

Evaluation of Brainstorming Session as a Teaching-learning Tool among Postgraduate Medical Biochemistry Students

Abstract

Background: The thrust for postgraduate teaching should be self-directed learning with equal participation by all students in academic discussions. Group discussions involve conduction of the discourse by a leader who guides the discussion as well as points out any wrong information. This discourages quieter students from participation with the fear of rebuke. Brainstorming is devoid of all such fallacies with no judgment and reprimand. **Aim:** The aim of this study was to use brainstorming as a teaching-learning tool among postgraduate students of medical biochemistry. **Materials and Methods:** The project was commenced after due approvals from the research and ethical committee. The participants were enrolled after informed consent and sensitization. All the pro forma and questionnaires were duly validated by experts. After piloting and incorporation of the suggestions for improvisation, the main sessions were planned and implemented. The response was judged by posttest scores and feedback forms. **Results:** There was an improvement of understanding of the biochemical concepts as assessed by the posttest scores and solving of a similar clinical problem. The students expressed satisfaction with the conduction, timing, and discussion of the clinical problems. The drawbacks of traditional teaching as expressed during the feedback stage were also taken care of by the brainstorming sessions. **Conclusions:** Our project made the students and the faculty aware about the utility of brainstorming for teaching purposes in medical education which till now was considered efficacious only for troubleshooting in advertising and management institutions. The students were satisfied with this technique for understanding of biochemical concepts.

Keywords: Brainstorming, group discussion, interactive learning

Introduction

Postgraduation courses in preclinical and paraclinical specialties such as biochemistry, pathology, and microbiology incorporate in-depth knowledge about the core topics in each specialty along with skills for clinic-laboratory correlations. It is pertinent that these students should have an inherent knack to associate the laboratory findings with clinical presentation. This cannot be achieved by rote learning alone. It is imperative for us to sharpen our skills for clinicopathological correlation so as to aid the clinicians to reach a definitive diagnosis. Otherwise, we may be just recognized as teachers who take lectures on mundane topics that have no clinical relevance.

Active learning with participation by all is the norm that is recommended to be followed.^[1] Interactive learning involves active deliberations between the facilitator

and the student. It empowers the students and facilitates self-directed learning.^[2] Small group teaching has been considered a very good modality of interactive learning. Small group teaching can take on a variety of different tasks such as problem-solving, role play, discussions, brainstorming, and debate. Group discussion (GD) is one such avenue of active learning among medical students. Research has demonstrated that group discussion promotes greater synthesis and retention of knowledge.^[3] However, it suffers from certain fallacies. Many times GDs can be literally hijacked by the vocal participants. The silent members hesitate to participate with the fear of being rebuked on giving a wrong answer by the leader. Hence, they end up being passive disinterested spectators. The discussion is hence steered by the vocal participants and the focus often gets shifted.^[4]

Brainstorming is a group creativity technique, by which efforts are made to find a conclusion for a specific problem by

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Table 1: Comparison of pretest and posttest scores (maximum marks-10) for the brainstorming sessions

| Session 1 | | | | | |
|--------------------------------|---------------------------------|--------------------------------|---------------------------------|--------------------------------|---------------------------------|
| 3 rd year (pretest) | 3 rd year (posttest) | 2 nd year (pretest) | 2 nd year (posttest) | 1 st year (pretest) | 1 st year (posttest) |
| 6.75 | 8.8 | 6.2 | 8.1 | 5.9 | 7.9 |
| $P<0.01$ | | $P<0.01$ | | $P<0.001$ | |
| Session 2 | | | | | |
| 3 rd year (pretest) | 3 rd year (posttest) | 2 nd year (pretest) | 2 nd year (posttest) | 1 st year (pretest) | 1 st year (posttest) |
| 7.8 | 9.1 | 7.6 | 8.7 | 6.5 | 7.8 |
| $P<0.001$ | | $P<0.01$ | | $P<0.01$ | |
| Session 3 | | | | | |
| 3 rd year (pretest) | 3 rd year (posttest) | 2 nd year (pretest) | 2 nd year (posttest) | 1 st year (pretest) | 1 st year (posttest) |
| 7.0 | 8.5 | 6.8 | 8.4 | 6.5 | 7.5 |
| $P<0.01$ | | $P<0.001$ | | $P<0.01$ | |
| Session 4 | | | | | |
| 3 rd year (pretest) | 3 rd year (posttest) | 2 nd year (pretest) | 2 nd year (posttest) | 1 st year (pretest) | 1 st year (posttest) |
| 6.8 | 7.9 | 7.3 | 8.0 | 6.6 | 7.1 |
| $P<0.01$ | | $P<0.01$ | | $P<0.01$ | |

