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CROWDSOURCING TO IMPROVE TEACHING-LEARNING IN BIOCHEMISTRY

Medical Education

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ABSTRACT

Learning depends on many factors, but crucial one is the engagement of the learners. Questioning techniques have been the most common and effective method for engaging the learner. This qualitative observational study demonstrates the innovative manner of crowdsourcing teaching –learning (T-L) method of questioning in Biochemistry to improve student's active interaction and self-directed learning. This qualitative study was done on 152 First Professional MBBS students in a tertiary care center. Short answer questions were collected from the students after coverage of a subject topic to prepare a question bank for their internal assessment. Feedback on effective perception of the newer T-L technique from students and faculty were collected by a pre-validated questionnaire. In the present study, majority of the students agreed that self-questioning technique had a positive influence on the student's attention in class, doubt clearance, self-reflection on learning of the topic and encouraged them to self-directed learning. Faculty were satisfied and agreed that students were more interactive. The present study showed that including innovative methods of teaching-learning and involving students to prepare the questions for their own assessment has been more effective in learning the subject as compared to the traditional lectures.

KEYWORDS

Crowdsourcing, Biochemistry, Questioning, Medical Education, Effective Teaching, Undergraduate Students

INTRODUCTION

Teaching and learning are the two sides of a coin. There is a strong correlation between the methods used in delivering the information by the facilitators and the assimilation of that knowledge by the learners. Learning depends on many factors, but a crucial step is the engagement of the learner. This is affected by their motivation and perception of the relevance. These, in turn, can be affected by the learner's previous experiences and preferred learning styles and by the context and environment in which the learning takes place [1].

Medical students in their initial course must memorize and recall substantial amounts of information. The main teaching-learning methods for MBBS Phase I includes lecture, tutorial, practical, problem-based learning (PBL) and early clinical exposure (ECE). Recent trends in medical education emphasize collaboration through team-based learning. In the technology world, the trend toward collaboration has been characterized by the crowdsourcing movement. The concept of crowdsourcing was introduced by J. Howe and M. Robinson in 2006 [2]. Crowdsourcing approach has been used for solving several diverse problems like academic innovation, health, and research participation [3-6].

Crowdsourcing refers to a problem-solving approach in which a specific task is completed more effectively by a large cohort of decentralized individuals than by any single person or small group. Although participants may lack expertise within the relevant fields, the distributed wisdom of the group brings the advantages of efficiency, flexibility, and diversity to solving a particular problem [7-9].

Questioning techniques have long been used as the most common and effective teaching method and studies have demonstrated that questions have an important effect on academic achievements for students. Despite the importance of questioning, however, the use of questioning techniques during classes is very low in universities. A study that surveyed typical university class patterns reported that faculty members use only 4% of the total class time for posing questions to students. According to the report, even if faculty members ask questions, they do not receive an answer from the students approximately 30% of the time, and the faculty members give the answer instead of waiting for the student's answer [10-12].

This qualitative observational study demonstrates the innovative manner in which the students generate questions in the form of short answer questions (SAQ) to prepare a question bank for their own internal assessment and thus helps in active learning through crowdsourcing. The aim of the study was to prepare Indian Medical Graduate to be a life-long learner by improving his/her self-directed learning by crowdsourcing innovative teaching-learning method of questioning.

METHODOLOGY

This qualitative observational study was conducted in the Department of Biochemistry, at a tertiary care Medical College from November 2018 to February 2019. Institutional Ethical committee permission was taken prior to the commencement of the study. The study group included 1st Professional MBBS students, total 170 in numbers, out of which 152 students gave consent. Students who were absent and refused to give consent were excluded from the study. The faculty members of the Department of Biochemistry were sensitized regarding the method used in the study. Feedback questionnaire for students and faculty were designed and validated. The students were briefed about the concept of this innovative teaching-learning method. Students were sensitized about how to think (Applying 'why', 'how', 'what', 'when'?) and prepare a short answer question (SAQ) after coverage of each topic and submit SAQs via writing on paper, email, or WhatsApp to the respective teacher immediately in the classroom. Thus, by crowdsourcing, a question bank was generated by the collection of questions from the students, and assessment was planned on the topics covered. The topics covered were: Protein chemistry, properties, structural organization of proteins, digestion and absorption, and carbohydrate metabolism (Glycolysis and gluconeogenesis). For Internal assessment, question format were formed from the question bank collected from the students and by the faculty (80:20 question pattern respectively). Each test of total 60 marks, questions validated by senior faculty members and thus, all total three internal assessments were taken during the study period. Feedbacks from students and faculty members were taken regarding the attitude and perception towards the innovative crowdsourcing teaching –learning (T-L) method. Pre-validated questionnaire on five-point Likert scale and descriptive questions was used. The responses obtained from the questionnaires were entered in SPSS version 21 and statistical analysis was done.

