AN INNOVATIVE METHOD TO ENHANCE INTERACTION DURING LECTURE SESSIONS

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The B. P. Koirala Institute of Health Sciences, Dharan, is following an innovative hybrid curriculum. Conventional lectures are replaced by “structured interactive sessions” (SIS). SIS involves increased interchange between teachers, students, and lecture contents by proper planning and organized efforts. It can promote active learning and heighten attention and motivation. The present study was conducted to enhance active interactions during such sessions. The students were divided into two groups and asked to come prepared for the lectures. Students were encouraged to ask questions and interact informally during lectures. A scoreboard was maintained, and student feedback was taken at the end of the lecture block. The entire student response was reduced to a student acceptability index (SAI). Our results show a statistically significant increase in interactions per student per day. A majority of the responses in the questionnaire and SAI were favorable. Specific comments and suggestions of students were also positive. These results show that simple innovative techniques enhance the interactions during a lecture session.

Medical education has seen major changes over the past decade. The advent of newer technology and innovations is redefining the role of conventional approaches. Conventional lecturing has been a means of instruction since even before printing was introduced (13, 31). In the past, it was widely respected, but in recent times, lectures as a method of teaching and transmitting information have come under increasing criticism (3, 23). A lecture may be considered worthwhile today only if it aims at arousing students’ curiosity, motivating them to learn, and guiding them into creative thinking, or, in short, if it accomplishes more than what any book can. Critics argue that lectures are less effective than other methods when instructional goals involve the application of knowledge, the development of thinking skills, or the modification of attitudes (26, 32). In addition, students are frequently seen as passive recipients of information (6) and, as a result, not engaged in the learning process (8). Lectures can still be made very interesting and meaningful by proper planning and organized efforts (17, 31). When done effectively, the lecture can transmit new information in an efficient way, explain or clarify difficult notions, organize concepts and thinking, challenge beliefs, model problem solving, and foster enthusiasm and a motivation for learning (12, 14, 16, 37).

B. P. Koirala Institute of Health Sciences is an autonomous university following an innovative, hybrid curriculum. It has a community-based, integrated, and partially problem-based curriculum. Conventional lec-
tures are replaced by “structured interactive sessions” (SIS). SIS involves an increased interchange between teachers, students, and lecture content by proper planning and organized efforts. In a typical SIS, students come prepared and are encouraged to interact informally. Rao and DiCarlo (35) have shown that the cooperative-learning technique promotes critical-thinking, problem-solving, and decision-making skills. Indeed, interactive lecturing is a way to capitalize on the strengths of small-group learning in a large-group format (5).

The present study was conducted to enhance interaction during a lecture session. Our past experience has shown that dental students usually have a very casual approach toward cardiovascular physiology lectures. This could be due to different learning needs of the dental students, the complexities of cardiovascular physiology, and fewer allotted teaching hours. The present study was conducted to make these lecture sessions more interactive by cooperative learning.

MATERIALS AND METHODS

This study was conducted at B. P. Koirala Institute of Health Sciences, Dharan, Nepal. The experimental group consisted of the first-year dental students (n = 40). The cardiovascular system was covered in a series of five lectures in five days. The class was divided into two groups by where they sat on the two sides of the lecture theater. The groups were named Mt. Everest and Annapurna. The students were asked to come prepared for the lectures. During the course of the lectures, students were encouraged to ask questions and interact informally. Brainstorming was used at different points in the lectures. In brainstorming, students generate a list of issues in response to a specific question or topic depending on their learning needs. Judgment of the responses is initially suspended (32, 38), and comments or critiques are invited only after the list is completed. Straightforward questions are also asked during the sessions.

Two instruments were used for evaluation: a scoring system for the interactions and an immediate postlecture questionnaire. Scoring was primarily for motivating and measuring the total interactions and not for comparing the groups’ performance. A scoreboard was maintained on the blackboard, giving one point for every question asked (relevant to ongoing discussion and learning needs) and two points for every right answer (to a question from the students or teacher). Scores for interactions by the same student were written together to calculate the interactions per student. After every lecture, total scores were announced. Scores were converted to interactions per student per day. At the end of the lectures, student feedback was taken on a standard student evaluation questionnaire. Primary analysis of the teaching evaluation questionnaire was done in terms of the number of students who gave a particular type of response. These figures were converted into percentages for better comprehension. This analysis is being used to guide the department and the individual teacher toward a better course next year. The entire student response was reduced to a single value, i.e., a student acceptability index (SAI), on a scale from 0 to 2.

\[ SAI = \frac{\sum (weightage \times number\ of\ responses\ at\ each\ weight)}{\sum total\ number\ of\ responses}. \]

A weighting of 2 was given for the most favored response, 1 for a mediocre response, and 0 for the least favored response (2).

