Introduction of integrated lecture module: performance and perception of II year medical students

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ABSTRACT

Background: Integration of subjects, facilitates acquisition of knowledge, skills and attitudes to 'theoretical' subjects in a clinical context in comparison to traditional teaching. The utility of integrated lecture modules (ILM) was accordingly planned and the objective of the study was to evaluate the performance and to document the perception of year II MBBS students exposed to both the integrated and didactic lecture modules.

Materials and Methods: The project was executed on 140 consented year II MBBS students who were randomly divided into 2 groups; group I (n=70) was exposed to didactic lecture (DLG), group II (n=70) to integrated lecture (ILG). The didactic lectures were taken by Pharmacology faculty, while integrated lectures by Pharmacology, Preventive and Social Medicine and Pediatrics faculty. Before the session, students appeared for a pretest consisting of 20 MCQs. Following the post test, the evaluation of the perception of students regarding this study was done by administering an 18 item feedback questionnaire. The agree and disagree comments from the respondents was expressed in percentage and the pre and post test scores were analysed using the t test.

Results: The mean pretest MCQ score in the DLG was 6.95 ± 1.38, which increased to 13.84 ± 3.79 in posttest. Similarly, the mean pre and post test scores of ILG were 6.17 ± 1.54 and 17.64 ± 2.68 respectively. In the feedback questionnaire 96% students opined that ILM improved their understanding (versus 77% for DLG) and 83% students stated that the knowledge gained in ILM will help them in clinical practice (versus 73 % in DLG).

Conclusion: Implementation of vertical integration among pre, para and clinical subjects is beneficial as observed by the improved performance of students when exposed to ILM and as indicated by their response in the feedback.

Key words: Vertical integration, student feedback, didactic lecture.

hybrid system with incorporation of various methods of teaching, viz: integrated lectures, problem based learning, bedside clinics, case based teaching etc.\[1,2\]

Horizontal and vertical integration of subjects results in facilitation of attainment of knowledge, skills and attitudes to ‘theoretical’ subjects in a clinical context. This enables the students to relate the clinical data (obtained from patient history, physical examinations and laboratory analyses) taught in clinical subjects to biological principles and mechanisms as presented in basic sciences. In addition, this enforces deeper understanding, which means that the learning is associated with curiosity, personal interest and lack of external pressure ultimately leading to internal motivation in students. Studies have concluded that the students in integrated lectures see connection in the different disciples of their course, thereby increasing effectiveness of their learning.\[3\]

For integrated lecture programs to be effective and to achieve their purpose of deeper understanding of concepts among students, interdepartmental members are required to co-ordinate, plan and give adequate time. In addition, before teachers take such lectures, it is essential to share, collate all information to be presented in the lecture. Thus planning and collaborative efforts by teachers' is a vital necessity prior to designing integrated lecture modules and sessions.\[4\]

Medical (MBBS) students in their 3rd, 4th and 5th semester are exposed to pharmacology as a subject which in our institute is taught in accordance to the Maharashtra University of Health Sciences (MUHS).\[5\] The subject pharmacology is taught with the help of didactic and interactive lectures, practicals and tutorials. The students in our Institute are exposed to integrated lecture program in their 6th and 7th semesters. It was decided by the authors to develop and introduce vertical integrated lecture modules early in their MBBS training program i.e. in their 3rd and 4th semesters. Year II MBBS students have clinical postings (i.e. clinical exposure) from their 3rd semester onwards. Hence, if students are taught pharmacology topics with its clinical applications in the form of vertical integrated lecture module (ILM) it will be beneficial for the students. Thus the present study was planned to develop vertical ILM with the help of interdepartmental faculty and evaluate the perception of student towards this early exposure to vertical integrated teaching methods when compared with didactic lecture. This study was designed, to also compare the student performance following the traditional lecture and integrated lectures.

**MATERIALS AND METHODS**

**Study design**

The design of the study was prospective, 2-arm, comparative, crossover study. After obtaining the permission from the Head of the departments of Pharmacology and Therapeutics, Pediatrics and Preventive and Social Medicine and Ethics Committee of the Seth GS Medical College, the project was initiated on fresh batch of year II MBBS students (entering in 3rd semester of their MBBS course in Aug 2010). The project was conducted in accordance with Ethical Guidelines For Biomedical Research On Human Participants (ICMR, 2006) and Declaration of Helsinki 2008. The students of year II MBBS entering 3rd semester and who provided written, informed voluntary consent were included in the study. The total duration of the study was of two years.

