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Perception of students on the learning environment during early stages of curriculum reform at the College of Medicine, University of Ibadan

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Abstract
Background: Nigeria has been at the forefront of efforts to establish a competency-based curriculum, beginning at its oldest medical school, the College of Medicine, University of Ibadan (COMUI). This study obtained baseline information from students at all training levels on perceptions of the curriculum and the educational environment, in the early stages of implementation of a new medical school curriculum.
Methods: A cohort of 268 preclinical and clinical students undergoing the traditional curriculum filled out the Dundee Ready Educational Environment Survey (DREEM), an instrument that measures the quality of the educational environment. At the end of the survey, an open-ended question helped elicit commentary to provide COMUI specific information to those in charge of planning and implementing the new curriculum.
Results: Areas of concern focused on students' perception of teachers and the learning atmosphere. Comments from pre-clinical students centered on the mode and content of teaching, a need for improved practical and tutorial sessions, the timing of the curriculum and methods of assessment. For clinical students, areas of concern included a need for increased hands-on clinical experiences, improvement in clinical teaching, a more constructive clinician/student relationship, increased opportunities for research and professional development and greater consistency in assessment.
Conclusion: The DREEM-focused component of the study aids understanding of its feasibility and use in different cultural settings and in guiding curriculum reform. This evaluation points to teaching skills and the teacher-student relationship as two key areas of improvement that need to be addressed in future efforts at curriculum reform.

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Keywords*: CBME, Curriculum development, Learning environment, Medical Education in Africa, Student feedback*

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Introduction

Internationally, there have been major calls for reform in medical education due to gaps between aspects of the current organization and delivery of the curricula and local health needs. As such, there is greater awareness of the need to focus on competency-based education where schools are socially accountable for the health needs of the local and global community [1]. The creation of competency-based curricula involves not only enhancing the content of the curriculum but also incorporating evidence-based learning, teaching, and assessment practices with input from its end-users, the medical students. While the education of physicians is not the whole solution, it is vitally important for health system performance, given that physicians serve crucial roles as clinicians, educators, policymakers and leaders in the healthcare system.

In sub-Saharan Africa, many medical schools have traditional curricula derived from different European models – depending on colonial history – whose authors did not have the needs of specific African countries as their focus. Some of these curricula have only undergone minor changes since their introduction and therefore, medical education in this region of the world is in need of reform. From 2000 to 2010, the College of Medicine, University of Ibadan (COMUI), the premier university in Nigeria, initiated a major revision of its undergraduate medical and dental curriculum with the main goals of updating medical education to current global standards as well as meeting local health needs and projected manpower requirements. The revised curriculum introduces a horizontal, competency-driven, systems-based integration of courses, reduces the number of lectures and emphasizes small group, problem-based instruction [2,3]. It also introduces key new topics including health policy, medicine as a profession, health systems, and entrepreneurial skills. Full implementation of the new revised curriculum began in 2011 on a phased basis, where students registered in the old (traditional) and new curricula proceeded at different stages through their respective programs.

Curriculum evaluation has been defined as the "continuous systematic process of gathering information about all elements of a curriculum, analysis and interpretation to help arrive at an understanding of the extent to which goals, objectives and outcomes have been achieved and subsequently take informed decisions for further improvement" [4]. Evaluation is crucial to the process of curriculum implementation as it helps ensure that goals and objectives are met, improvements are made based on feedback and satisfaction rates, and best practices are disseminated to medical educators, policy makers, funders and other stakeholders in medical education [5].

Student feedback is an important component for development and evaluation of medical curriculum as students observe and experience the teaching environment firsthand. Prior studies have shown that students' perception of the educational environment positively correlates with academic success and satisfaction with educational curriculum [6]. Consequently, during the period of curricula transition at COMUI, it was important to identify areas for improvement and examine differences in student perception between the traditional and new curriculum.

