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RESEARCH ARTICLE

Medical students' perception of the educational environment in a medical college in India: a cross-sectional study using the Dundee Ready Education Environment questionnaire

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Abstract

Purpose: The objective of this study was to assess student perceptions of the environment in this medical college using the Dundee Ready Educational Environment Measure (DREEM). **Methods:** Cross-sectional study; 348 medical student volunteers (68.1%) of all semesters participated (511 enrolled). DREEM has 50 items, each rated from 0-4 (Likert scale: 0, strongly disagree to 4, strongly agree), that measure five domains: students' perceptions of learning; perceptions of teachers; academic self-perception; perceptions of the atmosphere; and social self-perception. Mean item scores, domain scores, and global scores were computed. **Results:** The three highest rated items were knowledgeable teachers, having good friends, and confidence about passing; the three most problematic items were a poor support system for stressed students, inability to memorize everything, and over-emphasis on factual learning. The percentage score for perception of learning (47.26 ± 14.85) was significantly lower than that for teachers (52.28 ± 9.91; P < 0.001); academic self-perception (52.14 ± 15.21; P < 0.001); perception of the atmosphere (51.21 ± 13.60; P = 0.001); and social self-perception (50.63 ± 13.90; P = 0.010). The global scores were lowest for eighth-semester students (89.8 ± 21.24) when compared to second (101.33 ± 21.05; P = 0.003), fourth (107.69 ± 18.96; P < 0.001), and sixth (100.07 ± 20.61; P = 0.020). **Conclusion:** Improvement is required across all domains of the educational environment at this institution. Students, particularly of the eighth semester, perceived the teaching negatively. The lowest scores were given to the support system, burdensome course content, and factual learning; thus, a hybrid curriculum that includes problem-based learning might provide students with stimulating learning; structured clinical teaching with specific curricular objectives, as well as mentoring of senior students by faculty and near-peers, might improve the learning environment for senior students.

Key Words: *Dundee Ready Educational Environment Measure; Educational environment; Medical student; Perception; Questionnaire*

INTRODUCTION

Medical students experience a variety of learning activities in the environs of the medical college. The environment is usually complex and unique [1]; its most important determinant is the curriculum [2]. Studies conducted in other parts of the world have shown that the educational environment affects students' achievement, happiness, motivation, and success [1-4]. The world over, medical educators are attempting to reform the educational environment so as to make it student friendly without compromising the standards and the quality of learning. Successful management of the curriculum is only possible with systematic feedback and assessment [5].

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There are only limited studies from India in this regard [6,7].

The Dundee Ready Educational Environment Measure (DREEM) is a culturally non-specific, generic instrument; it was developed to analyze undergraduate educational environments in the health professions [8]. DREEM has been found to be highly reliable in a variety of settings; with its help, institutions can identify shortcomings and formulate changes in curriculum [1,9-11].

This study aimed to assess student perceptions of the educational environment at a single medical college, using DREEM; our hypothesis was that both strengths and weaknesses would be identified. The results, by providing a baseline, might offer a starting point for instituting measures towards curricular reform.

METHODS

This was a cross-sectional, questionnaire-based study; data was collected in the year 2011. The medical curriculum in this college is traditional and discipline-based; the intake was 100 students per year until 2009, when it was raised to 150 students annually. There are nine semesters over four and a half years. Preclinical subjects are taught in the first two semesters; students in semesters 3-5 study paraclinical subjects and have a limited exposure to medicine, surgery, gynecology, pediatrics, and community medicine; students in semesters 6-9 are exposed to all clinical subjects.

Sample size

Studies using DREEM have shown a variable student response rate (36.0% to 82.8%) [1-4,10,12,13]. Based on these figures, we planned to recruit all students from every semester (n = 511); thus, if we obtained a response rate of 50%, we would have at least 250 students.