**Instruments**

To assess the students’ perceptions regarding the given teaching-learning technique, an 18 item questionnaire with closed questions was prepared after a literature review:
where the responses were obtained with a 5 point Likert scale (where in each item was rated as 5-strongly agree, 4-agree, 3-neutral, 2-disagree and 1-strongly disagree). Open ended comments regarding advantages, disadvantages and suggestions were also encouraged. The questionnaire had items related to teaching, discussion during/after sessions, benefits experienced due to teaching-learning technique and its relevance. Face and content validity of the questionnaire was checked by experts in medical education research of the Institution and content assessment of the questionnaire was also done by senior faculty members of Pharmacology Department.

To evaluate the performance of students a pre-test and post test, consisting of 20 MCQs of single best response type was conducted for all the groups. Out of the 20 MCQs: 13 MCQs were of the recall type, 3 were of comprehension type and 4 of application type. The MCQs carried one mark each and thus the maximum score student could achieve was 20. The pre-session evaluation of the performance was designed for eliminating any bias of previous exposure to the subject matter and to assess the improvements (if any) in student knowledge after the session. Students who scored more than 75% marks in the pretest were excluded from the study. The answer key was given to the batch teachers who evaluated the pretest and post tests.

**Study population**

The batch of II MBBS students (entering 3rd semester in August 2010) were eligible for participation in the study. Students were informed that they would have to participate in any one of the large group teaching-learning sessions viz; integrated lecture or didactic lecture (traditional teaching) and evaluate content and quality of the teaching learning activity at the end of the session. In addition, students were also informed that there would be pretest and posttest. Students who agreed voluntarily and gave written informed consent were included in the study. Sample (n=140) was selected based on convenient sampling technique. Students’ responses to feedback questionnaire and performance scores were anonymised.

**Development of module**

Identification of the core committee of the experts and facilitators for exploring the feasibility and implementation of the concept and its various aspects with timelines were constituted. Core committee included 2-3 departmental faculty members of Pharmacology, Pediatrics and Preventive and Social Medicine. Prerequisites of the implementation of integrated module were carried out viz selection of the topics from curriculum of second MBBS course for introduction of the concept, deciding contents and scope of teaching by the subject experts by the core committee members. The members finalized two topics: management of dehydration and vaccines in immunization program. The module was carried out with help of teachers from pharmacology, pediatrics and preventive and social medicine. The faculty members involved in conducting the integrated lecture module took the opinion of other interdepartmental faculty members for content improvisation.

In addition, the teachers involved underwent extensive interdepartmental microteaching sessions with subject experts. Each teacher made a presentation to the subject experts of the concerned departments. Subsequently, there was a discussion among the teacher and the experts, to arrive at a consensus about the content to be covered by each, and the flow of those contents. A total effective time of 8-10 hours were spent in the development of integrated module for each topic.
The teachers undertaking didactic lectures presented the topics before the faculty of Pharmacology for content improvisation. The suggestions on the content and flow of contents were incorporated. This was followed by microteaching session in the department of Pharmacology. An effective time of 3-4 hours was spent on this activity.

**Teaching learning activity**

The students (n=140) who consented were divided into 2 groups randomly based on computer generated simple randomization list wherein group I (n=70) was didactic lecture group (DLG), group II (n=70) was subjected to integrated lecture (ILG). The didactic lecture (Topic1: management of dehydration) was taken by a faculty member from the Department of Pharmacology for 60 minutes (for each topic), while integrated lecture (same topic as for didactic lecture) were taken by teachers from the Department of Pharmacology, Department of Preventive and Social Medicine and the Department of Pediatrics. About 15-20 minutes were allotted for each faculty to teach the topic. The didactic and the integrated lecture on management of dehydration were conducted in the institute at the same time at different venues.

Subsequently, for the session on vaccine in immunization program, the groups were interchanged i.e. group I DLG students were now instructed to attend integrated lecture on vaccines and group II ILG students attended the didactic lecture on vaccines, scheduled at same time but different venues in the Institute.

**Assessment**

Before the session of didactic / integrated lecture, students were administered a pretest consisting of 20 MCQs on each topic. At the end of both the sessions, the students of both the groups (DLG and ILG) were asked to document their feedback on the teaching technique. In the feedback questionnaires, the statements were rated on Likert’s scale. All the students were also administered the posttest consisting of same MCQs as in the pretest for both the topics.

**Statistical analysis**

GraphPad InStat, version 3.06 was used for statistical analysis. The pretest and posttest scores of the two groups (intergroup analysis DLG versus ILG) were compared with student unpaired t test. Within the group, comparison of pretest versus posttest scores was done by using paired t test. For all the tests, two tailed p value of < 0.05 was considered as statistically significant. Descriptive analysis was used to assess the individual questions on student perception questionnaire of the teaching methods, and responses were expressed as percentages. The total number of students (expressed as %) stating score of 4 or 5 on the Likert scale for each item of the feedback questionnaire were considered as positive respondents for each teaching method.

