DUNDEE READY EDUCATIONAL ENVIRONMENT MEASURE: ANALYSIS IN A SAMPLE OF SAUDI MEDICAL STUDENTS

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Abstract
Objective: The educational environment should be evaluated regularly for quality improvement purposes of medical curricula. Objective of the study was to measure students' perceptions of educational environment.

Methods: The cross-sectional descriptive study reports data from 265 medical students of the College of Medicine, Saudi Arabia using Dundee Ready Education Environment Measure (DREEM).

Results: Grand score of DREEM was 124.4 out of 200. The total mean score for Perception of Learning was 30.40/48; for Perceptions of Teaching 26.35/44; for Academic Self Perceptions 21.32/32; for Perceptions of Atmosphere 29.99/48 and for Social Self Perceptions 16.34/28. Highest mean score was for the item 10 (I am confident about passing this year) which was 3.55. Item 3 (There is a good support system for students who get stressed) got the lowest mean score of 1.96 followed by item 27 (I am able to memorize all I need) which had mean score of 2.05.

Conclusion: Strong student support system to manage stress and memorizing the course content is required.

Keywords: DREEM; Educational Environment; Medical Students; Perception

Introduction
Engagement of learner is one of the crucial factors in effective learning.[1] According to learning theories, teaching is as much about setting the educational environment for learning as it is about imparting knowledge. [2,3]

Bloom described educational environment as the conditions, forces, and external stimuli that challenge the individual. These forces are physical, social, as well as intellectual".[4] The World Federation for Medical Education points educational environment as one of the targets for evaluation of medical education programmes.[2] Its importance has been further highlighted by the Standing Committee on Postgraduate Medical Education which states that a conducive environment is critically important for successful training.[2,4] In medical education, the educational environment

has to be integrated between theory and clinical practice in order to obtain balanced learning outcomes.[7] In the era of student-centered educational programs, it is important to assess the current medical curriculum and update it to the needs of students. [4,7] The educational environment encompasses a range of elements including teachers and teaching process, social, cultural, and psychological elements and the physical surroundings. A warm, supportive and challenging educational environment is generally considered an essential pre-requisite for optimal learning. The educational environment encompasses a range of elements including teachers and teaching process, social, cultural, and psychological elements and the physical surroundings. A warm, supportive and challenging educational environment is generally considered an essential pre-requisite for optimal learning. The educational environment encompasses a range of elements including teachers and teaching process, social, cultural, and psychological elements and the physical surroundings. A warm, supportive and challenging educational environment is generally considered an essential pre-requisite for optimal learning.

The educational environment includes a range of elements including the lecture room, the way students interact with their teachers and among themselves, the skills of the teachers in facilitating their learning, their attitude towards students, and the culture in which students learn.[6] These factors are essential in determining success or failure of the learning process. A warm, supportive and challenging educational environment is mandatory for optimal learning.[7]

The educational environment is considered as a positive learning environment when it increases students' motivation towards learning, promotes their knowledge, build skills, and stimulates their sense of social well-being.[7] Evaluation of the educational environment has been regarded as a key to the delivery of high-quality medical education.[5,6] The evaluation can be considered as a reflection of the quality of a curriculum and can be used to identify weak areas that require appropriate measures for improvement.[8,9]

The learning experience in a medical institute brings about a lifelong change in students' knowledge, attitudes, and practices.[9] In long term it affects their academic achievements as well.[10] Hence, it is important to identify, measure, quantify and compare the standards of educational institutes from students' point of view. [10-12]

Roff et al. designed an inventory named, DREEM (Dundee Ready Education Environment Measure).[6] It was originally developed at Dundee and released as AMEE Medical Education Guide No.23 by Genn and has been accepted as an international instrument for assessing the educational environment.[1,2]

DREEM is a questionnaire with 5 subscales having 50 items. Subscales are; students' perception of learning, perception of teaching, academic self-perception, perception of atmosphere and students' social self-perception.[15] Students' responses are scored for 50 items with a global score of 200.[13,14] While analyzing DREEM inventory, different mean scores are calculated; i.e., mean of total score of 50 items, mean score of its subscales and mean score of each of the item separately.[15,16]

Studies have shown that DREEM score ranges from 45.0% to 69.5% out of 200.[8,11] The score in the Middle East Medical Institutions is lower than this range, as compared to medical schools in other parts of the world such as Dundee, Malaysia, and Nepal. [2,8,17] This difference is most likely due to the fact that universities of Middle East are recently established with comparatively less experienced staff and less scholarly activities. [5,7,13]