Study instrument

DREEM is a questionnaire with 50 items that assess five domains [8]: students' perceptions of learning, 12 items, maximum score 48; students' perceptions of teachers, 11 items, maximum score 44; students' academic self-perception, 8 items, maximum score 32; students' perceptions of atmosphere, 12 items, maximum score 48; and students' social self-perception, 7 items, maximum score 28. Each item is rated on a 5-point Likert scale from 0-4 where 0 = strongly disagree, 1 = disagree, 2 = unsure, 3 = agree, and 4 = strongly agree. There are nine negative items (items 4, 8, 9, 17, 25, 35, 39, 48, and 50), for which correction is made by reversing the scores; thus after correction, higher scores indicate disagreement with that item. Items with a mean score of ≥ 3.5 are true positive points; those with a mean of ≤ 2 are problem areas; scores in between these two limits indicate aspects of the environment that could be enhanced. The maximal global score for the questionnaire is 200, and the global score is interpreted as follows: 0-50 = very poor; 51-100 = many problems; 101-150 = more positive than negative; 151-200 = excellent [14].

After Institutional Ethics Board approval, DREEM, along with a respondent information sheet, was handed to all students present in the class (each semester separately) during a routine lecture. The information sheet gave a brief introduction of the aim of the study and of DREEM. The questionnaire was anonymous; it was to be voluntarily self-administered. Since it was anonymous, a separate consent form was not collected. In the event that questionnaires were returned filled, consent was implicit; non-consent was presumed when questionnaires were returned blank. The data was handled and stored in accordance with the tenets of the Declaration of Helsinki (1964, amended in 2008).

Statistical analysis

The data was entered into a Microsoft Excel spreadsheet (Microsoft Co., Redmond, WA, USA); SPSS ver. 17.0 (SPSS Inc., Chicago, IL, USA) was used for analysis. The mean and standard deviation were calculated for all of the 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; for comparison of the domain scores across semesters, the scores were expressed as a percentage of the maximum score possible. Thus, after conversion, 100 represented the best possible score (complete agreement) and 0 the worst score (complete disagreement). One-way ANOVA followed by Tukey's test was used to compare global scores and mean domain scores among the semester cohorts.

RESULTS

DREEM was administered to the students of all of the semesters. Table 1 shows the response rate. For all of the students taken together (n = 348), the global DREEM score, out

Table 1. Semester-wise response rate to Dundee Ready Educational Environment Measure (DREEM) from students of University College of Medical Sciences, India (2011)

Semester	Total students in the batch	Students present in class	Students who responded with completed questionnaires (%)
Two	154	101	98 (63.6)
Four	157	120	117 (74.5)
Six	90	70	70 (77.8)
Eight	110	64	63 (57.3)
Total	511	355	348 (68.1)

Table 2. Average scores of 50 items and eight domains of Dundee Ready Educational Environment Measure (DREEM) from 348 students of University College of Medical Sciences, India (2011)