**RESULTS**

A total of 140 students participated in the study. The study was conducted in 2 sessions; hence 70 students were in DLG and other 70 students in ILG in the first session. During the second session the groups were interchanged. Thus, all 140 students gave feedback on both the teaching learning techniques -didactic and integrated lecture and pre and post test for performance evaluation.

The knowledge component of the students was evaluated by giving them a pre and posttest (maximum score of 20) on the topic to be covered. Baseline performance of the students of both the groups before the session was comparable to each other. The pretest scores in both DLG and ILG were comparable and no student in either group received more
than 75% marks in the pretest to be excluded from the study. The mean pretest score (for both the topics) of the students in the didactic lecture group was 6.95 ± 1.38, which increased to 13.84 ± 3.79 (p < 0.001) after the session. Similarly, the mean pre and posttest scores (for both the topics) of integrated lecture group increased from baseline 6.17 ± 1.54 to 17.64 ± 2.68 (p < 0.001). There was a statistically significant increase (p < 0.05) in posttest performance score (17.64 ± 2.68) of students for integrated teaching module as compared to students of the didactic lecture group (13.84 ± 3.79). Topic wise pre and posttest scores were not calculated as the focus was on increment in performance due to a given teaching technique.

As regards the feedback on the given teaching learning technique, 96% students opined that ILM improved their understanding (versus 77% for the DLG). In addition, 68% students stated that ILM discussions brought concept clarity (versus 59% for the DLG) and 49% students (versus 31% for the conventional didactic lecture group) stated that the sessions were interactive in integrated lecture sessions. Students also opined that integrated lecture sessions aroused their intellectual curiosity (76 % for integrated lecture group versus 51% in DLG) and also the knowledge gained in integrated lectures would help them in clinical practice (83% for ILG versus 73% in DLG). Further, 84% students stated that they expect to score better in exams when taught in integrated lecture mode whereas only 66% students stated that they expect to score better in exams when taught by didactic lectures. The percentage of students responding to each of the 18 item questionnaire is presented in Table 1.

In the comments section of feedback questionnaire 23% students had stated that there was repetition of points by various teachers during the ILM which helped them to understand and retain the facts. Whereas 18% students had written that repetition of similar points by all the teachers during the integrated lecture resulted in distraction and made the session boring. 38% students opined that integrated lectures gave them holistic and complete picture of the topic. Nearly 9% students stated they were thrilled by the practical points explained by the clinicians during the integrated lecture.

**DISCUSSION**

Integrated lecture is the organization of teaching matter to interrelate or unify subjects frequently taught in separate academic courses or departments. A medical integrated lecture program helps students to put together the learned facts so as to get the whole picture and adopt a holistic approach while treating a patient or planning a health care strategy. The need for integration has been advocated in many reports on medical education. Even MCI and MUHS have emphasized to run integrated lectures.

For any ILM to be effective, the learning outcomes, contents, relationship of contents to the learning outcomes, themes, sequencing of topics, contents of each topic and their relation to the learning outcomes must be defined. To achieve this, teachers taking a particular integrated lecture module have to co-ordinate, plan, discuss (with each other and departmental members) and execute. This pre session workout can be brought about by practicing content improvisation and microteaching by all the teachers amidst the interdepartmental subject experts. These interdepartmental pre-sessions interactions do require time, commitment from not only teachers but also subject experts and hence must have a time table in place for these sessions prior to actual execution of the integrated lecture.[6]
Such sessions were conducted as part of the study to develop the integrated modules. These pre session activities in real time setting must meet their purpose and objectives so that integrated lectures do achieve their estimated benefits in students. The institute and departments have to accommodate time tables for such faculty pre-session activities. This may not appear easy especially with clinicians as teachers. Faculty development, training, sensitization, time and commitment are essential for integrated lecture programs to flourish and be successful at medical institutes. Even in our study time spent for these pre-session activities involved in integrated lecture modules was 16-20 hours in comparison for didactic lecture (6-8 hours).

Our study has definitely shown that integrated lecture was perceived better than didactic lecture in terms of performance and understanding as is documented\[^{4,6,7}\] by many medical educationists. The overall impact of the session was very positive and was in favor of integrated teaching method which was evident by the improved performance of the students after the session and the perception given by the students. 96% students opined that integrated lecture modules improved their understanding while 68% students stated that discussions brought concept clarity.