The goal of this study was to assess medical students' perception of the learning environment at COMUI, prior to and during the early stages of implementation of a (revised) competency based curriculum. These perceptions will identify priority areas for improvement and establish a baseline for comparison once the new curriculum has been fully implemented.

Methods

The study was conducted under ethical approval of the University of Ibadan College of Medicine Ethics Review Board, Registration Number: NHREC/05/01/2008a. Student participation was voluntary and indivudal consent was obtained from the students before filling the forms.

Design and Survey Instrument:

This was a prospective cross-sectional study; a structured survey instrument called the Dundee Ready Education Environment Measure (DREEM) was used with a handwritten comment section after the survey. The DREEM inventory was developed with input from international medical educators and has been validated and used to evaluate student perceptions of curriculum change in five continents [7]. It is culturally neutral and aims to provide diagnostic analyses of undergraduate educational environments in medical schools. To gain more information specific to COMUI that may not be

readily evident based solely on survey data, at the end of the survey, students were invited to comment on three key things they would change about their learning environment if given the opportunity.

The DREEM survey is made up of a total of 50 items that can be answered on a 5 point Likert scale and is scored from 0 to 4, where 4 = strongly agree, 3 = agree, 2 = unsure, 1 = disagree, and 0 = strongly disagree divided into the following 5 domains [8]:

1. Students' perceptions of learning (SPL) = 12 items; maximum score is 48
2. Students' perceptions of teachers (SPT) = 11 items; maximum score is 44
3. Students' academic self-perceptions (SAP) = 8 items; maximum score is 32
4. Students' perceptions of atmosphere (SPA) = 12 items; maximum score is 48
5. Students' social perceptions (SSP) = 7 items; maximum score is 28

The total score for all domains is 200. In the questionnaire, there are nine questions asked in the negative, so these questions were scored in reverse.

were conducted with 22 clinical students (mix of students in their last 2 years of training – i.e. 500L and 600L students) as well as an equivalent number of preclinical students (first year medical students – i.e. 200L students) (Figure 1). A cover letter indicated the purpose of the study as well as the fact that it was optional and completely anonymous. During the pilot sessions, students filled out not only the DREEM survey but also an additional survey created based on the objectives of the new curriculum. Feedback from the pilot sessions showed that while the DREEM survey was clear and feasible, the additional survey was time-consuming and would have decreased overall participation. As a result, the decision was made to drop this second questionnaire and focus on recruiting students to complete the DREEM survey.

Sixty three medical students undergoing the new curriculum (200L) as well as 205 students who were still enrolled in the old curriculum were surveyed with the DREEM (Table 1).

