Effect on students' perception of learning environment among first-year medical students exposed to competency-based curriculum: A mixed-methods evaluation

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INTRODUCTION

There is ample evidence that the learning environment prevailing in an educational institution has an impact on the learning outcomes of students.[1,2] Evaluating a teaching-and-learning environment from the angle of the students' perception is helpful to provide key elements for guidance and corrections at the management level.[3] The World Federation for Medical Education emphasized the learning environment as one of the goals for the appraisal of medical education plans.[4]

The student support system (SSS) of our institution is concerned with the improvement of the learning environment of the students. As a part of the SSS, we did a survey of students' perceptions of the learning environment prevailing in our medical college among students belonging to the traditional batch (2018 batch) in the year 2019. We used the Dundee ready education environment measure (DREEM), a 50-item measure of students' perception of a specific environment, allowing for various forms of comparative assessments of the learning environment.[5]

The newly introduced competency-based medical education (CBME) curriculum has various modules such as a 1-month foundation course, a properly structured mentoring programme, AETCOM (attitude, ethics and communication), self-directed learning (SDL) and early clinical exposure for 1st year medical students of the 2019–20 batch. The students of the CBME batch participated in almost all the activities implemented before their course was interrupted due to the Covid-19 crisis when face-to-face teaching was shifted to the online mode.

The faculty members of our college were trained in faculty development programmes such as the curriculum implementation support programme conducted by the Medical Council of India (MCI) and the different modules of CBME were discussed, planned and implemented by all three preclinical subjects of first year MBBS. We wanted to elucidate the effect of CBME modules on the learning environment, especially on the domains of students' perception of atmosphere and the domain of social self-perception, which received low scores from the traditional curriculum batch.

We therefore assessed the effect on students' perception of the learning environment after the introduction of the CBME curriculum.

METHODS

Study settings

The present study was undertaken in Sri Manakula Vinayagar Medical College and Hospital, located in Kalitherthalkuppam, Madagadipet, Puducherry. It is a private medical college affiliated with Pondicherry University. It admits 150 students every year and holds a good record of academic performance for the past 12 years.

Study design

It was an educational evaluation where a mixed-methods approach (survey and open-ended responses) was used in which quantitative data on perceptions of learning were collected using the DREEM tool[6] and qualitative data were collected by asking open-ended questions in the same questionnaire.

Study participants

We obtained first year students' perceptions of learning for the cohort of the 2018 batch (n=150) who were exposed to traditional curriculum and the 2019 cohort (n=150) who were exposed to the CBME curriculum introduced by the MCI.

Data collection

All 150 students of the 2018 cohort were invited to participate in the study. After obtaining informed consent, at the end of the first year course, all students were given the DREEM questionnaire. The completed questionnaire was collected after 50 minutes by the members of the SSS. Similarly, all 150 students of the 2019 cohort were administered the DREEM questionnaire through an online platform in view of the Covid-19 pandemic. Students of both cohorts were explained the purpose of the study and the exact meaning of the items given in the questionnaire. They were also assured of maintenance of confidentiality and anonymity. Their participation was fully voluntary and they were allowed to withdraw any time during the study process.

The DREEM has been widely used as a tool to gather information about the educational environment in many institutions.[7,8] It was originally developed at Dundee and has been validated as a universal diagnostic inventory for assessing the quality of the educational environment of different institutions.[5]

It is a 50-statement, closed-ended questionnaire that requests information about five domains: Students' perception of learning, students' perception of teachers, students' academic self-perception, students' perception of atmosphere and students' social self-perception. Each statement response scored 0–4 on a 5-point Likert-type scale (strongly disagree, disagree, uncertain, agree and strongly agree). The negative statements were scored

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in reverse. In addition to the questionnaire, students were also asked to respond to an open-ended question: 'Mention three things to improve the learning environment in this college.'

Data analysis

The data collected from both batches were analysed using SPSS (Chicago, IL, USA) software package version 12.0. The mean and standard deviation (SD) were calculated for all of the items. The total scores were calculated by adding the mean scores of all 50 items. For each of the five domains, scores were calculated as the cumulative total of individual responses for all of the items in that domain. The mean score of each item for both batches was compared. To test the significance of differences between the batches the mean and SD of domains and each item were calculated.

