The Medical Education Environment at the University of Nairobi, Kenya: An Assessment with the DREEM Tool

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Abstract

Background: The supportive learning environment can enhance impartating of knowledge and skills. **Objective:** To assess the learning environment at the School of Medicine of the University of Nairobi using the Dundee Ready Educational Environment Measure (DREEM) tool. **Methods:** A cross-sectional survey carried in 2019 out among medical students during their clinical years to obtain their perceptions about the learning environment at the School of Medicine of the University of Nairobi. The DREEM tool was used for the survey. Data were entered and analyzed in SPSS version19. Comparisons were performed using analysis of variance (ANOVA). $p \leq 0.05$ was considered statistically significant. **Results:** We obtained 619 responses (77.4%) from 800 tools distributed. The total mean score of DREEM was 93.3/200. This is a 46.7% score overall indicating a poor perception of the learning environment. Year IV was the class with the poorest perception with a $p<0.05$. **Conclusion:** The DREEM score shows numerous problems, with perception of learning and social support being the areas requiring the most improvement. Although teachers are knowledgeable, students are wary of their ability to transfer knowledge and skills.

Introduction

The educational environment consists of, among other factors, a documented curriculum and a perception of teacher–student interaction both in and out of class (1). The anticipation and experiences of students concerning these factors can either motivate or demotivate them in their learning approaches and learning style, crucial to these being how the learner is engaged (2).

The learning environment as perceived by students determines their behavior and aspirations (3). The learning environment is one of the factors affecting quality that can be measured and actions taken to improve, correct, or change the environment in order to improve the quality of education (3,4). The Dundee Ready Education Environment Measure (DREEM) is a culturally non-specific tool that has been applied in many cultures and languages. It has been validated to be good for measuring the learning environment among medical students (5,6). It has also been used to determine the weaknesses or strengths of an institution's learning environments, make comparative analyses of students' perceptions within and between different cohorts, and can identify academic achievers (7).

To the best of our knowledge no study using the DREEM tool or any other tool to determine students' perceptions of the learning environment has previously been carried out in Kenya or at the University of Nairobi; thus, this study was undertaken.

Materials and methods

This was a cross-sectional survey of 3rd to 6th year medical students at the School of Medicine of the University of Nairobi. Ethical approval was obtained from Kenyatta National Hospital–University of Nairobi Ethics and Research Committee (P55/01/2019). We used the DREEM tool to gauge students' perceptions of the educational environment.

DREEM contains 50 statements on a range of topics directly relevant to the medical educational environment, scored on a 5-point Likert scale ranging from 0 to 4 (4: strongly agree–SA; 3: agree; 2: have no idea; 1: disagree; 0: strongly disagree–SD). The 50 items have a maximum score of 200. However, 9of the 50 (8, 12, 15, 16, 21, 23, 34, 39, 45) were given a reverse score, i.e., 0=SA and 4=SD, so that a higher score would indicate more positive responses. The inventory encompasses five subscales: (1) students' perceptions of learning (SPL)–12 items; (2) students' perceptions of teachers (SPT)–11 items; (3) students' academic self-perception (SASP)–8items; (4) students' perceptions of atmosphere (SPA)–12 items; and (5) students' social self- perceptions (SSSP)–7items.

Students who agreed to participate consented in writing. The tool was completed during class after an explanation from one of the research assistants and returned at the end of class. Data collection for DREEM consisted of paper-based demographics that included year of study and gender.

Data were analyzed using SPSS version 19 (IBM SPSS Statistics for Windows, Version 19.0. Armonk, NY: IBM Corp). Analysis was on the overall score out of 200, subscale score (SPL–48, SPT–44, SASP–32, SPA–48, SSSP–28) and individual score (0–4). Overall score of 0–50 is interpreted as extremely poor, 51–100 indicates plenty of problems, 101–150 is more positive than negative, and 151–200 as excellent.