gathering a list of ideas spontaneously contributed by its members. It was popularized by Alex Faickney Osborn as a tool for problem-solving in advertising sector in 1939. It comprises of an open discussion among all team members about a given problem with equal participation by all ensuring welcome of all ideas without any criticism. The judgment is deferred till the discussion reaches a logical conclusion.^[5]

The aim of our study was to evaluate brainstorming as a tool for postgraduate teaching. As pointed out previously, during group discussions many students hesitate to participate due to the fear of wrong answer and subsequent criticism. Brainstorming is devoid of these fallacies and hence may help us to ascertain the students' interpretation of common clinical problems.

Materials and Methods

This study was conducted in a Medical College after prior approval from the Research Committee and the Ethics Committee of the institution. Sensitization workshop cum training for the faculty members as well as residents of the department was conducted. The strength of the postgraduate students in the department is 10 and all of them agreed to take part in the study. Feedback was obtained from the participants regarding their views about the applicability of brainstorming as teaching-learning tool. This was followed by piloting of the brainstorming session with the postgraduate students. The agenda was interpretation of clinical biochemistry report and clinical correlation. The clinical problems were selected in such a manner that discrete laboratory findings and history were available. The response was assessed by feedback forms, pre- and post-tests. The students came about with certain suggestions such as recording of the points raised by the participants on an OHP sheet/PowerPoint instead of blackboard. This was duly applied in the subsequent sessions. The participants

were explained about the methodology and enrolled after their informed consent. One session per month was conducted (total 4) in the following format:

Day 1:

1. Topic was informed to students so that they could revise through traditional methods (recall from classes, textbooks)
2. Feedback form regarding the student perception with traditional methods (this was done once at the beginning of the study).

Day 2:

1. The pretest administered (test prior knowledge through traditional learning)
2. Clinical case description along with biochemical tests details distributed to all the participants
3. Brainstorming over the case and the laboratory findings
4. Recording of all points increased with adequate motivation and participation by all.

Day 3:

1. Summarization of the case with the distribution of the recorded summary to all.

Day 4:

1. Posttest administered
2. Solving of a similar case by the participants and collection of the answers
3. Filling up of feedback form.

This methodology was followed for all the four sessions. The team idea mapping method was preferred in our study. This method of brainstorming works by the method of association. It may improve collaboration and increase the quantity of ideas and is designed so that all attendees participate and no ideas are rejected. The process begins with a well-defined topic. Each participant brainstorms individually, then all the ideas are merged onto one large idea map. During this consolidation phase,

the participants may discover a common understanding of the issues as they share the meanings behind their ideas. During this sharing, new ideas may arise by the association, and they are added to the map as well. Once all the ideas are captured, the group can prioritize and/or take action. This method works by association, wherein each member puts forward his views on the particular problem being discussed. The ideas are then merged onto one large idea map. During the consolidation step where the solutions put forward by the members are discussed, the participants may discover a common understanding of the issues under scrutiny.

The assessment tools used were: One pre-test and post-test (through SQ or MCQ based on the expected outcome); Questionnaire for assessing their subjective feeling about the tool; and Clinical case solving (evaluation of higher levels of cognitive domain)

Results

The project was completed in 10 months. A total of 10 postgraduate students are currently enrolled in our department. The sessions were planned as such that all of them could participate in the sessions. All the cases were prepared after due deliberations by the core team with relevance and applicability being the main considerations. All the forms were validated by external experts and suitably modified.