All the responses of students to the open-ended question were analysed by manual content analysis and coding. The taxonomy of coding included categories, subcategories and codes. The coding was done with the inductive coding approach. Similar codes were brought under subcategories (strengths and suggestions for improvement). The categories were framed the same as that of the five domains of the DREEM questionnaire. The guidelines by UCLA Centre for Health Policy Research were used for data collection and analysis. The 'Consolidated Criteria for Reporting Qualitative Research' guidelines were followed while reporting.[9]

Ethical consideration

Ethical clearance was obtained from the institutional ethics committee (Ethical Clearance number: SMVMCH-ECO/AL/54/2020).

RESULTS

A total of 134 students from the 2018 batch (traditional batch) and 143 students from the 2019 batch (CBME) responded to the DREEM questionnaire. The mean (SD) age of the participants was 19 (1) years (±1SD) for the traditional batch and 19.8 (0.5) years for the CBME batch. The men and women populations were 64 (48%) and 70 (52%) in the traditional batch and 64 (45%) and 79 (55%) in the CBME batch, respectively. There was no statistical difference between the two batches with respect to age and gender.

There was significant improvement in most of the domain items in the batch exposed to the CBME curriculum compared to the batch exposed to the traditional curriculum, except for items such as 'The students irritate the teachers, the teachers get angry in class, I am confident about passing this year, and I seldom feel lonely' (Table I).

The suggestions given by students exposed to the CBME curriculum were organized into five categories and two subcategories under each category (Table II).

DISCUSSION

The overall scores between the two batches indicated that there was a statistically significant improvement in the students' perception of the learning environment after exposure to the newly introduced CBME curriculum. In the traditional batch, the results showed less scores for perception of atmosphere and social self-perception. In the CBME batch, the results showed a significant improvement in the scores of these domains.

The overall significant improvement in the DREEM scores of the CBME batch can be attributed to different modules included in the CBME curriculum such as 1-month foundation course, AETCOM, early clinical exposure, alignment and integration in the curriculum, SDL sessions and extracurricular activities. A study from our institute by Velusami et al. on 1-month foundation course of CBME batch concluded that all aspects of the foundation course were well received by the students.[10] A revised, properly structured and more student-centred SSS was also established for the CBME batch. We cannot deny the effect of that in the improvement of the perception of CBME batch on the learning environment as the perception of students on the item: 'There is a good support system for students who get stressed' significantly improved in the CBME batch (2.0–3.0). The requirement of a good support system for students appeared frequently in the suggestions of non-CBME batch students, but none appeared in the suggestions of the CBME batch.

The scores reflected the beneficial effects of the CBME modules mentioned above on perceptions of students about their learning. The students of the CBME batch were positive about their active participation and engagement, which is the cornerstone of the CBME curriculum. The CBME modules such as the foundation course, AETCOM and early clinical exposure involved many collaborative activities, which allowed them to get insight into their course and had helped them to develop confidence about not only their academic skills but also their social skills. That is why they proposed small group activities in teaching. The SDL sessions for students of the CBME batch had improved their attitude towards reading books. This is complemented in their suggestions of increasing the timing of library working hours.

The item of perception of learning domain which did not show any significant difference was that the teaching over-emphasizes factual learning. Students of both batches did not differ much in the perception of teaching for the items—the teachers are authoritarian, the students irritate the teachers, the teachers provide constructive criticism here, and the teachers get angry in the class. Among these, the items teachers are authoritarian and the teachers get angry in the class received a negative score in the CBME batch meaning the students agree with them. Though that change in perception is insignificant, we need to be concerned about these perceptions. These perceptions were reflected in their suggestions to improve the learning environment. They suggested inclusion of more student-centred activities such as tutorials/small group discussions, hospital visits, discussion on clinical scenarios, multiple-choice questions, conducting quizzes and SDL sessions.

