A Comparative Study to Evaluate the Role of Interactive Lecture Classes and Self-Directed Learning Sessions among First MBBS Students in the Department of Physiology during Implementation of Competency Based Medical Education

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ABSTRACT

BACKGROUND

Implementing the new competency based medical education is quite challenging for medical educators while teaching newly admitted undergraduate medical students. We wanted to compare the role of interactive lecture classes with self-directed sessions among first MBBS students in the Department of Physiology during implementation of competency based medical education.

METHODS

The present study was conducted in the Department of Physiology among two hundred undergraduate medical students after obtaining Institutional Ethical Clearance. Ten interactive lecture classes were compared with ten self-directed learning sessions using pre-test and post-test MCQS. Students' feedback was collected following the sessions and students were provided with feedback following each session. Feedbacks from facilitators were also taken following the sessions. SPSS version 16 was used to analyse the data. T test was done to compare the different teaching methods.

RESULTS

Students were more satisfied with the SDL sessions. According to the teachers, students participated and interacted in SDL sessions better when compared to traditional classes. Teachers had to put much more effort to the SDL sessions as compared to traditional lecture sessions to make these sessions effective. There was no difference in performance between traditional lecture classes and self-directed learning sessions in pre-test sessions (50.39 ± 19.41 vs. 52.84 ± 16.01; p value 0.17). Students performed better in post-test sessions (50.39 ± 19.41 vs. 63.38 ± 12.79; p value < 0.0001**) as compared to pre-test sessions in interactive lecture classes. Students performed better in post-test sessions (52.84 ± 16.01 vs. 69.79 ± 12.4; p value < 0.0001**) as compared to pre-test sessions during assessment of self-directed learning sessions. Performances of students were also better in SDL sessions as compared to interactive lecture classes in post-test sessions. (69.79 ± 12.4 vs. 63.38 ± 12.79; p value < 0.0001**).

CONCLUSIONS

Self-directed learning sessions were more effective than interactive lecture classes for teaching physiology to undergraduate medical students and for implementation of competency based medical education. Successful implementation of SDL sessions requires a greater number of teachers as compared to interactive lecture sessions.

KEYWORDS

Traditional Lecture Classes, Self-Directed Learning, Competency Based Medical Education

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BACKGROUND

Over a decade, medical educators have realized that changes need to be made in the medical curriculum. The healthcare system requires competent physicians of first contact who can deliver standard and cost-effective healthcare to the community. So the need of the hour is to prepare competent physicians of primary contact and to implement this, medical education method needs to be reformed.[1-4]

The Medical Council of India in 2019 has implemented competency based medical education which is a learner-cantered and outcome-based approach.[3] It requires multiple and continuous assessment of the students and advocates continuous feedback. The Medical Council of India has formulated the basic framework for this medical curriculum.

The Competency-Based Medical Education (CBME) curriculum has been designed to identify outcomes, level of performance and to develop a framework for assessing competencies. Medical Council of India (MCI) has recommended its implementation in 2019.[5] The document has 412 topics for learning and 2949 outcomes to be mastered[6]. CBME is learner-centric and focuses on competencies as end points. The Internal Assessment (IA) is embedded in curriculum providing continuous evaluation of student's performance and is given greater emphasis. The new curriculum emphasizes a cut off pass level of IA as 50 %. Recommendations in the new curriculum pose a challenge for implementation given the limited resources and large number of mostly indifferent students.[5-6]

In a traditional lecture a single teacher usually delivers a lecture to students. Audio-visual aids like a blackboard, charts, models or PowerPoint presentation are used to support the class. For active learning Problem-Based Learning (PBL) and Self-Directed Learning (SDL) are usually used. Sometimes combination of traditional classes and active learning methods are also used, hybrid forms of lecture with self-directed methods are in practice. In SDL students usually take initiative and responsibility for their own learning.[7-11] Both SDL and PBL are considered as fundamental tools for achieving the goal of lifelong learning in the new medical education curriculum.

From the above discussion it is evident that self-directed learning and interactive lecture classes combined may be more effective in implementing the new competency based medical education.

For teaching Physiology, in the curriculum, the following schedule has been provided: 160 lecture hours, small group teaching / integrated teaching / practical / tutorial 310 hours, self-directed learning 25 hours: a total 495 hours. The MCI has also advised to cover two third of the syllabus with small group teaching.[3]

Overtly the above facts may sound ideal for transforming the current curricula as envisaged by the MCI. But implementation of CBME is quite challenging, as many concepts are new and demands a lot more time and involvement of faculties.

Multiple studies on medical education need to be conducted to make implementation of this new curriculum a success. The present study was conducted in a Medical College of West Bengal in the Department of Physiology to compare the performance of students' following traditional interactive lecture classes and self-directive learning sessions.

METHODS

The study was conducted in the Department of Physiology, Medical College of West Bengal. Institutional ethical clearance (Memo No: BMC/I.E.C/127: Dated 12/3/2020) was taken before conduction of the study.