Student perception regarding existing methodology

It was observed that majority of the students felt that the traditional methods did not give much scope for participation by the reluctant participants. They also expressed the need for participative learning instead of didactic lectures or self-study without any discussion.

Pretest and posttest scores: This was carried to evaluate gain in knowledge following the brainstorming session on the topic. A statistically significant improvement was observed in the posttest scores for all the postgraduate students [Table 1].

Clinical problem solving: After each session a similar (not same) clinical problem with relevant biochemical investigations was administered to each student with 5 questions. The student

had to write answers for those questions and handover the answer sheets. It was observed that the understanding was improved more so in the final year students as compared to the 1st-year students. This was understandable due to less exposure among the First year students.

Feedback form – the students replied in the affirmative that the sessions had proved to be useful to them. The average scores after 4 sessions are depicted in Table 2.

The paired *t*-test was used to assess the improvement in understanding if any. A significant improvement was observed with a $P < 0.05$

Discussion

The project was done to assess the acceptability and feasibility of brainstorming as a learning tool for postgraduate students. Snell has emphasized that creativity is crucial in medical education. They reiterated the role of brainstorming in improving the creative potential of students.^[6] It has already been emphasized that interactive learning aids in better memory, recall capability as well as the promotion of higher level of thinking which includes analysis and synthesis of material, application to other situations, and evaluation of the material presented as compared to didactic lectures and pedagogical concept of instruction teaching.^[7]

Geuna and Giacobini-Robecchi had conducted a similar study for students studying anatomy. More than 50% of the students found brainstorming as very effective.^[4] Our study also demonstrated affirmative results. Almost all of the residents were satisfied with brainstorming. They felt that traditional teaching methods did not ensure adequate participation and rote learning did not help them in dealing with the clinical problems in the laboratory with the clinical interpretation of difficult biochemical reports. They were not aware of brainstorming nuances which was adequately explained to them in the sensitization phase.

The sessions were carried out in a nonthreatening positive environment with jokes and anecdotes thrown in between to relax everybody. The barriers of seniority were broken and all the students participated equally. The improvement

Table 2: Student responses to the questions in the feedback form

| | Strongly disagree (%) | Disagree (%) | Neutral (%) | Agree (%) | Strongly agree (%) |
|--|-----------------------|--------------|-------------|-----------|--------------------|
| The time organization and management for the sessions was adequate | - | - | 1 | 6 | 93 |
| The sessions were conducted in a manner that there was enough scope for participation by all | - | 1 | 1 | 8 | 90 |
| The sessions have stimulated me to think critically about the subject | - | - | - | 11 | 89 |
| The sessions have motivated me for self-learning | 1 | 4 | 5 | 15 | 75 |
| The sessions should be held regularly for PG teaching | - | - | - | 4 | 96 |
| The sessions are time-consuming | 96 | 4 | - | - | - |
| The sessions should be discontinued as they do not add to our existing knowledge | 100 | - | - | - | - |

in understanding was proved by the posttest scores and clinical interpretation skills. Creativity and participation are important aspects of interactive learning and our sessions were fully dependent on them.^[8]

This study was feasible as it was easy to approach a small batch of postgraduate students as compared to a large batch of 200 undergraduate students. It will be possible to assess the role of brainstorming in understanding of biochemistry concepts by evaluation of the performance of PG students in the periodic examinations and assessments. Improvement of communication skills is a gradual process and it will require at least a year to notice any appreciable change. Our endeavor attempts to improve the teaching-learning methods in the field of postgraduate training in the specialty of biochemistry at our institution. The concept of “brainstorming” involves open discussion about a topic in an open forum. This technique adds to the knowledge about a particular topic and also encourages “out of the box” thinking. If the experiment succeeds in improving the learning experience among postgraduate students, the experiment can be extrapolated to undergraduate teaching. This is of prime importance as classroom teaching is slowly losing its sheen as all the theoretical concepts are available in books and internet and most of the students merely attend classes for the mandatory attendance requirement. Teachers in the present scenario need to innovate and introduce newer methodologies in learning to sustain the students’ inquisitiveness and interest.

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Conflicts of interest

There are no conflicts of interest.

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