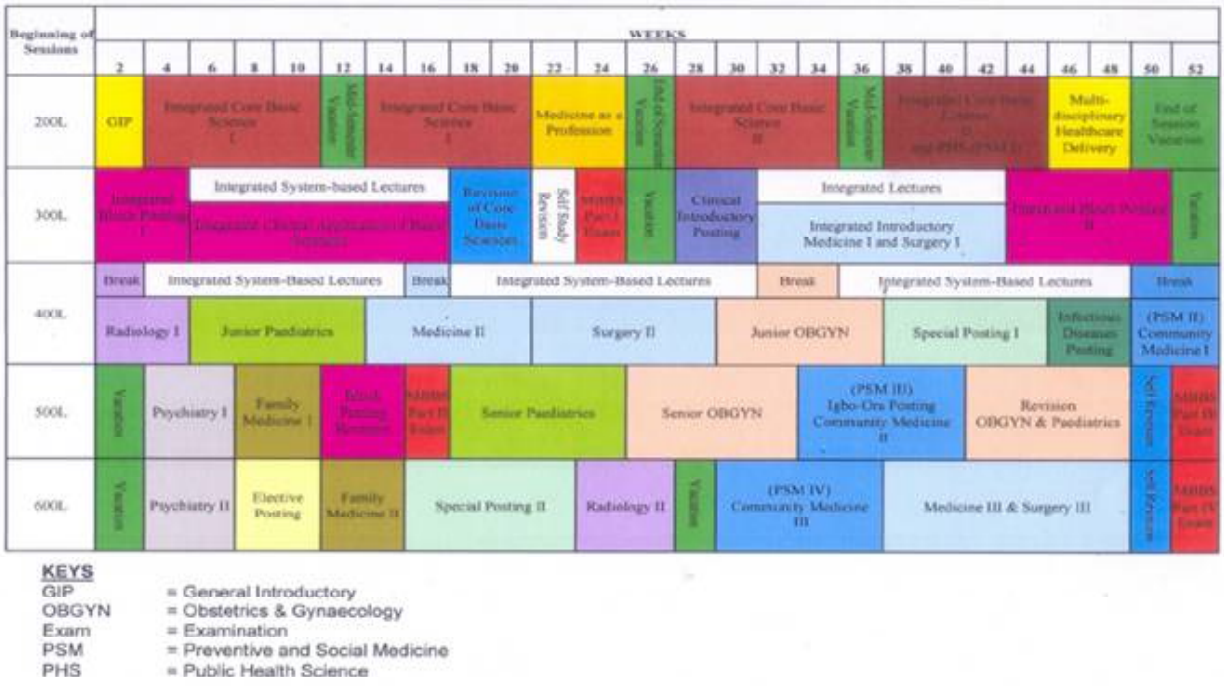


Fig.1: 2010 CMUI MBBS Curriculum Schematic. The 200L and 300L (1st semester) are preclinical students, who need to pass the MBBS Part I exam before advancing to the clinical years. The 300L (2nd semester), 400L, 500L and 600L students are clinical students.

Recruitment

To ensure that the DREEM survey was understandable and to anticipate any questions/ confusion that could potentially arise when larger groups of students took the survey, pilot sessions

Data Analysis

Data was entered into MS-Excel and analysed using SPSS package. Analysis of the survey data involved descriptive statistics including mean and standard deviation on subscales of the DREEM survey by academic year (Table 2).

Table 1: Demographic Information for DREEM Survey

Academic Level	200L (preclinical)[A]	300L (preclinical)	400L (clinical)	500L (clinical)	600L (clinical)	Total
# of Participants	65	59	55	53	36	268

A: Students in the new curriculum. All other students were in the old curriculum.

Table 2: Summary of results for DREEM - Mean (SD)

Subscale	200 Level	300 Level	400 Level	500 Level	600 Level	Overall for Subscale
Perceptions of Learning (Max: 48)	29.8 (7.0)[a]	32.1 (6.5)[b,d]	29.9 (7.4)[c]	26.4 (5.2)[a,b,c]	27.5 (6.5)[d]	29.3 (6.8)
Perceptions of Teachers (Max: 44)	25.8 (6.4)[a,d]	27.1 (5.0)[b,e]	25.5 (5.2)[c,f]	22.3 (5.2)[a,b,c]	21.0 (6.1)[d,e,f]	24.7 (6.0)
Academic Self-Perception (Max: 32)	19.5 (4.9)	21.3 (3.8)[a]	21.3 (3.8)[b]	18.6 (3.4)[a,b]	19.2 (4.2)	20.0 (4.2)
Perceptions of Atmosphere (Max: 48)	28.3 (5.6)[a]	28.5 (6.1)[b]	27.6 (5.6)[c]	24.2 (5.1)[a,b,c]	25.3 (6.6)	27.0 (6.0)
Social self-perceptions (Max: 28)	15.1 (4.1)[a]	16.3 (3.9)	15.8 (3.9)	14.3 (3.3)	14.5 (3.5)[a]	15.3 (3.8)
Overall	118.5 (23.1)	124.9 (19.9)	119.4 (21.2)	105.2 (17.3)	106.8 (23.4)	115.8 (22.2)

Note: Superscripts indicate significant differences between groups, Tukey's HSD, $p<0.05$. Significantly different from: [a] 300 level, [b] 400 level, [c] 500 level, [d] 600 level, [e] 200 level, [f] mean

Results

The mean DREEM score was 115.8/200. Further breakdown of scores by sub-scale and by academic level are presented in Table 2. The primary analysis is a comparison of the differences of DREEM scores across training levels, compared to the differences within training levels, using the one-way analysis of variance – ANOVA (Table 3).