RESULTS

The study group included 152 students of 1st Professional MBBS and 4 faculty members of the department of Biochemistry. Majority of the students agreed (61.2%) that this innovative T-L method has helped them in better understanding the topic as compared to didactic lectures (Fig 1). 51.3% students agreed that it has enhanced their critical thinking and encouraged in their self-directed learning (55.9%) (Fig 2 & 3). 57.9% students agreed that it helped in better retaining in understanding of the topic (Fig 4); 42.8% of students perceived that this technique helped them in understanding the topic in-depth (Fig 5) and 44.7% agreed to be more attentive in class (Fig 6). 50% students agreed that it helped in self-reflecting on the understanding of the topic (Fig 7), 46.7% students agreed that it helped them to perform better in internal assessment (Fig 8); 38.2% of students responded 'agree' to incorporate the newer technique as a routine method in Biochemistry and 36.2% students responded to incorporate it in other first

Professional subjects.

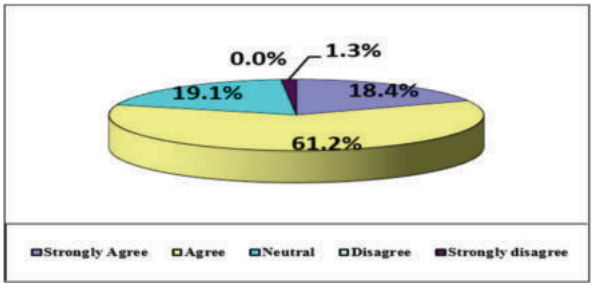

Figure 1: Students perception on agreeing to the newer method more helpful in understanding as compared to didactic lecture. (n=152)

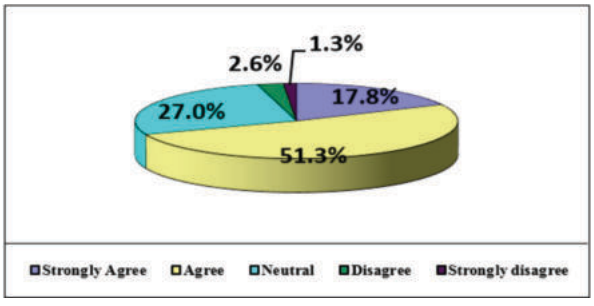

Figure 2: Students perception on agreeing to the newer method more helpful in enhancing critical thinking. (n=152)

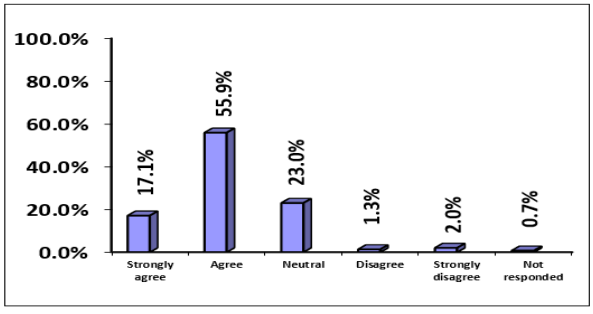

Figure 3: Students perception on agreeing to the newer method more encouraging in self-directed learning. (n=152)