The items that did not show significant improvement between the two batches in the domain of academic self-perception were learning strategies—'which worked for me before continue to work for me now, last year's work has been good preparation for this year's work, I am able to memorize all I need, and I have learnt a lot about the way scientific research is carried out'. Among these, the item of perception on the way scientific research is carried out did not show any improvement and received low scores from both the batches. This area has not been included in CBME activities and is a potential remedial measure in the future. All other items received positive scores from both the batches and also showed statistically significant improvement in the CBME batch.

There is an appreciable statistically significant improvement in the overall scores and also the individual items of domains of perception of atmosphere and social self-perception except

TABLE I. Comparison of mean values of DREEM scores between batches exposed to the traditional curriculum (Batch A) and the CBME curriculum (Batch B)

No.	Item	Batch A		Batch B		P
		Mean	SD	Mean	SD	
Perception of learning						
1	I am encouraged to participate in the class	2.7	1.03	3.4	0.78	0.001
3	The teaching is student-centred	2.5	1.05	3.3	0.84	0.001
4	The teaching helps to develop my competence	2.5	1.02	3.0	0.97	0.001
5	The teaching is well-focused	2.7	1.02	3.3	0.90	0.001
6	The teaching helps to develop my confidence	2.5	0.99	3.2	0.84	0.001
7	The teaching time is put to good use	2.6	1.09	3.1	0.83	0.001
8	The teaching over-emphasizes factual learning	2.3	1.00	2.0	1.28	0.031
9	Long-term learning is emphasized over short-term learning	2.4	1.11	2.9	0.93	0.001
10	The teaching is too teacher-centred	1.8	1.01	2.4	1.06	0.001
11	I am clear about the learning objectives of the course	2.6	0.96	3.2	0.85	0.001
12	The teaching encourages me to be an active learner	2.4	1.05	3.2	0.79	0.001
13	The teachers deliver research-led teaching	2.1	1.12	2.7	0.88	0.001
14	The teaching is often stimulating	2.3	1.10	3.0	0.81	0.001
17	The teachers help me to develop my practical skills	2.6	1.11	3.4	0.83	0.001
	Mean value for the domain	2.4	0.20	3.0	0.40	0.001
Perception of teaching						
2	The teachers are knowledgeable	3.3	0.71	3.6	0.77	0.009
15	The teachers ridicule the students	2.4	1.07	2.8	1.23	0.004
16	The teachers are authoritarian	2.3	1.00	2.0	1.27	0.031
18	The teachers are good at providing feedback to the students	2.8	1.05	3.3	0.91	0.001
19	The students irritate the teachers	2.6	0.94	2.5	1.16	0.433
20	The teachers provide constructive criticism here	2.2	0.88	2.5	1.17	0.017
21	The teachers give clear examples	2.7	0.93	3.3	0.86	0.001
22	The teachers get angry in the class	2.5	1.29	2.4	1.11	0.489
23	The teachers are well prepared for their classes	2.9	1.05	3.6	0.84	0.001
	Mean value for the domain	2.6	0.30	2.9	0.60	0.001
Academic self-perception						
24	Learning strategies which worked for me before continue to work for me now	2.3	1.08	2.8	0.93	0.004
25	Last year's work has been a good preparation for this year's work	2.6	1.10	2.8	0.94	0.104
26	I am able to memorize all I need	2.1	1.03	2.4	1.09	0.020
27	I am confident about passing this year	3.1	0.93	3.2	0.98	0.385
28	My problem-solving skills are being well-developed here	2.4	1.00	3.0	0.84	0.001
29	I feel I am being well-prepared for my career	2.4	1.05	2.9	0.93	0.001
30	I have learnt a lot about the way scientific research is carried out	1.9	1.02	2.4	1.02	0.001
31	Much of what I have to learn seems relevant to a career in healthcare	2.5	0.92	3.0	0.80	0.001
39	The course is well timetabled	3.0	0.94	3.5	0.78	0.001
	Mean value for the domain	2.5	0.38	2.9	0.40	0.001
Perception of atmosphere						
32	I feel comfortable in the class socially	2.6	1.12	3.1	0.93	0.001
33	The atmosphere is relaxed during seminars/tutorials	2.5	1.21	3.2	0.93	0.001
34	I find the experience disappointing	1.7	1.17	3.2	0.94	0.001
35	I am able to concentrate well	2.3	1.01	2.8	0.86	0.001
36	There are opportunities for me to develop my interpersonal skills	2.3	1.16	2.8	0.93	0.001
37	The atmosphere is relaxed during lectures	2.5	1.13	3.0	1.00	0.001
38	The atmosphere is relaxed during laboratory/practical/fieldwork classes	2.6	1.14	3.2	0.95	0.001
40	I feel able to ask the questions I want	2.5	1.22	3.1	0.96	0.001
41	Cheating is a problem in this faculty	2.4	1.25	3.0	1.26	0.001
42	The enjoyment outweighs the stress of the course	1.9	1.32	2.3	1.10	0.006
43	The atmosphere motivates me as a learner	2.1	1.14	2.9	0.79	0.001
	Mean value for the domain					
Social self-perception						
44	I am rarely bored on this course	1.9	1.28	2.3	1.21	0.008
45	I have good friends in this college	2.3	1.27	3.1	1.01	0.001
46	My accommodation is pleasant	2.1	1.13	2.7	0.94	0.001
47	There is a good support system for students who get stressed	2.0	1.30	3.0	1.13	0.001
48	I am too tired to enjoy the course	2.0	1.21	2.6	1.14	0.001
49	I seldom feel lonely	2.1	1.28	2.2	1.41	0.538
50	My social life is good	2.4	1.22	3.0	1.00	0.001
	Mean value for the domain	2.1	0.20	2.7	0.40	0.001