Table 3: Analysis of Variance (ANOVA) of DREEM total and subscale scores

DREEM SubScale	F*	Significance
Perceptions of Learning	6.2	p=.000
Perceptions of Teachers	10.2	p=.000
Academic Self-Perception	5.0	p=.001
Perceptions of Atmosphere	5.8	p=.000
Social self-perceptions	2.7	p=.03
Total DREEM	8.4	p=.000

*This is the variable that defines the populations to be compared. Here, academic year is the factor.

After establishing that there are statistically significant differences across all training levels on each of the DREEM factor scores, as well as on the DREEM total score at $\alpha = 0.05$ with the ANOVA, a conservative follow up post-hoc test, Tukey's significant differences test, was run to see if differences from some groups were especially responsible for contributing to the finding of overall differences across groups (superscripts, Table 2). Tukey's analysis (Table 2) shows that the group that most contributes to the overall differences are the 500 level students. In addition, apart from one sub-scale (students' perception of teachers), the 500 level group had the lowest mean scores for every subscale and for the total DREEM score.

Apart from statistical analyses, another way to analyse the data from the DREEM survey is to group the mean scores from individual statements as below [9]:

1. Mean scores $\geq$ 3.5: Very positive points
2. Mean scores between 2.1 and 3.4: aspects of learning environment that should be enhanced
3. Mean scores $\leq$ 2: Problem areas

Table 4 below shows mean scores of individual questions that fell below the ≤ 2 mark, thereby denoting problem areas for those in the 200 level group (new curriculum) compared to students in other academic levels (old curriculum).

Finally, comparisons of the total DREEM score from this study were also made with international published data from schools evaluating their learning environments during periods of curriculum reform (Figure 2).

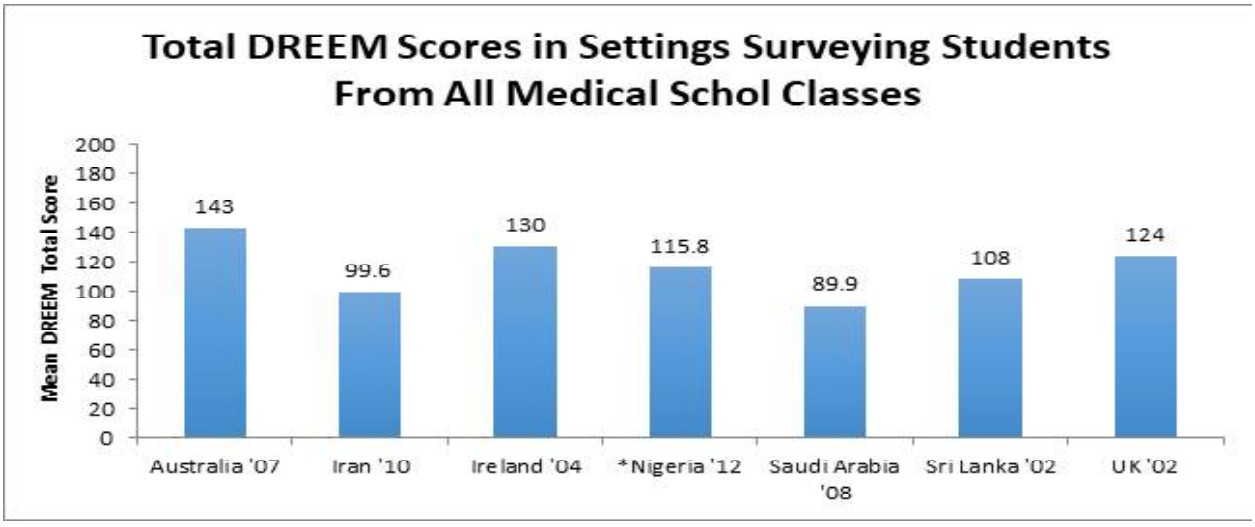
Table 4: Statements on DREEM survey (of 50 question) eliciting mean scores ≤2