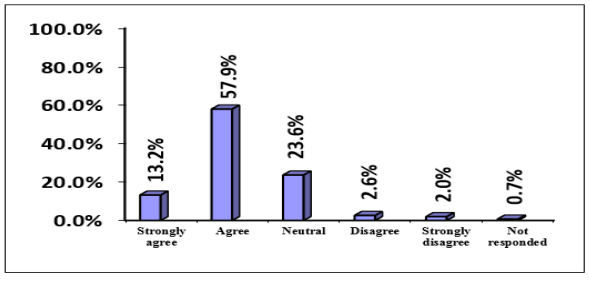

Figure 4: Students perception on agreeing to the newer method helpful in retaining the topic better as compared to didactic lecture. (n=152)

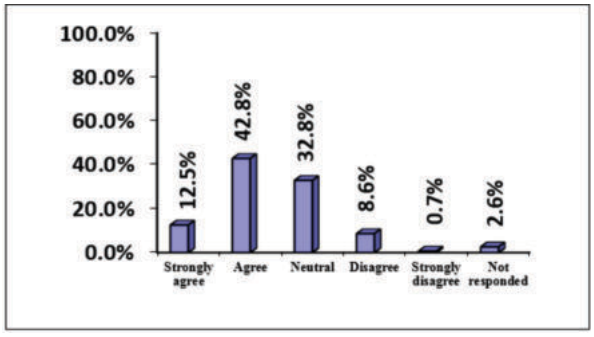

Figure 5: Students perception on agreeing to the newer method helpful in understanding the topic in depth. (n=152)

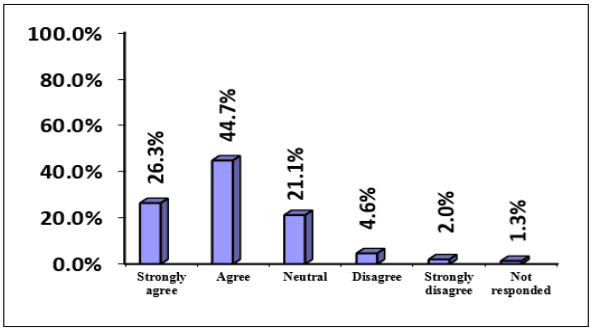

Figure 6: Students perception on agreeing to the newer method helpful in more attention paying in class. (n=152)

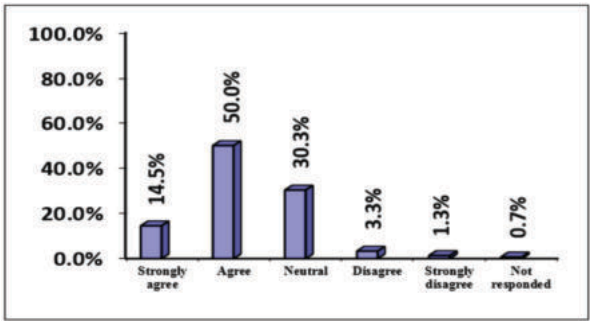

Figure 7: Students perception on agreeing to the newer method helpful in self reflection of learning. (n=152)

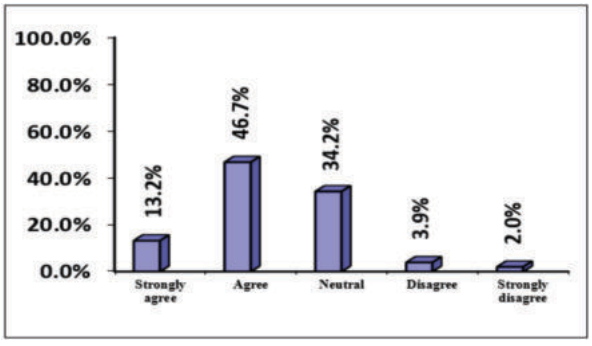

Figure 8: Students perception on agreeing that the assessment taken on the topic that were covered by the newer method were performed better than the topics covered by the conventional style method. (n=152)

Students' responses to open ended questions:
"good things about the newer method of T-L":

"Helps in concentrating during the lecture"
"Makes us aware of things we didn't know"
"It also helps in preparing the semester exams"
"It raises many questions in our mind regarding the topic and we are more interacted with teachers"
"It helps in self analysis"
"It is helpful in making concept and also help in remembering of topics"
"Decreases the shyness in asking questions/clearing doubts"
"We think out of the box"
"Proper attention and motivation to every students whether he/she is weak or strong"
"This method has encouraged us in giving some critical thinking rather than just mugging up the thing"
"It makes the learning better as we ourselves question 'why' on various facts i.e., we start understanding the things"