<table>
<thead>
<tr>
<th>No.</th>
<th>Questionnaire item</th>
<th>ILG</th>
<th></th>
<th>DLG</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The flow of contents during the session was lucid and clear</td>
<td>67.85 (4)</td>
<td>69.28 (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Good understanding is achieved by this teaching technique</td>
<td>95.71 (4)</td>
<td>77.14 (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>As a student I was comfortable with this teaching technique</td>
<td>74.28 (4)</td>
<td>79.28 (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>As a student I was satisfied with this teaching technique</td>
<td>87.85 (4)</td>
<td>69.28 (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Time allocated for the session was adequate</td>
<td>64.28 (4)</td>
<td>66.43 (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>The session was interactive</td>
<td>48.57 (3)</td>
<td>31.43 (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Time allocated for discussion was adequate</td>
<td>37.14 (3)</td>
<td>43.57 (3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Discussions held in class helped in understanding the subject better</td>
<td>67.85 (4)</td>
<td>58.57 (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Students were given an opportunity to clear their doubts</td>
<td>64.28 (4)</td>
<td>75.71 (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Teacher’s explanations were simplified and clear</td>
<td>87.85 (4)</td>
<td>77.14 (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>The clinical applications of topic were explained by the teacher(s)</td>
<td>87.85 (4)</td>
<td>75.71 (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>The relevance of topic to other branches of medicine was also explained</td>
<td>64.28 (4)</td>
<td>43.57 (3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>This teaching technique encouraged my intellectual curiosity</td>
<td>76.43 (4)</td>
<td>51.43 (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>I expect to score better in this topic as a result of this teaching</td>
<td>84.28 (4)</td>
<td>66.42 (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>The knowledge and skills acquired about this topic via this teaching technique will help me in clinical practice</td>
<td>82.85 (4)</td>
<td>72.85 (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>The teacher / teachers provided guidance for self learning</td>
<td>44.28 (3)</td>
<td>32.14 (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Teacher / teachers paid enough personal attention to the students</td>
<td>37.14 (3)</td>
<td>62.14 (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>All topics must be taught collaboratively by multiple teachers of different departments</td>
<td>76.43 (4)</td>
<td>47.85 (3)</td>
<td></td>
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</tbody>
</table>

Table 1: Positive responders (%) on student perception questionnaire evaluating the feedback to integrated lecture (IL) module and didactic lecture (DL) as teaching technique.
Students also opined that integrated lecture sessions aroused their intellectual curiosity and 83% students stated that the knowledge gained in integrated lectures will help them in clinical practice. Further, students stated that they expect to score better in exams when taught in integrated lecture mode (Table1).

The last section of the questionnaire encouraged the students to express their opinions about the teaching method they were taught with. Majority of students agreed that the integrated teaching technique is good teaching method and separate vertical integrated lecture program should be conducted from 3rd to 9th semester of their MBBS course for topics in accordance to their clinical postings. They felt that integrated teaching helped in better understanding of a particular topic. About 37% students from ILG stated that enough personal attention was paid by the teachers versus 67% in DLG. Similarly, only 64% students agreed in the ILG that they were given an opportunity to clear their doubts in contrast to the DLG wherein 76% students stated the same.

This may be the limitation of integrated teaching method which might give less time for each teacher to interact with the students as opposed to didactic lecture. Few students also felt that integrated teaching method is time consuming, involves repetition of points (18%) and only few topics can be taught by this teaching method. Repetition of points in any teaching technique module is essential for reinforcement of the topic. This could be minimized if faculty involved in integrated learning modules discuss and decide during the presession meetings on the points to be reinforced and the extent of repetition required in the session. Interdepartmental collaborative sessions and microteaching prior to the execution of an integrated lecture are vital to provide skilled supervision with an opportunity to get a constructive feedback on the topic from all interdepartmental members and improvise on the clarity, specificity and lucid flow of lecture.

In our study, we developed vertical integration models which tend to bring more relevance and excitement in learning. To involve clinicians in preparation of basic medical science modules and vice versa is vital to develop vertical integration.[8] Sessions such as early clinical exposures and use of clinical examples in teaching sessions of basic medical sciences generate interest among the learners and help them to see why it is important to learn basic sciences. It also helps to involve clinicians in the identification of the core contents of basic medical science modules. In our study, students appreciated the early exposure to vertical integrated lecture modules and also their immediate performance was better with integrated learning. The authors did not analyze the pre and post test scores topic wise as we were interested in the evaluation of the performance due to a given teaching technique rather than the topic on which students performed better.

It is for Institution authorities and medical educationists to plan cohesive timetables for integrated lectures (inclusive of horizontal and vertical) and pre lecture sessions of content improvisation and microteaching so that due time, commitment, co-operation and conflict management can be put in place by the faculty members and holistic knowledge can be imparted to the students.

There were some limitations in our study. The prime one being that the authors did not take feedback from the faculty on development and implementation of integrated lecture modules. The measures to entirely eliminate bias among teachers were not possible.
In conclusion, integrated teaching method had a positive response from the medical undergraduate students which was also accompanied by a better performance. Vertical integration must start early as a part of paraclinical subject training. Meticulous planning of integrated lecture program with microteaching and pre-session content modification by interdepartmental teachers will prove to be powerful teaching technique and effective learning approach for students.

ACKNOWLEDGEMENT

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