriented problem-solving exercises (POPSEs) following SLS^[4] and test sessions with SLS.^[5] We also introduced group discussions and role plays with SLS to make them active process of T-L. The feedback of these interventions was compared with that of traditional SLS.

SUBJECTS AND METHODS

This was a prospective interventional study conducted in the Department of Pharmacology of a Government Medical College in South India. Institutional Ethics Committee approval was obtained, and informed consent was obtained from all those who were willing to participate. The study period was 2 months. Second professional MBBS students of the third term, i.e., fifth-semester students ($n = 121$) formed the sample population. The study tools were structured questionnaires which were validated in terms of time requirement, clarity of instructions, and appropriateness of questions by pilot testing among the postgraduate students ($n = 5$). The responses were coded based on 5-point Likert scales.

The feedback on SLS was obtained after five SLS sessions conducted in the traditional way. The modified seminars were adopted for the next five sessions in the form of educational interventions. We introduced five different modifications, one in each week, in the form of SLS and a group activity based on role play, SLS combined with pre- and post-test, SLS with quiz (group activity), SLS with group discussion, and SLS with POPSE (group activity). All the students were exposed to all the interventions and feedback was obtained using the structured questionnaire. The marks of the group activities (except group discussion) and pre- and post-test were recorded for getting a quantitative feedback. A final feedback on SLS was obtained at the end of all modified seminars.

Statistical analysis

The data were analyzed using SPSS for Windows, Version 16.0. (SPSS Inc., Chicago, USA). Feedback on traditional SLS is expressed as frequencies and percentages. Responses to study variables are expressed as mean Likert scores and compared with traditional seminars using Friedman test and Wilcoxon signed rank test.

RESULTS

There were 121 participants, and all the responders completed the feedback on traditional SLS (response rate = 100%). However, due to absenteeism the participation in each of the modified seminars varied. The mean age was 20.74 ± 0.88 years, with a male:female ratio of 1:2.6.

About 60.33% opined that the most essential component of seminar was interaction followed by the presenter (22.231%). The ideal time for a seminar was thought to be 20 min by 57%, 1 h by 24.79%. Majority (62.6%) responded that the pharmacology seminars were above average or outstanding compared to other subjects of the same year. As shown in Figure 1, majority opined that seminars were essential component of T-L method with good topic selection and adequate time duration. The majority did not wish addition of newer topics and opined that the teacher should summarize at the end. A vast majority (72.7%) were well-prepared for their seminar presentations while only seven participants came well-prepared for all the seminars. About 95% claimed that their presentations were self-prepared while six participants admitted that they used presentations prepared by others.

The Wilcoxon sign rank test was used to compare the feedback on each of the modified seminars with that of the traditional seminars. As shown in Tables 1-5, all the modified seminars helped in creating more interest, enthusiasm, and inspiration. All modified seminars except group discussion were opined to be more useful and helped in better understanding of the subject. Group discussion, role plays, and quiz were opined to be more effective in increasing the peer coordination and team dynamics. Feedback showed that the students felt that pre- and post-test and quiz with SLS would increase their academic performance and encourage trial of

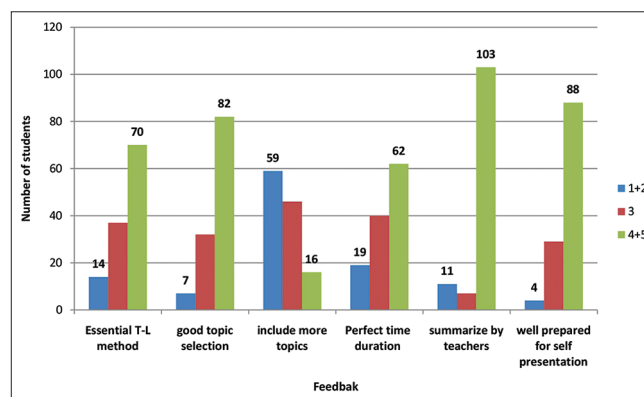


Figure 1: Feedback on traditional seminars. 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree

Table 1: Comparison of role play + student-led seminars with traditional student-led seminars