Descriptive statistics of parameters were computed as means ± SD. The data were not normally distributed, and a nonparametric analysis was selected. Friedman’s test for repeated-measures analysis (nonparametric repeated-measures ANOVA) was used to compare between interactions per student per day. The Friedman analysis differs from a standard (parametric repeated-measures) ANOVA, as the analysis is performed on the ranks of the data rather than on the actual data. Kendall’s coefficient of concordance and error term were also used for comparisons. Tukey’s multiple comparisons were performed, as the aforementioned test showed significance (P < 0.05) between ranks. Difference between ranks (≥40), Q value (≥4), and critical \( q \) (3.86) were computed. Comparisons <0.05 significance level (α-level) are shown in RESULTS.

RESULTS

The total interactions (questions and answers) and score are shown in Table 1. There was a linear increase in total interaction over 5 days. Our results
show a statistically significant increase in interactions per student per day (Fig. 1). There was a statistically significant increase in interactions on days 3, 4, and 5 compared with day 1 and on days 4 and 5 compared with day 2. A majority of the responses in the teaching evaluation questionnaire were positive (Table 2). This feedback also highlighted the general aspects of lecturing for future planning. Specific comments and suggestions of students were also favorable (Table 3). The SAI was 1.77 on the 0-to-2 scale.

**DISCUSSION**

There is a fundamental shift in the role of the teacher (20) in student-centered education. If students are to learn desired outcomes in a reasonably effective manner (39), then the teacher’s fundamental task is to get students to engage in learning activities that are likely to result in their achieving those outcomes. Learning is a dynamic process requiring the active participation of the students (1). The educational research has shown that students who are actively involved in the learning activity will learn more than students who are passive recipients of knowledge (5, 9, 30). Other studies have demonstrated that increased attention and motivation enhance memory (16, 25, 28). In fact, some authors have said that increased arousal and motivation are the essential ingredients for learning and are often more important for retention than intelligence. Active involvement enhances the student’s level of understanding and ability to integrate and synthesize material (31, 34). It also improves the student’s conceptualization of systems and how they function and increases the student’s level of retention (4, 10, 29). This is particularly important in medical education, where the application and use of information is as important as the retention and recall of facts.

Our results show a statistically significant increase in interactions per student per day. There was a remarkable increase in student participation. Most of the responses in the teaching evaluation questionnaire were positive (Table 2). This feedback also highlighted the general aspects of lecturing for future planning. Specific comments and suggestions of students were also favorable (Table 3). The SAI was 1.77 on the 0-to-2 scale.
questions and answers matched the learning needs. The value of effective questioning has been highlighted by many authors (12, 38). Questions can stimulate interest, arouse attention, serve as an “ice breaker,” and provide valuable feedback to the teacher and student alike (3, 19, 24). Oral questioning with informal responses encourages more participation and a sustained attention span. Attention span studies have shown that students’ interest and attention in the traditional lecture diminish significantly after 20 minutes (12, 14, 33, 40). Similarly, students listening to lectures when the instructor paused to allow discussion performed significantly better on free-recall quizzes and comprehensive tests (36). Studies have shown that combining segments of lecture with short activities is an excellent way to keep students interested and involved (7). By changing the pace and incorporating a variety of techniques that arouse attention, interactive lectures can stimulate interest and help maintain attention. Our study maintained the collective attention and induced multiple attention peaks among the students.