Competency based medical education provides an effective outcome-based strategy where various domains of teaching including teaching learning methods and assessment form the framework of competencies are included. Ten SDL classes and ten interactive lecture classes was included in this study. The project was conducted in time span of 2 months.

For both lectures and SDL sessions seven days ahead of the commencing of classes the students were provided with all study material (competencies, objectives, power point presentations, learning methods, references to be used) in an email address created for the total batch of students, but only 10 student representatives were included in the group and they shared all information with rest of the class. Horizontal integration with other departments was done as far as possible as per new directives in the medical curriculum of MCI. Topics for SDL sessions and lectures has already been decided by MCI in the new curriculum implemented in 2019. So we followed the same guideline for SDL and lecture sessions.

• Total number of students in each group 200 (Traditional class: control group and SDL: case group)
• Total SDL session = 10; Total traditional class = 10
• Pre-test in both SDL and traditional class session (MCQ) 10 marks in each session
• Comparison of marks obtained by students in pre-test sessions by unpaired T test between SDL and traditional classes
• 10 SDL sessions and 10 traditional classes conducted
• Post-test MCQ for both sessions 10 marks in each session
• Comparison of marks obtained by students in post-test session by unpaired T test between SDL and traditional classes
• Comparison of marks obtained by students in Pre-test sessions and post-test session by paired T test in traditional classes
• Comparison of marks obtained by students in pre-test sessions and post-test session by paired t test in SDL sessions
Flow Chart - Methodology

Inclusion Criteria

All students enrolled in the first MBBS program were included in the study. This comparative observational study was conducted after taking approval from the Institutional Ethics Committee. According to the competencies of the new curriculum interactive lecture and SDL classes were arranged with specific educational objectives.

The topics for the study for SDL classes included application of basic physiological concepts in clinical settings through case-based scenarios following the competencies. Cases were constructed for SDL. Guiding questions were focused to make the students learn about relevant physiological concepts.

The students were informed about the classes ahead of time. Information regarding the topics and the mode of teaching, learning and assessment were provided.

Interactive Lecture Sessions

Each lecture class lasted for 40 minutes and was made interactive as far as possible. Assessment of lecture session: In the pre-test MCQs (Multiple Choice Questions) test was given, students were asked to fill up their answers in Google sheet before the session. In the post test session students had to answer 10 MCQs (to be answered in 10 minutes) for a maximum of 10 marks. The MCQ assessments were carried online using Google form and scores were released immediately in the end of the class. No negative marking was done. Pre and post MCQs were the same set of questions. IL and SDL groups received same set of MCQs.

SDL Sessions

The students were divided into ten batches according to their roll numbers, and each batch was provided with a facilitator during the session. During the SDL session, the students had to go through each topic independently. The facilitator for each group followed the students' discussion closely and encouraged critical thinking.

Flow chart of SDL session.

- No of students = 200.
- Divided into 10 batches according to roll number.
- Each batch having 20 students.
- The contents of the session were divided into 20 subdivisions and each member was allotted 1 subdivision to study. So ten students got same topic to study.
- These ten then discussed their understanding among themselves.
- Following this they returned to their original batch of twenty and explained what they had learnt to the rest 19.

Jig-Saw pattern was followed to make the SDL sessions more interactive. Students were organized into jigsaw groups with 20 participants in each group each. The topic to be learned in the session was divided into twenty parts. Each member of the group was assigned to a different reading material and 5 minutes was allowed for this reading.

A facilitator was present to facilitate the group movement and discussions. Group members then joined members of other groups assigned to the same reading piece to form expert groups with the goal to become experts in the topic. Peer assistance was provided to them. The expert group members interacted for 10 minutes. The students themselves decided how to present the information.

Finally, trainees left their expert groups and returned to their original groups with a task to 'piece together' and solve the overall outcome of the problem based on their respective expert topics. For the next 25 minutes, they taught each other about their specific reading material. The session lasted for 40 minutes. Methods of assessment of SDL session were similar to the traditional lecture classes. The facilitators selected for both SDL and lecture classes were faculties of physiology department. The facilitators received training from the medical education unit which provided them effective guidelines for successful implementation of the new curriculum implemented by MCI.

Students' feedback was collected following the sessions and students were provided with feedback following each session. Feedbacks from facilitators were also taken following the sessions. In this way, we did both direct and indirect assessment in the present study.

Statistical Analysis

SPSS version 16 was used to analyse the data. Unpaired T-test was used to compare the two groups and paired T-test to compare the outcome of intervention in the two groups.

RESULTS

The present study was conducted in a Government Medical College of West Bengal on two hundred undergraduate medical students. According to feedback provided by the students they were more satisfied with the SDL sessions as they could interact freely in small groups with their facilitators and were easily able to clear their doubts regarding different problems. According to the teachers the students participated and interacted in SDL sessions better as compared to interactive classes. It was also easier to monitor students in SDL sessions, but teachers had to put much more effort to the SDL sessions as compared to interactive lecture sessions to make these sessions effective.