Literature have revealed that in the medical institutions, majority of students face difficulty in memorizing the content and are stressed[9-12]. Stress affects their academic performance and their

grades[10,11]. Other issue identified is that the medical teachers, could be expert in clinical practice, but are not necessarily good in delivering academic sessions effectively[13,14]

The College of Medicine, University of Hail, Saudi Arabia follows a hybrid modular curriculum that adopts both traditional and problem-based learning (PBL) for teaching undergraduate students. The aim of the study was to assess quality of the educational environment by exploring areas of strength and weakness as perceived by the medical students using DREEM inventory. Results of the study were considered while drafting curriculum for the next academic year.

Objectives were to;
1. Determine the mean score of each item, subscale, and grand mean of DREEM
2. Identify strengths and weaknesses of the educational environment

Methods
The cross-sectional descriptive study was conducted at College of Medicine, University of Hail, Saudi Arabia during 2022 on medical students. Sample size was 260. Sampling technique was non-probability convenience sampling method. After getting ethical approval from Institutional Review Board of the University, DREEM questionnaire was fed on Google form. Link of Google form was sent to students. Aim and objectives of the study were written on the first page of Google form. Students' names and IDs were not asked. Those who consented filled the form. After achieving sample size of 265, data was transferred from Google Excel Sheet to SPSS.

In the inventory, there are nine negatively expressed items (4, 8, 9, 17, 25, 35, 39, 48 and 50) which are scored in reverse order (lower the score the more positive is rating). [5] Responses for the items are recoded on Likert Scale. Each item is scored from 0 to 4; with 4= strongly agree, 3= agree, 2= unsure, 1= Disagree and 0= strongly disagree.
1. Students' Perception of Learning—12 items/maximum score 48
2. Students' Perception of Teachers/Teaching—11 items/maximum score 44
3. Students' Academic Self Perceptions—8 items/maximum score 32
4. Students' Perception of Atmosphere —12 items/maximum score 48
5. Students' Social Self Perceptions —7 items/maximum score 28

GUIDE TO INTERPRET DREEM-ITEM SCORES:[5]
>3.5 strong areas
2-3 areas that could be improved
<2.0 Areas that need particular attention
The inventory was piloted with 5 students. Data was analyzed on SPSS (version 23). While data analysis, mean scores of each item and subscales were calculated, finally overall mean score of DREEM 50 items was calculated.

Results
Table-1 shows result of subscales Students' Perception of Learning and Students' Perception of Teaching. In the first subscale, the highest mean score of 2.71 is of item 1 (I am encouraged to participate) and item 13 (the teaching is student centered). According to the guidelines, these mean scores reflect strong areas. Item 44 (the teaching encourages me to be an active learner) got the least mean score of 2.4, it means that this area needs to be improved. Items 25 and 48 (the teaching over-emphasizes factual learning and the teaching is too teacher-centered) are negatively scored items. Mean score of item 48 is in positive direction as it is very small. Overall score of this subscale is 30.40 out of 48 while mean is 2.50, which means that this area could be improved. In the subscale Students' Perception of Teaching, the highest mean score is of item 6 (the teachers are patient with the patients) followed by item 18 (the teachers have good communication skills with patients). According to the guidelines, these scores reflect strong areas. Least mean score is of item 37(the

teachers give clear examples) which is 2. This subscale has 4 negatively scored items (the teachers ridicule the students, the teachers are authoritarian, the teachers get angry in class, and the students irritate the teachers). All of those items are in positive direction as their scores are very small except the score of item 9 (the teachers are authoritarian) which 2.01. Overall score of this subscale is 26.35 out of 44 while mean is 2.75, which means that this area could be improved.

Result of subscales Students' Academic Self-Perceptions, Perception of Atmosphere and Social Self Perceptions, is shown in table-2. Regarding Students' Academic Self Perception, item 10 (I am confident about passing this year) got the highest mean score of 3.55 followed by item 45 (much of what I have to learn seems relevant to a career in medicine) which is 2.91. Item 27 (I am able to memorize all I need) shows the least mean score of 2.05. Overall score of this subscale is 21.32 out of 32 while mean of this subscale came out 2.66, which means that this area could be improved. In subscale Students' Perception of Atmosphere, item 43 (the atmosphere motivates me as a learner) has mean score of 2.85, which is the highest mean score in this subscale. Items 17 (cheating is not a problem in this school) and 35 (I found the experience disappointing) are negatively scored items. The mean item scores of these items are 1.8 and 1.82, which means a more positive atmosphere. Mean score of this subscale came out 2.45, reflecting that this area needs improvement. In subscale Students' Social Self- Perceptions, item 15 (I have good friends in this school) scored the highest mean score of 2.59. This subscale has item 4 which was negatively scored (I am too tired to enjoy this course). Its score is 2 means it needs attention. Item 3 (There is a good support system for students who get stressed) got the least mean score of 1.96 among all 50 items. Overall score of this subscale is 16.34 out of 28 and its mean is 2.45, which means that this area needs attention.