DREEM Dundee ready education environment measure   CBME competency-based medical education

TABLE II. Strengths perceived by the students exposed to the CBME curriculum and suggestions for further improvement

Category	Strengths of CBME curriculum	Suggestions for improvement
Learning	• Small group activities—tutorial classes, CBL sessions, practical classes and SDL sessions • Hospital visits • AETCOM sessions • MCQ tests • Vertical and horizontal integration classes	• Need for more practical classes, CBL sessions and hospital visits • Need research-related sessions • Require activity-based learning
Teaching	• Dedicated, knowledgeable, hardworking, punctual and student-friendly teachers	• Special care for slow learners • Share PPT after the class • Give feedback to students
Academic self-perception	• Good support of teachers for academics • Repetition of concepts • Proper planning and revision sessions • Friendly teachers and are readily available for clearing doubts • Well organized timetable	• More study hall timing • E-learning facilities • More cadavers • Motivation classes • Classes on ethics • Computer with internet in hostel • More library time after college • Permission to take many books at a time • Library time for day scholars
Perception of atmosphere	• Good team of faculty with motivational behaviour and support and solve the issues in studies • Relaxed and comfortable class atmosphere • Good library	• Need more quiz and other competitions • Extracurricular activities
Social self-perception	• Good student support system • (Mentorship programme) • Helping friends • Ragging-free campus • Good and comfortable accommodation • Caring teachers	• Lenient rules for hostel • Gymnasium in ladies' hostel • Food quality must be improved • More outings • More extracurricular activities

CBME competency-based medical education   CBL case-based learning   PPT power point   SDL self-directed learning   AETCOM attitude, ethics and communication   MCQ multiple-choice questions

for the items—'the enjoyment outweigh the stress of the course in the domain of perception of atmosphere, I am rarely bored on this course and I seldom feel lonely in the domain of self-perception'. These scores go along with their suggestions of planning for more extracurricular activities as relaxation activities and de-stressors. They have also requested for counselling sessions to explore the psychological issues.

To the best of our knowledge, this is the first study in India that examines the effect of CBME on students' perception of the learning environment. However, a limitation of the study is that it was based on the comparison of two batches where there could be many unknown confounders affecting the results.

Conclusion

The introduction of the CBME curriculum improved students' perception on the domains of atmosphere and social self-perception. In fact, all domains of the learning environment showed improvement in DREEM scores. The improvement is attributed to the different modules of CBME which concentrate on student-centred activities. However, some items such as the attitude of teachers towards students, course-oriented stress more than enjoyment, feeling lonely and not getting awareness about research in the field need special attention and remedial measures must be planned in the near future. The survey has to be continued every year to perceive the effect of remedial measures.

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