Individual items with a mean score ≥ 3.5 are particularly strong areas, items with a mean score ≤ 2.0 need attention, and items with mean scores between 2 and 3 are areas of the educational environment that could be improved. Cronbach's alpha was calculated for internal validity of the DREEM tool within our context. The Kaiser–Meyer–Olkin test was performed for sampling adequacy. Comparison of mean used Student's t-test and analysis of variance (ANOVA). Statistical significance was taken as $p<0.05$.
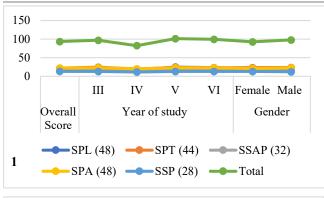
Results

We obtained a 77.4% response rate (619/800). The highest number of responses (32.1%) was obtained from 4th year students. The gender response rates were: female 50.2% and male 49.8% (Table 1).
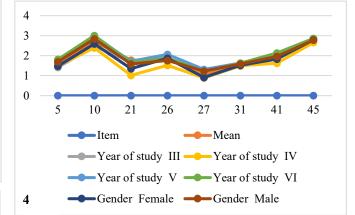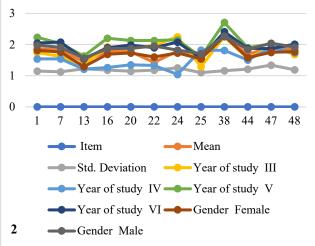
Table 1: Distribution by year of study and gender.

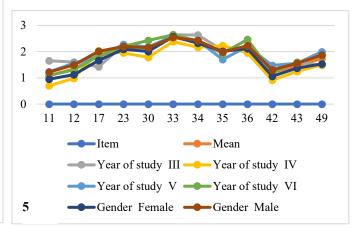| Item	Number	Frequency (%)
Year of study		
III	94	15.2
IV	199	32.1
V	147	23.7
VI	179	28.9
Gender		
Females	294	50.2
Males	292	49.8

Cronbach's α was 0.882 while the Kaiser–Meyer–Olkin test was 0.904 (p<0.001), indicating sample size was adequate and had a high internal validity. The mean score was 93.3/200 (46.7%), implying that generally there are numerous problems with how our students perceive their educational experience.

On the subscale scores, only year V seems to have overall and specific areas such as SPL, SPT, and SSAP that appear to be moving towards a positive experience. In addition, year III has positives for SPT and year VI has positives for SSAP (Figure 1). The
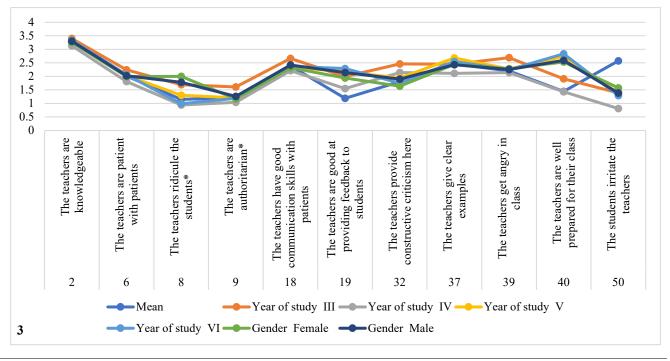
Figure 1. Subscale score for class and gender. SPL-students' perceptions of learning – 12 items; (2) SPT-students' perceptions of teachers – 11 items; (3) SASP-students' academic self-perceptions – 8 items; (4) SPA-students' perceptions of atmosphere – 12 items; and (5) SSSP-students' social self-perceptions – 7 items. **Figure 2:** Students perception of learning (SPL). (1) I am encouraged to participate in class, (7) the teaching is often stimulating, (13) the teaching is student-centered (16), the teaching is sufficiently concerned to develop my competence, (20) the teaching is well focused, (22) the teaching is sufficiently concerned to develop my confidence, (24) the teaching time is put to good use, (25) the teaching over-emphasizes factual learning, (38) I am clear about the learning objectives of the course, (44) the teaching encourages me to be an active learner, (47) long-term learning is emphasized over short term, (48) the teaching is too teacher-centered. **Figure 3:** Students perception of teachers.(2) the teachers are knowledgeable, (6) the teachers are patient with patients, (8) the teachers ridicule the students*, (9) the teachers are authoritarian*, (18) the teachers have good communication skills with patients, (19) the teachers are good at providing feedback to students, (32) the teachers provide constructive criticism here, (37) the teachers give clear examples, (39) the teachers get angry in class, (40) the teachers are well prepared for their class, (50) the students irritate the teachers. **Figure 4:** Students academic self-perception (SASP). (5) learning strategies which worked for me before continue to work for me now, (10) I am confident about my passing this year, (21) I feel I am being well prepared for my profession, (26) last year's work has been a good preparation for this year's w**ork, (27) I am able to memorize all I need, (31) I have learned a lot about empathy in my profession, (41) my problem-solving skills are being well developed here, (45) much of what I have to learn seems relevant to a career in medicine. Figure 5:** Students' perception of atmosphere. (11) the atmosphere is relaxed during the ward teaching, (12) the school is well time-tabled, (17) cheating is a problem in this school, (23) the atmosphere is relaxed during the lectures, (30) there are opportunities for me to **develop inter-personal skills, (33) I feel comfortable in class socially, (34) the atmosphere is relaxed during seminars /tutorials, (35) I find the experience disappointing, (36) I am able to concentrate well, (42) the enjoyment outweighs the stress of studying medicine, (43) the atmosphere motivates me as a learner, (49) I feel able to ask the questions I want.**