200 Level (New Curriculum)	Mean Score
I am rarely bored with the curriculum	1.8
Learning strategies which worked for me before continue to work for me now	1.8
I am able to memorise all I need	1.8
The teaching over emphasizes factual learning*	1.6
The enjoyment outweighs the stress of studying medicine in this program	1.4
There is a good support system for students who get stressed	1.3
300 to 600 Level (Old Curriculum)	Mean
The teaching is too teacher centred*	2.0
The teachers get angry in class*	2.0
The atmosphere is relaxed during ward teaching	1.9
I am able to memorise all I need	1.8
The teachers are good at providing feedback to students	1.8
The teaching over emphasizes factual learning*	1.8
I am rarely bored with the curriculum	1.7
The teachers ridicule the students*	1.7
The teachers are authoritarian*	1.6
The enjoyment outweighs the stress of studying medicine in this program	1.2
There is a good support system for students who get stressed	1.1

* These statements were written in the negative and so unlike the other statements in the survey, they were scored 0 for strongly agree, 1 for agree, 2 for unsure, 3 for disagree and 4 for strongly disagree (see methods section for scoring of all other survey statements)

Discussion

The successful design and implementation of a major curriculum review in a tertiary insitution is a major undertaking that is often accompanied by significant challenges [3]. Such major instructional change p



* Represents this study.

Fig. 2: Comparison of DREEM Total Scores from the Literature on Students in Similar Settings

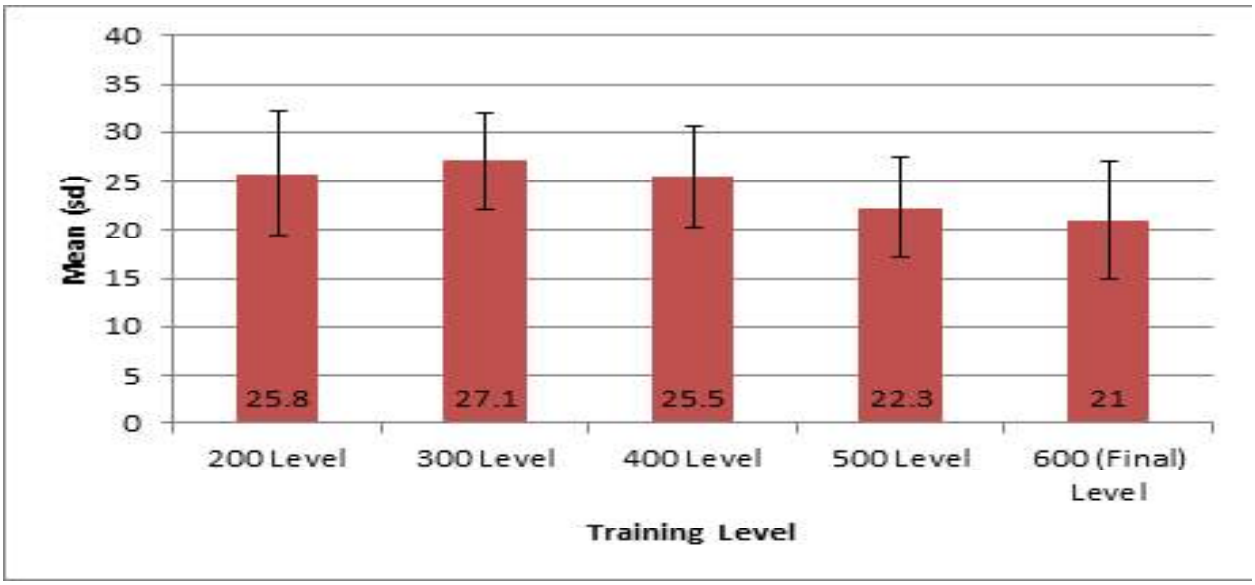


Fig. 3: Medical Students' Ratings on a Sample DREEM Sub-scale: Perception of Teachers (SPT)