Pre-Test (Lecture) (Percentage of Marks) Mean ± SD	**Pre-Test (SDL)** (Percentage of Marks) Mean ± SD	**P Value**
50.39 ± 19.41	52.84 ± 16.01	0.17

Table 1. Results of MCQ Assessments of Students in Pre-Sessions in Interactive Lecture Classes and Self-Directed Learning Sessions

Pre-Test (Percentage of Marks) Mean ± SD	**Post-Test** (Percentage of Marks) Mean ± SD	**P Value**
50.39 ± 19.41	63.38 ± 12.79	< 0.001**

Table 2. Results of MCQ Assessments of Students in Pre- and Post-Test Session in Interactive Lecture Sessions

Pre-Test (Percentage of Marks) Mean ± SD	**Post-Test** (Percentage of Marks) Mean ± SD	**P Value**
52.84 ± 16.01	69.79 ± 12.4	< 0.001**

Table 3. Results of MCQ Assessment of Students in Pre- and Post-Test Session in Self-Directed Learning Sessions

Post-Test (Lecture) (Percentage of Marks) Mean ± SD	Post-Test (SDL) (Percentage of Marks) Mean ± SD	P Value
63.38 ± 12.79	69.786 ± 12.4	< 0.001**

Table 4. Results of MCQ Assessments of Students in Post Sessions of Interactive Lecture Classes and Self-Directed Learning Sessions

There was no difference in performance between interactive lecture classes and self-directed learning sessions in Pre-test sessions (50.39 ± 19.41 vs. 52.84 ± 16.01; p value 0.17) (Table 1; Figure 1). Students performed better in post-test sessions (50.39 ± 19.41 vs. 63.38 ± 12.79; p value < 0.001**) as compared to pre-test sessions in interactive lecture classes (Table 2; Figure 2). Students also performed better in post-test sessions (52.84 ± 16.01 vs. 69.79 ± 12.4; p value < 0.001**) as compared to pre-test sessions in self-directed learning sessions (Table 3; Figure 3). Performances of students were better in SDL sessions as compared to interactive lecture classes in post-test assessment. (69.79 ± 12.4 vs. 63.38 ± 12.79; P value < 0.001**) (Table 4 and Figure 4).

DISCUSSION

The present study conducted on two hundred undergraduate medical students demonstrated that performance of students in SDL sessions were significantly better as compared to interactive lecture sessions. We took multiple assessments for our students and they could obtain 50 % marks in all post-test sessions in both methods of teaching.

In the new curriculum implemented by MCI there is decreased emphasis on passive didactics lectures. The new curriculum advocates teaching only one third of the curriculum in lectures. All competencies need assessments and students have to get at least 50 % marks to be declared as competent and results need to be entered in logbooks and certified by faculties. In the present study we were able to achieve this objective in both the teaching methods used.[5-6]

The small group activities require the use of multiple faculty facilitators. The present medical curriculum advocates active learning, and this requires more involvement of faculties and availability of faculties in more numbers may pose a huge challenge. Our SDL sessions were more interactive, and we could effectively engage the learners in these sessions but required more number of faculties.[12-14]

A study conducted by Goolsarran N[15] was aimed to assess the effectiveness of the jigsaw method as a method of small group learning. Results indicated that there was significantly more improvement in tests scores with the jigsaw method. We also used jigsaw method in SDL sessions.

The objective of a study conducted by Phillips J et al[16] was to evaluate the effectiveness of the jigsaw technique. The study was also conducted to engage students in a clinical controversy exercise and assess student engagement during the procedure. A quiz was taken individually and was used to measure the effectiveness and this method of teaching was observed to be significantly effective. In the present study we have observed positive effects of the jigsaw technique on SDL sessions.

An interventional study was conducted among ninety-six students studying in the third semester, in the academic year 2014 by Devi S. et. al[10] the study centre was Pondicherry Institute of Medical Sciences. The study was conducted by the Department of Microbiology. Lectures and SDL sessions were conducted for the students simultaneously. The sessions were assessed by using pre-test and post-test MCQs as assessment tool. Students' feedbacks were also collected. Feedback from students revealed that SDL classes were more interesting and helped in better understanding of the topics; stimulated reasoning; and also helped in the active learning process. The findings are similar to the present study.

A biomedical researcher is interested in explaining the cause-and-effect relationship between different variables; predicting an event, while the educational researcher would like to mostly explore new interventions and describe those interventions to gain insight into the problem.[4] So in the present study we tried to implement jigsaw in SDL sessions and study the effects in implementation of CBME.

CONCLUSIONS

Self-directed learning sessions were more effective than interactive lecture classes for teaching physiology to undergraduate medical students and for implementation of competency based medical education. Successful implementation of SDL sessions requires a greater number of teachers as compared to interactive lecture sessions.

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