Domain items	Average score	Standard deviation
Students' perception of learning		
1 I am encouraged to participate in class	2.01	1.05
7 The teaching is often stimulating	1.94	1.04
13 The teaching is student-centered	1.78	1.05
16 The teaching is sufficiently concerned to develop my competence	2.03	1.11
20 The teaching is well focused	2.06	1.08
22 The teaching is sufficiently concerned to develop my confidence	1.88	1.12
24 The teaching time is put to good use	1.75	1.17
25 The teaching over-emphasizes factual learning*	1.54	1.08
38 I am clear about the learning objectives of the course	2.24	1.05
44 The teaching encourages me to be an active learner	1.81	1.14
47 Long-term learning is emphasized over short-term	2.07	1.18
48 The teaching is too teacher-centered*	1.58	1.09
Subtotal score	22.68	7.13
Students' perception of teachers		
2 The teachers are knowledgeable	2.83	0.71
6 The teachers are patient with patients	1.95	0.98
8 The teachers ridicule the students*	1.96	1.01
9 The teachers are authoritarian*	1.66	1.06
18 The teachers have good communications skills with patients.	2.46	0.97
19 The teachers are good at providing feedback to students	1.75	1.00
32 The teachers provide constructive criticism here	1.97	1.12
37 The teachers give clear examples	2.09	1.02
39 The teachers get angry in class*	1.92	1.19
40 The teachers are well prepared for their class	2.28	1.02
50 The students irritate the teachers*	2.13	1.23
Subtotal score	23.00	4.36
Students' academic self-perception		
5 Learning strategies which worked for me before continue to work for me now	1.95	1.08
10 I am confident about my passing this year	2.85	0.94
21 I feel I am being well prepared for my profession	1.85	1.11
Students' academic self-perception		
26 Last year's work has been a good preparation for this year's work	2.11	1.00
27 I am able to memorize all I need	1.54	1.57
31 I have learned a lot about empathy in my profession	2.26	1.06
41 My problem-solving skills are being well developed here	1.76	1.11
45 Much of what I have to learn seems relevant to a career in medicine	2.36	1.11
Subtotal score	16.68	4.87
Students' perception of atmosphere		
11 The atmosphere is relaxed during the ward teaching	2.05	1.15
12 This school is well time-tabled	1.80	1.37
17 Cheating is a problem in this school*	2.02	1.28
23 The atmosphere is relaxed during the lectures	2.20	1.16
30 There are opportunities for me to develop inter-personal skills	1.98	1.15
33 I feel comfortable in class socially	2.45	1.00
34 The atmosphere is relaxed during seminars/tutorials	2.12	1.20
35 I find the experience disappointing*	2.09	1.14
36 I am able to concentrate well	2.04	1.12
42 The enjoyment outweighs the stress of studying medicine	1.79	1.29
43 The atmosphere motivates me as a learner	1.83	1.16
49 I feel able to ask the questions I want	2.22	1.15
Subtotal score	24.58	6.53
Students' social self-perception		
3 There is a good support system for students who get stressed	1.12	1.06
4 I am too tired to enjoy this course*	1.93	1.22
14 I am rarely bored on this course	1.60	1.21
15 I have good friends in this school	2.78	1.10
19 My social life is good	2.33	1.18
28 I seldom feel lonely	2.11	1.21
46 My accommodation is pleasant	2.30	1.16
Subtotal score	14.18	3.89

*Negative item; low score indicates agreement.

of a maximum possible of 200, was 101.13 ± 21.14. The global scores were the lowest for eighth semester students (89.80 ± 21.24) when compared to those of the second (101.33 ± 21.05; P = 0.003), fourth (107.69 ± 18.96; P < 0.001), and sixth semesters (100.07 ± 20.61; P = 0.020). Table 2 shows the items with their average scores in different domains; 26 items scored between 2 and 3; 24 items scored less than 2. The three most highly rated items were 'The teachers are knowledgeable,' 'I have good friends in this school,' and 'I am confident about my passing this year'; three items that students had the greatest problem with were 'There is a good support system for students who get stressed,' 'I am able to memorize all I need,' and 'The teaching over-emphasizes factual learning.'

When individual domains were considered, for all of the students taken together, the average score percent for the students' perception of learning (47.26 ± 14.85) was significantly lower than for the students' perception of teachers (52.28 ± 9.91; P < 0.001); students' academic self perception (52.14 ± 15.21; P < 0.001); students' perception of the atmosphere (51.21 ± 13.60; P = 0.001); and students' social self-perception (50.63 ± 13.90; P = 0.010). Table 3 displays the average percentage score in each individual domain for each semester co-

Table 3. Average Dundee Ready Educational Environment Measure (DREEM) scores (in percent) for comparison among four different semesters of 348 students of University College of Medical Sciences, India (2011)

DREEM domain	Semester, average ± SD				Significant difference between semesters for each domain*
	Two	Four	Six	Eight	
I Students' perception of learning	48.68 ± 14.52	51.42 ± 13.54	44.23 ± 14.92	40.67 ± 14.96	2:8, P = 0.003; 4:6, P = 0.006; 4:8, P < 0.001
II Students' perception of teachers	52.16 ± 9.14	52.79 ± 9.28	55.16 ± 10.10	48.30 ± 10.86	4:8, P = 0.017; 6:8, P < 0.001
III Students' academic self-perception	50.41 ± 13.57	57.43 ± 15.64	51.29 ± 13.70	45.93 ± 15.55	2:4, P = 0.003; 4:6, P = 0.031; 4:8, P < 0.001
IV Students' perception of atmosphere	50.11 ± 14.18	55.59 ± 12.06	50.36 ± 13.29	45.73 ± 13.48	2:4, P = 0.014; 4:6, P = 0.044; 4:8, P < 0.001
V Students' social self perception	52.95 ± 14.51	52.53 ± 13.50	49.95 ± 12.48	44.22 ± 13.39	2:8, P < 0.001; 4:8, P = 0.001

*ANOVA followed by Tukey's test.

hort separately.