Student's response to open ended questions: "things to be included for improvement of this newer T-L technique":

"Clinical relation should be given more stress"
"It should be competitive and best question should be praised"
"This method can be improved by making it a routine habit"
"Quiz should be organized with SAQ"
"LAQ must also be encouraged alongside SAQs"
"10 minutes every class should be given on SAQ"

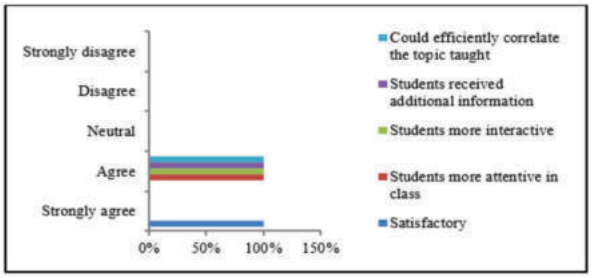

Figure 9. Faculty's perception on the innovative teaching-learning method

Among the four faculty members of Biochemistry department participated, all were satisfied and strongly agreed that the students were more attentive and more interactive, and had more additive information to the topic taught (Fig 9).

Faculty responses on their experience on the newer T-L method:

"Students were more attentive in class and were more interactive in clarifying their doubts."

"They received additional information to the topic discussed"

"They were able to practically correlate with the topic taught"

DISCUSSION

The concept of 'active learning' is gaining much momentum, especially in the field of Medicine. Lectures alone are not generally adequate as a method of training and are poor means of transferring information.

In a study by Young et al. where they surveyed the perception of questioning techniques by medical school faculty members and analyzed how the questioning technique during classes as being important and expected positive outcomes in terms of students' participation in class, concentration in class and understanding of the class contents [13].

In another study by Ismail et al, the majority of the students preferred to the interactive teaching and learning methods to be applied in their study. The lecturer's creativity in transferring the information, clear illustrations, imagination, and demonstration about the core concept of the topic and practicing of two-way communication during lecture sessions seem to be their preferred style of teaching and learning [14].

Time to time evaluation of medical curriculum by experts is the routine practice in medical education. However, the student's perception and opinion about the teaching-learning methodology is equally important because it is meant for them. So, evaluation of teaching-learning methodology by the students in a medical college may further help in the modification and construction of the medical curriculum [15].

Studies have shown that crowdsourcing collaborations between diverse groups generate more complete and higher-quality ideas than collaborations between only the top-performing individuals in a field. Some surveys have showed, students prefer the crowdsourcing learning tools and have improved in their performances [16,17].

The present study indicated that crowdsourcing T-L technique of question preparing by involving students, have been beneficial and improved their academic performance. This innovative T-L technique have helped them in better understanding the topic (61.2%) as compared to only didactic lectures. It had positive influences on the student's attention in class (44.7% agreed) and doubt clearance. It also has encouraged (55.9%) them for self-directed learning and to self-reflect on their understanding of the topic. 46.7% of students responded that it helped them to perform better in their internal assessment and 57.9% of students agreed that it helped them to retain the understanding of the topic longer. In the internal assessment the score seems to improve showing better performance of the topics covered by the innovative technique. 84% - 86% students scored more than 76%-80% in all three assessments. Faculty response was also positive and satisfactory. They agreed that students were more attentive and interactive in the class.

Student's feedback is a useful basis for modifying and improving medical education curriculum.

Limitation

The limitation of this study was that due to the short study period only short-term outcomes were observed and few topics could be covered. Also only a few faculty members participated.

CONCLUSIONS

To make the subject interesting, the innovative method used in the present study of crowdsourcing teaching-learning by involving students to self prepare the questions ('why'/'how') after coverage of topics has helped in better understanding of the subject at the undergraduate levels, better retention and active learning. This will help them to apply this knowledge in the future in clinical decision making in patient care. Student's feedback should be incorporated for modifying the curriculum.

"Reading without a question is a waste of time"

J. Pelley

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