Table 2: Students' social self-perception

	Item	Mean	Std. Deviation	Year of study				Gender	
				III	IV	V	VI	Female	Male
3	There is a good support system for students who get stressed	0.70	0.85	0.71	0.45	0.75	0.9	0.65	0.73
4	I am too tired to enjoy this course	*2.16*	1.31	2.09	2.53	2.05	2.53	2.45	2.23
14	I am rarely bored on this course	1.52	1.22	1.26	1.42	1.76	1.5	1.63	1.38
15	I have good friends in this school	3.26	0.89	3.27	3.21	3.26	3.25	3.25	3.22
19	My social life is good	1.70	1.29	1.39	0.81	1.38	1.23	1.04	1.27
28	I seldom feel lonely	2.05	1.34	1.74	1.63	1.77	1.68	1.63	1.76
46	My accommodation is pleasant	1.80	1.46	2.29	1.32	2.02	1.88	2.04	1.54

student perception on the learning subscale is an area that requires attention as the only statement that scored above 2 was "I am clear about the learning objectives of the course" (Figure 2).

ANOVA revealed significant differences in the scores across the clinical years in all questions except 47 (p=0.772) and 48 (p=0.072), all other questions had *p* less than 0.05. The differences in gender were significant only for questions 13 (p=0.006), 22(p=0.022), 44 (p=0.009), and 47(p=0.012).

Students' perceptions of teachers

Across this subscale, only statement 2 had a mean above 3.0. Areas that require action include every item statement where the score was less than 2 (Figure 3). A one-way ANOVA showed mean for year IV was significantly different from other class years in all the areas (p as follows: questions 2=0.004, 6=0.014, 8=<0.001, 9 =<0.001, 18=0.012, 19=<0.001, 32=0.014, 37=0.040, 39=<0.001, 40=<0.001, and 50=0.001). The score by females was significantly different from that of

males on questions 19 and 32 with p of 0.007 and 0.014, respectively.

Students' academic self-perception

Most areas of academic self-perception need attention except two areas: statements 10 and 45 (Figure 4). A one-way between-subjects ANOVA compared the effect of classes on their academic self-perception for years III, IV, V and VI. The higher the student's year the more likely they were to agree with item 5, p=0.027, while they were more likely to disagree with items 10, 21, 26, 27, and 41 with p=<0.001 for all items. Female students disagreed with items 5, 10, 21, and 27 with p=0.038, 0.005, <0.001 and <0.001, respectively.

Students' perceptions of atmosphere

Items 23,30, 33, 34 and 36 scored between 2-3 and therefore could be improved (and the rest need attention because they scored below 2 (Figure 5). Using ANOVA there was significant difference in means for year class with year IV disagreeing with statements 11, 12, 23, 30, 34, 35, 42, 43, and 49 and agreeing with statement 17, p values of <0.001, <0.001, 0.041, <0.001, 0.008, 0.003, 0.001, 0.011, <0.001, and 0.002 respectively. The females also agreed with statement 17(p=0.001), and disagreed with statements 11, 12, 42, and 49 with p=0.005, <0.001, 0.020, and 0.001, respectively.

Students' social self-perception

The worst area is that of support for students, with a mean of less than 1 (Table 2). Using ANOVA, females agreed with item 4, p=0.006, and disagreed significantly with items 14, p=0.011, and 46, p<0.001. All classes disagreed, although more of year IV disagreed significantly with statements 3 ,14 ,29, and 46, than agreed with statement 4 with p=<0.001, 0.008, <0.001, <0.001, and 0.009 respectively.

Discussion

The DREEM instrument was developed and validated for use in any culture and country (6). It has been used to measure the educational environment, identify problem areas in an education program, get a baseline before instigating curriculum reform, determine student reaction to curriculum reform, and as a tool for monitoring improvement (8,9). In this study, it was used for assessing students' perceptions of the learning environment and possible problem areas in the education program.