DISCUSSION

This study originated from a desire to learn how students perceive the educational environment in this institution. The University College of Medical Sciences is a typical urban medical college in North India, with students representing both privileged and under-represented, minority, backgrounds. DREEM was used, as it is reported to be culturally non-specific and reliable for the health professions [3,4,7]. With a global score of around 101/200, the students rated the overall environment in this institution as more positive than negative. Most other institutions that run teacher-centered, traditional, discipline-based curricula report similar global scores [2,6,7,12,15]; however, scores reported from student-centered, integrated, problem-based curricula are higher, suggesting that institutions with innovative curricula are rated higher by students [1,4,9,10]. An item that scores 3.5 or more is considered to represent a positive aspect of the curriculum [14]. None of our students scored any item above 3; nevertheless, we are heartened that many scores ranged between 2 and 3.

Students' perception of learning

The lowest scores were reported for this domain (Table 2); items that scored less than 2 points pertained to factual and teacher-centered learning; poor use of teaching time; lack of opportunities for confidence building or for active learning; and lack of stimulating teaching. Many institutions globally report similar concerns [1,3,4,6,7,15]; these difficulties are not insurmountable and should be addressed. Factual learning is probably driven by the pattern of formative and summative assessments that the students currently encounter; a problem-based evaluation might be the key to doing away with both factual and teacher-centered learning [1,3,10]. The Medical Education Unit of the institution could train faculty on appropriate teaching and assessment methods that might drive active learning. The literature suggests that such a change might provide students with stimulating opportunities for learning, thereby building confidence as well [1,3,13]. Eighth semester students perceived the greatest difficulty. For these students, much of the learning is at the bedside or in the outpatient department with only a few hours a day spent in lectures. Poor use of teaching time, particularly for clinical students, is unfortunate but by no means peculiar to this institution [4,16-18]. Bed-side teaching is an effective instrument to teach clinical skills, communication, ethics, empathy, and professionalism; however, in overburdened government hospitals such as ours, teachers are overwhelmed with patient care responsibilities. Added to that, overcrowded, noisy wards and outpatient departments also serve as obstructions to clinical teaching [18]. Researchers suggest that the learning experience of clinical batch students can be improved by structured and systematic clinical teaching [4,10]; teachers may be advised to plan clinical encounters keeping in mind a specific set of curricular objectives, rather than teaching opportunistically on whatever case comes along [16,17].

Students' perception of teachers

Items in this domain that scored less than 2 points pertained to authoritarian teachers, poor feedback skills, angry and impatient teachers, and ridicule and lack of constructive criticism. Of these factors, fourth semester students reported the greatest difficulty with authoritarianism and anger, suggesting that teachers in our institution, as elsewhere, are inclined towards traditional styles of teaching [4]. It is important to remind teachers that respect for the student is critical to the learning process [1,19,20]. Eighth semester students gave the lowest scores to the remaining aspects; clinical teachers need to be trained in providing constructive feedback so that students are encouraged to take responsibility for their own learning [1,10,21]. With the current emphasis on self-directed and life-long learning, teachers are no longer simply providers of information, but should facilitate the acquisition of attitudes and skills necessary for learning [1]. Ability to give timely and specific feedback is an important skill that sets stu-

dents on the right path to learning. Excessively harsh criticism, on the other hand, or absence of feedback of any kind, is considered to be discouraging and damaging to students' self-confidence [13].