The grand score of DREEM was 124.4 out of 200 and its grand mean was 2.56.

Table-1: Students' Perception of Learning & Teaching

Subscale	Items	Mean on Likert Scale
Students' Perception of Learning (Score=30.40/48 and Mean Score=2.50)	Encouraged to participate	2.71
	Teaching is often stimulating	2.55
	Teaching is student centered	2.71
	Teaching is sufficiently concerned to develop my competence	2.51
	Teaching is well focused	2.62
	Teaching is sufficiently concerned to develop my confidence	2.41
	Teaching time is put to good use	2.57
	Teaching over-emphasizes factual learning	2.00
	I am clear about the learning objectives of the course	2.54
	Teaching encourages me to be an active learner	2.40
	Long-term learning is emphasized over short term	2.60
	Teaching is too teacher-centered	1.34
Students' Perception of Teaching (Score=26.35/44 and Mean Score=2.75)	Teachers are knowledgeable	2.54
	Teachers are patient with the patients	3.53
	Teachers ridicule the students	1.45
	Teachers are authoritarian	1.90
	Teachers have good communication skills with patients	3.50
	Teachers are good at providing feedback to students	2.20
	Teachers provide constructive criticism here	2.37
	Teachers give clear examples	2.00
	Teachers get angry in class	1.41
	Teachers are well prepared for their classes	2.75
	Students irritate the teachers	1.42

Table-2: Students' Academic Self Perception, Perception of Atmosphere & Social Self Perceptions

Subscale	Items	Mean on Likert Scale
Students' Academic Self-Perceptions (Score=21.32/32 and Mean Score=2.66)	Learning strategies which worked for me before continuing to work for me now	2.54
	I am confident about passing this year	3.55
	I feel I am being well prepared for my profession	2.56
	Last year work has been a good preparation for this year's work	2.54
	I am able to memorize all I need	2.05
	I have learned a lot about empathy in my profession	2.71
	My problem-solving skills are being well developed here	2.51
	Much of what I have to learn seems relevant to a career in Medicine	2.91
Students' Perception of Atmosphere (Score=29.99/48 and Mean Score=2.45	Atmosphere is relaxed during the ward teaching	2.64
	This school is well timetabled	2.21
	Cheating is not a problem in this school	1.80
	Atmosphere is relaxed during lectures	2.80
	There are opportunities for me to develop interpersonal skills	2.70
	I feel comfortable in class socially	2.72
	Atmosphere is relaxed during seminars/tutorials/PBL	2.60
	I found the experience disappointing	1.82
	I am able to concentrate well	2.13
	Enjoyment outweighs the stress of studying medicine	2.16
	Atmosphere motivates me as a learner	2.85
	I feel able to ask the questions I want	2.80
Students' Social Self-Perceptions (Score=16.34/28 and Mean Score=2.45)	There is a good support system for students who get stressed	1.96
	I am too tired to enjoy this course	2.00
	I am rarely bored of this course	2.11
	I have good friends in this school	2.59
	My social life is good	2.38
	I seldom feel lonely	2.50
	My accommodation is pleasant	2.69

*Negatively scored items are shown in **bold.**

Discussion

The curriculum of the Medical College of University of Hail is integrated and student-centered. Students are trained to interact with the community by assigning community health-related tasks right from first year. Initially every task is discussed in class which is then followed by the field visit (experiential learning opportunity).[5,17,18] They are also assigned research tasks to work in small groups. Use of Problem Based Learning make them able to take part actively in group discussions to solve problems close to real life clinical cases.[14] Self-Directed Learning sessions are practiced in every module, which help the students to become self-responsible.[14,18] It's an approach which help them to become life-long learners.[19] Study done in Pakistan, has demonstrated that students' perceptions of learning environment correlate with their academic achievements.[5,19]

In present study, students' perception of learning, needs attention. Literature has reported an improvement in the mentioned subscale after adding active learning techniques in the curriculum; like, role-play, case studies, group projects, think-pair-share, peer teaching, debates, and short demonstrations followed by class discussions.[13,14]