The overall score was 93.3/200, which implies perception of a very poor learning environment with plenty of problems. Similar findings have been reported by various studies (10–13),mostly in the Asian and Arab worlds. Factors associated with low scores in these studies were the use of a traditional curriculum instead of a modern curriculum that includes problem-based learning or system-based learning (11,14). The more senior classes were more likely to give lower scores (10,13,15) in environments where teachers are perceived to be authoritarian (10). Most surveys usually get an average of between 101 and150, meaning more positive than negative responses, as was described in a systematic review of DREEM studies by Chan et al. (16). Only a few studies have scored higher than 150 according to Chan et al.'s systematic review, and those that scored high had small to moderate size classes (17) and those that had placement in general practice or community hospitals (18).

The medical school is an institution whose principal inhabitants are its students; its *raison d'être*is their education, training, and welfare (19). It is for this reason that student's perception of their learning environment is an important factor. A deeper look at this complex environment, both in the subscale and individual items, reveals the depth of the problems.

The SPL domain had only one statement (I am clear about the learning objectives of the course) scoring above 2. The only year that scored most items above 2 was year V. The reason could be that students are divided into smaller groups that deal with a particular discipline before moving to the next. They may therefore perceive this arrangement as a more friendly micro-environment created in this space. The most affected are the 4th years who seem to be finding the clinical years difficult and the teachers hostile to them. This result is similar to the study by Hasan and Gupta in Iran and Roff et al. in comparing Nigeria and Nepal where most scores were low in earlier years, then increased, and then declined again (10,20). Emphasis is

on factual learning, superfluous teacher-centered learning where lecturers just read through the slides, as well as an overemphasis on exam scores. This is similar to studies done in Iran (21) and Sri Lanka (22) and in contrast to the study by Abraham et al. in India (23). Another study has shown that students in traditional medical curricula often perceived learning as being too teacher centered, dogmatic, and with an over-emphasis on "rote memorization" (24).

The SPT domain had 21.73/44 (49.3%) which is above all other domains in this study, with just over half of the items being above 2 and one above 3. The students acknowledge that their teachers are knowledgeable but may lack the critical skills in how to deliver the subjects. They also criticize teachers as being unavailable, irritable, authoritarian, and having difficulty in interacting with patients and giving feedback to students. Teachers being irritable, sarcastic, and authoritarian has long been noted by Abraham et al. in India (23) and Lokuhetty et al. in Sri-Lanka (22) as well as Hasan and Gupta in Iran (10). This has been postulated to be due to pressure of work and increased work load which might be eased by even distribution of work (10).

In the SPA domain, most items, 7 out of 12, were below 2, indicating serious problems. They include lack of following the schedule, tension in classes and in wards due to the interaction of the teachers with the students expressing social discomfort, an inability to clarify doubts in class due to being chastised by teachers, cheating by other students, and a lack of interpersonal cohesiveness. These factors further diminish confidence among students in the environment and coupled with heterogeneity (male–female, Kenyan–non-Kenyan, age) of the student population, bring about inadequate bonding patterns. The diminishing of student confidence is further reduced by hectic student schedules and authoritarian or uninvolved teaching styles. Hasan and Gupta as well as Hassan et al. found similar issues in Iran and Sudan respectively (10,24). These issues should be explored in remedial measures because they lead to failure due to factors other than the academic ability of the students.

In the SASP domain, 6th year students seem more confident than the rest of the students. Increased confidence among seniors has been noticed in the studies in Asia (21,22).

One of the poorly scored domains was SSP, mainly because of the lack of social support during stressful periods, as has been shown in the SPA domain. This could arise due to a lack of teacher interaction and involvement in student life. The involvement may be due to the teacher's workload, among other things. So strong was this perceived lack of support and the teacher's role in increasing stress that some felt the School of Medicine participates in destroying and not building the life and career of students. The stress in medical school may be attributed to exam anxiety, lack of leisure time, and inadequate resources as shown by studies from Australia (25) and Europe (26).

Limitations of this study include: it is a single-center study, timing of the study in that it was given 4 weeks before exams, and the increased stress associated with exams could have led to more complaints and participant bias.

Conclusion

This study shows that medical students in the University of Nairobi are critical of the general climate of the school and of the quality of teaching, especially in areas regarding class participation and provision of clear learning objectives. The students also perceive their courses as being tutor centered, having an unbalanced curriculum, having difficulty with time-tabling of teaching, having knowledgeable teachers who do not provide feedback in an appropriate manner, and the school being overly concerned with the marks obtained and not the clinical skills learned. These findings should encourage reflection by medical schools in Kenya to relook at the learning environment of medical education so as to improve it.

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