Students' academic self-perception

Items in this domain that scored less than 2 points pertained to students being unable to memorize everything, poor development of problem solving skills, being poorly prepared for the profession, and having learning strategies that they had used earlier not working now. Academic self-perception is related to the ability to cope with the academic workload; most studies have reported low scores in this domain, suggesting that curriculum overload is a universal problem, regardless of whether the curriculum is traditional or innovative [1,6,7,10]. Clearly, the curriculum needs revision not only in methodological terms, but also by a judicious reconsideration of course content.

Of all of the semester cohorts, fourth semester students had the highest scores on academic self-perception; they have a longer span to the next professional examination, and may feel less overwhelmed with course load; also, they have limited exposure to clinical teaching, and thus, may not be plagued by the unstructured and chaotic teaching that seems to oppress our clinical batch students.

Students' perceptions of atmosphere

Items in this domain that scored less than 2 points pertained to poor timetabling, stress, lack of a motivating environment, and lack of opportunities to develop interpersonal skills. Fourth semester students perceived the least difficulty. This finding draws attention again to differences in the experience of preclinical and clinical batch students [4]. The clinical environment is rich with real-world exposure but tends to degenerate into a disorganized, stressful experience because patient overload ensures that teachers are kept busy; priority is given to patients first and students later [1]. A critical review of the current practice of clinical teaching at this institution is necessary, followed by implementation of contemporary recommendations for improving student learning in the clinics [4].

Students' social self-perception

Items in this domain that scored less than 2 points pertained to a poor support system for students who get stressed, boredom, and tiredness. Eighth semester students perceived the greatest difficulty. Poor support, especially for senior students, is a problem reported by others also [4,6,7,20]. This institution has a mentoring program for first-year students where near-peer students and faculty engage with them to reduce stress and provide support [22]. Perhaps mentoring, as a means of providing academic and social support, could be extended to senior students as well. Students reported that they were happy with their friends and had a good social life; the mentoring program could exploit this to generate more near-peer mentors for senior students. Curriculum planners could consider ways to make the curriculum less bulky and more innovative, engaging, and meaningful so as to avoid student boredom and tiredness [3]. This is likely to be a tall order requiring debate, since decreasing curriculum content may impact course outcomes unfavorably.

When the guide of McAleer and Roff [14] was used to interpret the total mean scores (Table 2), all of the students taken together viewed the teaching negatively (students' perception of learning), although the perception of teachers was that they were "moving in the right direction". There were "many negative aspects" in their academic self-perception; "many issues that needed changing" in the atmosphere; their social self-perception was that this was "not a nice place". These results are disturbing, and should prompt curriculum planners to target specific issues in an attempt to improve the educational environment at this institution.

A limitation of this study is that it used a questionnaire with predetermined choices; some factors that impact the environment in our institution may have been left out. Secondly, a survey may not capture all the information that a qualitative interview can; however, DREEM has been found to be useful and more efficient than qualitative interviews [19]. Informal feedback from participants revealed that some found the length of the questionnaire daunting; nevertheless, only seven respondents returned incomplete questionnaires (Table 1). The educational environment is a complex mix of multiple factors, specific to each institution, and the results of our study may not be applicable to other institutions in India, or worldwide. This is the first assessment of students' perception of the educational environment at this institution; thus, it can serve as a baseline to monitor the effects of curricular change over a period of time [5]. There is evidence available that links a favorable learning environment to improved student learning; however, further research is required to correlate perceptions of the environment with academic success.

In conclusion, students assessed the educational environment at this institution as more positive than negative; however, improvements are required across all five domains. The greatest difficulty was with 'students' perception of learning' (students perceived the teaching negatively); the most troubled were the eighth semester students. Specifically, students gave the lowest scores to the institutional support system, burdensome course content, and factual learning. A hybrid curriculum that includes some elements of problem-based learning and assessment might provide students with stimulating

opportunities for learning; structured and systematic clinical teaching keeping in mind a specific set of curricular objectives might improve the learning environment for clinical batch students; mentoring of senior students by faculty and near-peers may help provide support.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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Supplementary material: authors' explanation of their paper in an audio recording of the author speaking.

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