Table 5: DREEM Survey questions related to the 2 categories most often identified by students as problem areas

Students' perception of learning/teaching	Students' perceptions of teachers
I am encouraged to participate in class	The teachers are knowledgeable
The teaching is student centred	The teachers are patient with students
The teaching is often stimulating	The teachers ridicule the students
The teaching encourages me to be an active learner	The teachers are authoritarian
The teaching is sufficiently concerned to develop my confidence	The teachers have good communication skills with patients
The teaching is too teacher centred	The teachers are good at providing feedback to students
The teaching time is put to good use	The teachers provide constructive criticism here
Long term learning is emphasised over short term learning	The teachers give clear examples
The teaching helps to develop my competence	The teachers get angry in class
The teaching is well focused	The teachers are well prepared for their classes
The teaching helps to develop my confidence	The students irritate the teachers
The teaching over-emphasises factual learning	
I am very clear about the learning objectives of the course	

presents an opportunity to better understand how the purpose and meaning of the changes is presented to and understood by the learners. This change in the method of instruction at the College of Medicine, University of Ibadan represents a transition from the older curriculum, to a socially responsive, competency-driven, community-oriented curriculum which also offers a chance at entrepreneurial skills acquisition [3]. This study examines students' perceptions on the attempt of a premier West African medical school to meet the global challenge of transforming the education of health professionals and thereby, improve the capacity building efforts of the Nigerian health system. The relevance of the findings of this project is in assessing the strengths and possible limitations of the new curriculum.

Traditionally, students are viewed as silent beneficiaries of institution of learning and so their opinions of the educational environment are often not solicited. Part of the concern from educators is that students may be more interested in easy grades and lessening their workload. However, the clear consensus of student opinion's across the academic levels as shown in the DREEM survey and in students' comments is that they are thoughtful participants who are largely interested in improving the quality of the education they receive. The finding of statistically significant differences across training levels reveals that differences exist in students' experience of the learning environment. Students' ratings of the training environment identified

potential areas for improvement in each of the DREEM subscales but especially with regard to students' perception of teachers and their perception of learning (Table 5).

The overall DREEM score (115.8±22.2) as reported in this study was beyond the range of 50 to 100 which McAleer and Roff [10] stated would indicate worrying issues and limitations to the curriculum. This suggests that overall, the students had a "more positive than negative" perception of their learning environment [11,12]. Furthermore this overall score is within range of that reported in an earlier study in Nigeria (118/200) [13], while other scores close to our finding were reported in earlier studies carried out in Sri Lanka (108/200) [14], and Trinidad (109/200) [15]. The implications of this is that certain areas of the new curriculum were perceived by the students as positive, while some other areas were still in need of attention. However, other studies have reported higher overall DREEM scores than we report in this study [16,17].

Overall across all classes, the students' perceptions of learning reflected "a more positive approach" (29.3/48) for their learning; and their perceptions of their teachers was that they were "moving in the right direction" (24.7/44). Academic self-perception of the students would be characterized as "feeling more on the positive side" (20.0/32); while their perception of their learning atmosphere was of "a more positive environment" (27.0/48); with a "not too bad" (15.3/28) view of their social self-perception. The findings are encouraging for the new curriculum as the average overall scores in each subscale reflected positive perceptions of the curriculum by the students. However, these findings should be a source of motivation for improvement and elevation of students' perceptions and acceptance of this curriculum to the highest possible extent.

No significant differences were observed in DREEM scores that exist solely between the 200 level students (new curriculum) and the other students (Table 2). The significant differences between the 200 level students and other students are largely in relation to the 500 level students and in the case of the subscale – students' perception of teachers – with the 600 level group as well (Figure 3). However, in both cases, the cause of the difference appears to lie primarily with either the 500 level or 600 level group and is not related to a fundamental difference in the 200 level group. This lack of a notable difference may be because this study was conducted during the first year of implementation of the new curriculum when the implementation process was still in its early stages.