Results of students' perception of teaching is in positive direction and has the highest mean score among all the 5 subscales of DREEM. However, item 37 (teachers give clear examples) received lowest score. Similar result was reported from a study where after conducting workshops for

teaching faculty on effective teaching strategies, and taking students' feedback after every teaching session, improved the score.[15] On the other hand, low scores on negatively expressed items, such as 'teachers ridicule the students, they are authoritative, get angry and irritate the students', signify that the attitude of teachers is positive. Feedback from teachers is essential to help students achieve the objectives of the course by utilizing their maximum potential and identifying their weak areas requiring improvement.[15] During pre-clinical years, the students receive feedback after every PBL, and assigned task. During clinical years, students receive feedback on the level of competence they achieve in clinical encounter. This is the area which need particular attention as evident from the mean score of 2.20 of item 29. Effective feedback helps students know regarding their performance and enables them to develop an action plan.[14,15] This emphasizes the need of training of faculty to bring improvement in providing effective feedback.

Analysis of items related to Students' Academic Self-Perceptions, (I am confident about passing this year), got the highest mean score among all the 50 items of DREEM. This is consistent with the findings of studies done elsewhere.[5,19] This reflects that medical students are being effectively supported and guided by academic advisors in the institutions though the same subscale also reveals that medical students felt difficulty in memorizing the course content.[20] However, in institution where self-directed and team-based learning are promoted and practiced effectively, students faced minimal difficulty in memorization.[15-17] A study conducted in Pakistan, found academic self-confidence as one of the mediating variables between positive verbal input and improved cognitive performance.[17] A conducive learning environment, comfortable class rooms, receptive clinical environment and motivated, competent and approachable teachers, increase learners' motivation which in turn leads to better learning ability, and improve performance.[18] Development of higher order skills and meta-cognition is a complex process, which is affected by all aspects of the learning environment. Literature has shown that positive self-concept is strongly correlated to positive outcomes.[5,19]

Regarding students' social self-perception, item 3 (there is a good support system for students who get stressed) got the least mean score. Relevant studies revealed least score of the mentioned item among overall 50 items.[7,18] Psychological stress is one of the most common problems faced by medical students in their day to day life.[20] It can directly or indirectly hamper the performance of a medical student. The top stressors for undergraduate students by a recent study were completion of tasks on time, clinical shifts, fear of failing a course, and examination results. Stress may affect students' wellbeing and their academic performance.[20,21] Practicing mindfulness, exercise, mental health awareness exercises, time management and seeking help from experts can be beneficial in coping with stress.[22,23] It is recommended that the college, during academic advising sessions, should offer consultation to the students how to manage and cope with the various stressful situations, by one to one counseling and workshops.[24,25]

DREEM score between 101–150, indicates a 'more positive than negative' perception of the educational environment[24]. Previous studies reported DREEM score less than 120.[10,22,23] In current study, overall mean score of DREEM is 124.4 out of a maximum 200 indicating that the learning environment of the college was more positive than negative.

The establishment of formal student support programs focusing on stress management within the university is strongly recommended to address issues that may hamper the learning.[22,25] Continuous evaluation of learning environment by DREEM inventory should be emphasized.[7,18] It is important to get regular feedback from students regarding their learning experiences.[15] Faculty development programs should be regularly conducted by Medical Educators.[5] The results of present study will create a database of reference for improvement of our curriculum in future.

Limitations: Self-reporting questionnaires were likely to be associated with response bias, as those students with less satisfaction have been keener to take part in order to voice their grievances.

Conclusions

Students' perceptions of their educational environment were reasonably-positive, indicating adequate satisfaction in most areas. Emphasis needs to be paid on the implementation of strong student support system to manage stress and memorizing the course content. Teachers training programs in giving effective feedback and delivering effective teaching sessions is required.

Limitation of Study

Firstly, the convenience sampling method which may have produced inflated results, as those who were regularly attending the classes at the time of the study may have felt more positively to fill the form. Secondly, those with less satisfaction may have been keener to take part in order to voice their grievances. It can be delimited by taking larger sample size.

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Ethical Approval

This research was approved by the Research Ethics Committee (REC) of University of Ha'il, Ministry of Education, Kingdom of Saudi Arabia on Feb.13.2023. Approval number was H-2023-107.

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Author Contribution

All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

Conflict of Interest

There is no conflict of interest to declare as FHK is the single author.

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