	Mean±SD (n=116)		Wilcoxon signed rank test (Z, P)
	Seminar scores	Seminar + role play scores	
Create interest	3.20±0.68	3.68±0.79	-5.16, <0.001
Better understanding	3.32±0.76	3.66±0.77	-3.43, 0.001
Usefulness	3.21±0.80	3.59±0.79	-4.13, <0.001
Inspiration to learn	3.21±0.81	3.59±0.79	-4.17, <0.001
Communication skills	4.06±0.70	3.97±0.78	-1.24, 0.21
Create enthusiasm	3.36±0.74	3.78±0.71	-4.18, <0.001
Coordination	3.78±0.72	4.01±0.89	-2.74, 0.006
Teacher student interaction	3.68±0.75	3.66±0.82	-2.07, 0.84
Better organize	3.85±0.69	3.70±0.71	-1.72, 0.09
Work as team	3.58±0.78	4.06±0.73	-4.64, <0.001
Academic performance	3.46±0.80	3.57±0.78	-1.32, 0.19
Trying new innovations	3.43±0.74	3.55±0.81	-1.24, 0.22
Recommendation to juniors	3.37±0.77	3.43±0.88	-0.61, 0.54
Assessment method	3.61±0.74	3.46±0.88	-1.77, 0.77

1: Poor; 2: Below average; 3: Average; 4: Above average; 5: Outstanding; SD: Standard deviation

Table 2: Comparison of pre- and post-test + student-led seminars with traditional student-led seminars

	Mean±SD (n=115)		Wilcoxon signed rank test (Z, P)
	Seminar scores	Seminar + pre- and post-test scores	
Create interest	3.24±0.68	3.96±0.71	-6.9, <0.001
Better understanding	3.35±0.72	3.90±0.74	-5.25, <0.001
Usefulness	3.48±0.68	4.05±0.69	-5.34, <0.001
Inspiration to learn	3.23±0.80	4.03±0.80	-6.72, <0.001
Communication skills	4.06±0.70	3.78±0.87	-2.49, 0.012
Create enthusiasm	3.38±0.73	3.96±0.86	-5.26, <0.001
Coordination	3.81±0.71	3.68±0.99	-1.11, 0.266
Teacher student interaction	3.70±0.77	3.76±0.94	-0.72, 0.47
Better organize	3.87±0.68	3.85±0.87	-0.31, 0.76
Work as team	3.61±0.85	3.50±1.13	-0.94, 0.35
Academic performance	3.49±0.79	3.84±0.84	-3.65, <0.001
Trying new innovations	3.46±0.72	4.03±0.75	-5.55, <0.001
Recommendation to juniors	3.43±0.72	3.84±0.82	-4.28, <0.001
Assessment method	3.62±0.73	3.78±0.89	-1.81, 0.06

1: Poor; 2: Below average; 3: Average; 4: Above average; 5: Outstanding; SD: Standard deviation

innovations in learning the subject. They also recommended the adoption of pre- and post-test as well as quiz sessions with seminars in their junior undergraduate batches. In quiz sessions, the teacher-student interactions were more than traditional SLS. With POPSE and group discussion sessions, the participants felt that the teacher-student interactions were less. Traditional seminars helped the students to better organize their presentation than group discussion or POPSE. Communication skill development was more in traditional SLS compared to modified seminars with POPSE, tests or quiz.

Table 3: Comparison of quiz + student-led seminars with traditional student-led seminars

	n=114		Wilcoxon signed rank test (Z, P)
	Seminar scores	Seminar + quiz scores	
Create interest	3.23±0.65	3.92±0.72	-6.18, <0.001
Better understanding	3.32±0.77	3.74±0.72	-4.23, <0.001
Usefulness	3.45±0.69	3.77±0.67	-3.44, 0.001
Inspiration to learn	3.24±0.29	3.83±0.79	-4.91, <0.001
Communication skills	4.09±0.69	3.76±0.85	-3.43, 0.001
Create enthusiasm	3.38±0.71	4.00±0.84	-5.5, <0.001
Coordination	3.80±0.73	4.19±0.80	-4, <0.001
Teacher student interaction	3.71±0.76	3.91±0.76	-2.07, 0.039
Better organize	3.87±0.69	3.75±0.83	-1.45, 0.247
Work as team	3.60±0.88	4.30±0.68	-5.96, <0.001
Academic performance	3.46±0.78	3.75±0.75	-3.047, 0.002
Trying new innovations	3.43±0.72	3.80±0.87	-3.33, 0.001
Recommendation to juniors	3.40±0.73	3.78±0.93	-3.38, 0.001
Assessment method	3.60±0.74	3.52±0.92	-0.795, 0.427