Of note, the DREEM sub-scale eliciting the largest number of significant differences across training level group is students' perception of teachers. In contrast, there were the fewest number of significant differences between groups on the social self-perception scale. With regard to students' perception of teachers, the 500 and 600 level groups, representing the final two years of medical school, both individually differed significantly from the 200 to 400 level students. Given that the 200 and 300 level students are pre-clinical students, it may be that this difference is related to an aspect of the clinical years but as shown in Table 2 and graphically in Figure 3, the 400 level students who are in their first year of clinical training under the old curriculum, rate their teachers just as favourably as the preclinical students.

Detailed examination of individual item results would indicate that many aspects require attention and improvement, as made obvious in the mean scores of less than 2. This would signify aspects of the learning environment that students identified as problem areas. Most statements in the DREEM survey had mean scores between 2 and 3 and no statements had mean scores above 3.5. As a result, at first glance, it may appear as though students at this institution view their learning environment negatively but as evident in Figures 2 and 3, the overall DREEM score from this institution is well within the ball park for similar institutions around the world during times of curriculum reform.

Many of the statements in Table 5, identified as problem areas, are with regards to the teacher-student relationship e.g. "the teachers ridicule the students", "the teachers get angry in class" and the learning environment e.g. "the teachers over emphasize factual learning" and "there is a good support system for students who get stressed". This theme is also very prominent amongst other issues raised in the comment section at the end of the DREEM survey. These concerns elicited from student comments at the end of each survey (Table 6), while specific to this institution, are no doubt similar to those of other medical students around the world [18]. Here, the resounding themes from clinical students were with regard to a desire for more hands-on clinical experiences, improved teaching especially providing constructive criticism, improving clinician/student relationship with clinicians serving in a wider capacity as mentors – not just as testers/examiners, improving

opportunities for research/professional development and increasing incentives for excellence. Other studies have also raised these issues, especially that of factual learning [19]. However, it has been indicated that this perpetual response from participants might indicate that students are utilising surface learning strategies at the expense of deeper learning strategies as detected in an earlier study at this institution [20]. This however, does not prevent the architects and implementers of the new curriculum from seeking to improve on the grey areas.

For pre-clinical students, the priorities were a little different albeit with some similarities. The main differences were with regard to improving the practical/tutorial (laboratory) aspect of their education, streamlining the oral exam format and providing clear learning objectives – all concerns more applicable to the pre-clinical section of the medical school. These issues raised are actually part of the provisions of the revised competency-based curriculum, with more time and importance attached to skills acquisition [21]. It is apparent that the students see this provision and are trying to get the most out of it. Similar themes were with regard to improved teaching and creating a more cordial teacher-student relationship.

In research focused institutions, teaching and training of faculty with regard to improving their teaching and communication skills can sometimes be placed on the back burner. However as this study shows, this aspect of medical education is of vital importance to students and any ongoing curriculum reform efforts should include this as a key aspect of reform efforts. In addition, it is clear that while the curriculum reform was well intended, some changes with regard to time constraints and the volume of material taught to students in the early years needs to further addressed with faculty members.

Conclusion

The DREEM-focused component of the study adds to existing understanding of the feasibility and utility of the DREEM instrument in different cultural settings and its usefulness in guiding curriculum reform. This evaluation enables members of the administration charged with curriculum implementation to identify areas of the implementation process where theory has not equaled practice and so, still needs fine-tuning. Teaching skills and the teacher-student relationship are two key areas of improvement that so far, have been elicited in not only the DREEM survey but also in student comments. Future efforts at curriculum reform will need to focus very heavily on these two issues.

Limitations to the study

We were only able to get a limited number of students to comment freely in the questionaires. It is possible we would have had a more robust discussion if more of them were able to comment freely.

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