### TABLE 2
Results of the teaching evaluation questionnaire

<table>
<thead>
<tr>
<th>Student No.</th>
<th>Question</th>
<th>Grading</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SIS About right 31 (83.7)</td>
<td>Too easy 5 (13.5)</td>
</tr>
<tr>
<td>2</td>
<td>Coverage Just right 23 (62.1)</td>
<td>Too extensive 13 (35.1)</td>
</tr>
<tr>
<td>3</td>
<td>Relevance Very useful 18 (48.6)</td>
<td>Useful 19 (51.3)</td>
</tr>
<tr>
<td>4</td>
<td>Presentation Good 34 (91.8)</td>
<td>Tolerable 3 (8.1)</td>
</tr>
<tr>
<td>5</td>
<td>Student participation Adequate 35 (94.5)</td>
<td>Inadequate 2 (5.4)</td>
</tr>
<tr>
<td>6</td>
<td>Questions by students Encouraged 35 (94.5)</td>
<td>Tolerated 2 (5.4)</td>
</tr>
<tr>
<td>7</td>
<td>Use of blackboard/OHP/slides Good 24 (64.8)</td>
<td>Fair 9 (24.3)</td>
</tr>
<tr>
<td>8</td>
<td>Pace About right 33 (89.1)</td>
<td>Too rapid 4 (10.8)</td>
</tr>
<tr>
<td>9</td>
<td>Course improved understanding of the subject A lot 30 (81)</td>
<td>Not much 7 (18.9)</td>
</tr>
<tr>
<td>10</td>
<td>New method of teaching Good 28 (75.6)</td>
<td>Fair 9 (24.3)</td>
</tr>
</tbody>
</table>

Data show total responses in a category; percentages of responses are in parentheses. SIS, structured interactive sessions; OHP, overhead projector. Student acceptability index (SAI), 1.77.

### TABLE 3
Selected comments and/or suggestions*

<table>
<thead>
<tr>
<th>Student No.</th>
<th>Comments/Suggestions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The approach to teaching is very nice. He encouraged us a lot to do more study.</td>
</tr>
<tr>
<td>2</td>
<td>Dividing in groups and giving marks makes us very energetic to study more.</td>
</tr>
<tr>
<td>3</td>
<td>Questions are entertained and students’ participation encouraged, and the help of a teacher makes it more interesting; I think SIS is very effective.</td>
</tr>
<tr>
<td>4</td>
<td>New method of teaching in physiology is really very helpful and encouraging for me. It will be more beneficial if other classes are also run in the same way.</td>
</tr>
<tr>
<td>5</td>
<td>It has helped me to do regular studies.</td>
</tr>
<tr>
<td>6</td>
<td>We are really satisfied with your teaching method.</td>
</tr>
<tr>
<td>7</td>
<td>Please don’t show the numbers that you give us during every SIS. Just keep them secret and flash them after the class is over.</td>
</tr>
<tr>
<td>8</td>
<td>This method of taking class is very helpful, because I have started studying the topic on the same day of the class and after the class. I am able to question and answer myself while studying. Thank you, sir.</td>
</tr>
<tr>
<td>9</td>
<td>This method encouraged regular study and active participation in the class.</td>
</tr>
<tr>
<td>10</td>
<td>If SIS is given the name for the sessions, this is the real SIS going on in physiology. This is the first time, I think, all students have read before coming to class.</td>
</tr>
<tr>
<td>11</td>
<td>I like the technique of teaching.</td>
</tr>
</tbody>
</table>

*A total of 19 students provided written responses.*
The feedback from a standard student evaluation questionnaire was quite encouraging. A majority of the responses from the teaching evaluation questionnaire and specific comments and suggestions of students were also favorable. The SAI was 1.77. Feedback is important for learning (21). The rationale for student evaluation was straightforward. Students are in a position to judge instructional effectiveness (15, 18). Although the SAI tells us that a teacher is highly acceptable to the students, it does not help the teacher concerned to improve his/her teaching further. The responses to individual questions show that there is ample scope for improvement (27). The only legitimate and desirable objective of student evaluation is improvement of teaching and individual teachers (11). Interactive techniques allow teachers to receive feedback at many levels: on students’ needs, on how information has been assimilated, and on future learning directions. On the other hand, students receive feedback on their own knowledge or performance (22).

Although performance on examinations is the traditional test for teaching or learning success, we did not analyze this, because each successive class of students has different abilities. Our results show that simple innovative techniques enhance interaction during lectures. Faculty members are often reluctant to incorporate active-learning activities in their classes. Interactive lectures are probably avoided because of time constraints, fear of not covering all of the material, need for more preparation, loss of control over students, and anxiety at not knowing the answers to questions posed by students (4). However, teaching experiences and the relevant literature do not support these apprehensions. Furthermore, the minimal extra time pays dividends in the understanding and retention of material. Finally, this active-learning strategy can be incorporated easily into large classrooms. Interactions allow discussion, reduce the monotony of passive learning, and enhance the students’ level of understanding and their ability to synthesize and integrate material (35). This study, based on self-reports from participants as well as from observational data, shows that interactive lecturing techniques are successful.

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