1: Poor; 2: Below average; 3: Average; 4: Above average; 5: Outstanding

Table 4: Comparison of group discussion + student-led seminars with traditional student-led seminars

	n=116		Wilcoxon signed rank test (Z, P)
	Seminar scores	Seminar + group disc scores	
Create interest	3.22±0.67	3.47±0.88	-2.26, 0.024
Better understanding	3.33±0.73	3.50±0.91	-1.48, 0.14
Usefulness	3.45±0.69	3.47±0.91	-0.14, 0.89
Inspiration to learn	3.22±0.79	3.52±0.87	-2.8, 0.005
Communication skills	4.07±0.71	3.97±0.74	-1.1, 0.27
Create enthusiasm	3.39±0.72	3.71±0.86	-3.11, 0.002
Coordination	3.79±0.73	4.05±0.69	-2.89, 0.004
Teacher student interaction	3.71±0.72	3.27±0.96	-4.02, <0.001
Better organize	3.87±0.69	3.46±0.86	-3.79, <0.001
Work as team	3.62±0.87	3.97±0.81	-3.49, <0.001
Academic performance	3.46±0.79	3.35±0.89	-1.18, 0.24
Trying new innovations	3.42±0.73	3.57±0.86	-1.45, 0.147
Recommendation to juniors	3.35±0.75	3.39±1.02	-0.435, 0.664
Assessment method	3.62±0.69	3.28±0.97	2.92, 0.003

1: Poor; 2: Below average; 3: Average; 4: Above average; 5: Outstanding

The comparison of traditional seminars with modified seminars using the Friedman test showed that there was significant difference in all the study variables as shown in Table 6. Since only ninety students attended all the interventions, the response rate was 74.38%.

Quantitative results

In the modified seminars with tests the mean pretest score was 4.73 ± 2.2 and mean posttest score was 7 ± 1.9 out of 10 (t = 11.99, P < 0.001). In the POPSE sessions ten out of 15 teams scored more than 75% marks while only one team scored <20% marks. For quiz sessions, there were nine teams with a +4 score for right answers and -1 score for wrong, and only four teams scored more than 50%. In the

role play sessions, of the 15 teams 13 teams scored more than 50% marks.

DISCUSSION

This study was done to obtain the feedback of traditional SLS, to introduce interventions in the form of modified SLS and compare the feedback obtained. Interactions in a seminar are dominated by the teachers and student-student interaction rarely occurs.^[5] Participants of this study opined that interaction is the most important component of a seminar. Teacher-student interactions consistently received low mean scores for the modified seminars except for quiz sessions in this study. Even though the majority (85.12%) wanted the teachers to summarize the topic at the end of the seminar

none (0%) thought that the facilitator's role was of prime importance. A good seminar teacher should be knowledgeable, friendly, and have eloquent communication skills to stimulate interactions. Seminars should be enriched with contextual clinical scenarios and real life examples that will provide clarity and bridge the gaps in knowledge.^[1] Indian studies which sought feedback on T-L methodologies in pharmacology state that seminars are largely unpopular and uninteresting T-L method.^[6-9] A similar student feedback in community medicine on the impact of small group teaching found out that majority considered seminars as not useful, and the duration of them needed to be shortened.^[10] Palappallil stated that only 8% participants showed interest in seminars, 44% participants did external referencing for preparation, and 17% considered postseminar tests as an effective method of assessment.^[6] Even though preparation and participation of students are the key factors of seminar learning, only a few participants came well-prepared for all the seminars. It is notable that majority of the presentations were self-prepared. The majority was well-prepared for their presentations, pointing out that seminars indeed help in self-learning. Interactive student-centered approaches to learning like problem-based learning and case-based learning have been adopted and well-incorporated into the undergraduate curriculum. Active learning occurs, and the responsibility of learning lies with the students.^[11] Tests and quiz scored more compared to traditional SLS in improving the academic performance of the students.

Some studies opined that there was no demand for SLS as students had minimal interest in seminar.^[7,8] In this study, majority participants considered them not only an essential T-L method with good topic selections and ideal time duration but also placed them above other subjects of the same year.

Table 5: Comparison of patient-oriented problem-solving exercise + student-led seminars with traditional student-led seminars

	n=108		Wilcoxon signed rank test (Z, P)
	Seminar scores	Seminar + POPSE scores	
Create interest	3.23±0.71	3.67±0.79	-4.54, <0.001
Better understanding	3.33±0.75	3.68±0.75	-3.33, 0.001
Usefulness	3.47±0.66	3.74±0.74	-2.97, 0.003
Inspiration to learn	3.25±0.81	3.62±0.81	-3.37, 0.001
Communication skills	4.10±0.68	3.80±0.79	-3.00, 0.003
Create enthusiasm	3.42±0.71	3.81±0.76	-4.060, <0.001
Coordination	3.82±0.73	4.03±0.72	-2.02, 0.043
Teacher student interaction	3.70±0.79	3.44±0.77	-2.72, 0.007
Better organize	3.89±0.69	3.54±0.72	3.85, <0.001
Work as team	3.66±0.83	3.99±0.82	-2.96, <0.003
Academic performance	3.52±0.80	3.56±0.77	-2.77, 0.78
Trying new innovations	3.47±0.73	3.62±0.79	-1.621, 0.105
Recommendation to juniors	3.39±0.77	3.48±0.75	-0.773, 0.439
Assessment method	3.63±0.74	3.49±0.84	-1.718, 0.086

1: Poor; 2: Below average; 3: Average; 4: Above average; 5: Outstanding; POPSE: Patient oriented problem-solving exercise

Table 6: Comparison of traditional student-led seminars with modified seminars

n=90*	Seminar*	Seminar + role play*	Seminar + tests*	Seminar + quiz*	Seminar + group discussion*	Seminar + POPSE*	Friedman test, χ^2 , P
Create interest	2.63	3.62	4.14	4.02	3.27	3.32	52.95, <0.001
Better understanding	2.88	3.57	4.01	3.63	3.37	3.55	24.96, <0.001
Usefulness	2.96	3.34	4.28	3.73	3.22	3.47	38.7, <0.001
Inspiration to learn	2.76	3.46	4.37	3.79	3.33	3.31	49.26, <0.001
Communication skills	3.89	3.64	3.24	3.30	3.73	3.19	15.12, 0.01
Create enthusiasm	2.69	3.52	4.02	4.06	3.29	3.42	45.27, <0.001
Coordination	3.19	3.58	3.03	4.03	3.58	3.58	21.39, 0.001
Teacher student interaction	3.74	3.63	3.81	3.96	3.29	3.46	37.01, <0.001
Better organize	3.99	3.52	3.91	3.61	2.89	3.08	34.26, <0.001
Work as a team	2.95	3.72	2.75	4.34	3.67	3.56	56.43, <0.001
Academic performance	3.21	3.42	4.11	3.88	3.12	3.26	28.82, <0.001
Trying new innovations	3.06	3.16	4.38	3.74	3.37	3.29	43.34, <0.001
Recommend to juniors	3.22	3.13	4.11	4.03	3.23	3.28	34.03, <0.001
Assessment method	3.62	3.42	3.82	3.51	3.31	3.43	20.22, 0.001

*n=90, even though sample size was 121 only 90 could participate in all the interventions; *Mean ranks obtained for Friedman test. Post hoc test was unavailable in SPSS 16. POPSE: Patient oriented problem-solving exercise

The inclusion of modified seminars helped in inculcating interest and enthusiasm, inspiring them to learn the subject. Like in studies conducted elsewhere, the students felt that dividing them to subgroups was a facilitating method.^[1,12,13] For each modified seminars, we ensured different subgroup formation which enhanced the peer interaction and teamwork.

Badyal *et al.* opined that seminars were not a useful assessment method.^[9] All the interventions except group discussions were found to be at par with traditional SLS as an assessment method. The inclusion of pre- and post-test significantly improves the learning outcome of the students as evidenced by the change in mean scores.

Participants of a study by Patel *et al.* stated that seminars are active learning techniques, and it should be used in their junior undergraduate students.^[14] Modified seminars with quiz and pre- and post-tests were recommended for use in subsequent junior undergraduates by the participants of this study.

Gomathi *et al.* stated that inclusion of quiz after seminars was perceived to be more interesting, interactive and fostered active learning.^[3] This is in concurrence with the present study. Studies done in Nigeria state that seminars improve the undergraduate teaching and hence more hours should be included for seminars.^[15,16] However in this study, the students were happy with the time duration and topic selection of each pharmacology seminars and did not want the inclusion of newer topics.

Palappallil and Gangadhar stated that the participant students suggested the inclusion of group discussions and role plays to make the practical sessions more interesting and role plays can increase the art of communication.^[17] In this study, these two interventions with seminars made it more interesting, however, no significant gain in communication skills was opined to be obtained.

Rao and Kate introduced the “problem solving interactive clinical seminars based on clinical scenarios” for teaching surgery which were well-accepted by the students.^[4] The active participation and team working with other factors like more use of audio-visual aids made the sessions more interesting than the conventional lectures. The combination of POPSE with traditional seminars in this study was found to be interesting and useful and inspired the student to learn the subject with enthusiasm. The exposure of students to apt clinical scenarios make the seminars interactive and create enthusiasm in active learning by providing an opportunity for decision-making and thus greater interest in the management of the patients.^[18-20]

Limitations

Conclusions are mainly focused on student perceptions. The

modified seminars received feedback on the educational interventions rather than on the combination of SLS with intervention. This is a single institution-based study.

CONCLUSIONS

In the medical curricula, every attempt is made to encourage students to participate in group discussions and seminars. Active participation in seminars helps in creating enthusiasm and interest to learn, improve communication skills, peer interaction and team work and organization of a presentation. This will help in molding the personality of the medical undergraduate. The modified seminars have shown to be beneficial in imbibing the art of functioning as a team with peer coordination and trying innovation in learning. The communication skill was best developed with the traditional seminars.

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Conflicts of interest

There are no conflicts of interest.

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