British Journal of Medicine & Medical Research

21(5): 1-9, 2017; Article no.BJMMR.33545
ISSN: 2231-0614, NLM ID: 101570965

Analysis of Undergraduate Students' Perception of the Educational Environment of a Medical School in Zambia Provided a Framework for Strategic Planning

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors designed the study and wrote the protocol. Author CCE supervised the data collection, performed the statistical analysis and wrote the first draft of the manuscript. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/BJMMR/2017/33545
Editor(s):
(1) Ravi Kumar Chittoria, Department of Plastic Surgery & Advanced Centre For Microvascular, Maxillofacial & Craniofacial, Laser Surgery, Jawaharlal Institute of Postgraduate Medical Education and Research, Pondicherry, India.
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(3) Carla Maria Ferreira Guerreiro da Silva Mendes, School of Health Portuguese Red Cross, Portugal.
Complete Peer review History: http://www.sciencedomain.org/review-history/19008

Original Research Article

Received 19th April 2017
Accepted 8th May 2017
Published 11th May 2017

ABSTRACT

Aim: To propose a strategy for improvement of undergraduate students' learning environment based on analysis of their perceptions.
Methods: Medical, Pharmacy, and Physiotherapy undergraduate students participated in the study. The study used a quantitative descriptive design, based on the Dundee Ready Educational Environment Measure (DREEM) inventory. The University of South Africa and University of Zambia Ethics Committees provided ethical approval. Using stratified random sampling, participants were drawn from the Ridgeway Campus of the University. They responded to a demographic section and the 50 DREEM items. Data analysis included descriptive statistics on demographics, total and subscales DEEM scores, and mean scores on individual items. Cronbach's alpha and confirmatory

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factor analysis provided reliability and validity indices of the dataset. Specific issues derived from individual items' scores were used to propose a strategy.
Results: Total participants were 488 including 239 from Medicine, 135 from Pharmacy, and 74 from Physiotherapy. Response rate was 95.5%. Mean total score was 119.3/200. Scores within subscales of perception of learning, perception of teachers, academic self-perception, perception of atmosphere, and social self-perception were 29.87/48, 26.29/44, 20.96/32, 27.26/48, and 14.86/14, respectively. Four strategic issues emerged from six items with mean scores below 2.0/4.0: lack of adequate social support for stressed students, substandard teaching and mentoring, unpleasant accommodation, and inadequate facilities. Strategic objectives were raised and strategic options recommended from literature.
Conclusion: Strategic planning in medical and health professions education should consider learners' concerns by analysing their learning environments.

Keywords: DREEM; learning environment; strategic planning; students' satisfaction; health sciences education.

1. INTRODUCTION

The management of higher education has become complex due to increasing competition and internationalization of educational programmes. This phenomenon is compounded by the greater stakeholders' expectation from institutions with respect to competencies of graduates and contributions to social development. Within medical education, this expectation is exemplified by the recent call for "social accountability" of medical schools [1]. Medical education administrators need to deal with issues of resource scarcity, technological advancement, and the increasing expectations from the public [2]. Strategic planning therefore requires relevant information in order to prioritize scarce resources.

The scanning of the operating environment during strategic planning often overlooks students' views and expectations. However, that students' perception of the learning environment determines their approach to learning and the outcomes of learning is now well known. Analysis of this perception is widely adopted in medical and health sciences education, as well as in other fields of education to compare effectiveness of contrasting educational strategies, different teaching sites in the same institution, diagnose institutional problems, for curriculum reform, among a host of other published applications [3]. The Dundee Ready Educational Environment Measure (DREEM) is a popular tool for measuring learning environment quality in medical education [3]. According to Stukalina [4], students' satisfaction is as an important factor in the strategic management of higher educational institutions. This paper therefore, explored the usefulness of undergraduate students' learning environments measurement in strategic planning in a medical school. The aims of the study were to determine students' perception of their learning environment (the educational climate) and to use the issues to propose strategies for improvement of the learning environment. It had no interest in comparing DREEM scores between programmes or levels of study.

2. METHODS

To achieve the above aims, the study used a quantitative descriptive design applying the DREEM questionnaire. Undergraduate students of the Bachelor of Medicine and Surgery (years 3-7), Bachelor of Pharmacy (years 3-5), and Bachelor of Physiotherapy (years 2-5) participated in the study. Ethical approval for the study was granted by the Research Ethics Committee of the Department of Health Studies, University of South Africa (certificate number REC-012714-039), and subsequently, authority to proceed with the study was granted by the University of Zambia Biomedical Research Ethics Committee (UNZABREC, reference number IRB-00001131 of IORG-0000774). The Dean of the School of Medicine, University of Zambia gave written permission to carry out the study. Official permission to use the DREEM inventory was obtained from one of the tool's authors (S. McAleer). Aware of the effects of power differentials on data quality, none of the authors was involved in the teaching of these students prior to or at the time of the study, and they were not directly involved in data collection. Research assistants were used for all data collection.

Sample sizes for each programme were calculated using margin of error of 5%, confidence level of 95%, students' total enrolment in the programme, and response

distribution of 50%. For Medicine, total enrolment was 632, giving a sample size of 240, for Pharmacy, total enrolment of 220 gave sample size of 141, and for Physiotherapy, total enrolment of 105 gave sample size of 83. The total sample size for the three programmes was 464. The study used stratified random sampling (stratified according to programmes and year of study), and randomisation was achieved with the aid of an online randomiser (available at https://www.randomizer.org/). Each potential participant received an information sheet detailing the purpose of the study and the involvement of participants.

The DREEM was development by a team led by faculty at the University of Dundee through a Delphi process involving many stakeholders in medical education in 1997. It comprises 50 items including nine with negative statements. Each consenting student completed a demographic section of the questionnaire and then responded to the items in the DREEM inventory based on a 5 point Likert-like scale from strongly agree to strongly disagree. These were rated from 0 for 'strongly disagree' to 4 for 'strongly agree' (for items with positive statements). Items with negative statements were rated the other way round, 4 for 'strongly disagree' to 0 for 'strongly agree.' The maximum achievable total score is 200 representing 'an ideal educational environment,' according to the rating guide. The cores were interpreted as follows: 0-50 'Very Poor,' 51-100 'Plenty of Problems,' 101-150 'More Positive than Negative,' and 151-200 'Excellent.'

The factor structure of the DREEM also includes five subscales of 'perception of learning' (SPL) with 12 items, 'perception of teachers' (SPT) with 11 items, 'academic self-perception' (ASP) 8 items, 'perception of atmosphere' (SPA) 12 items, and 'social self-perception' (SSP) 7 items. Based on the DREEM developers' recommendation, the following guide was used for interpreting the subscale scores:

> ***Perception of Learning (SPL):*** 0-12 'Very Poor,' 13-24 'Teaching is viewed negatively,' 25-36 'A more positive perception,' and 37-48 'Teaching highly thought of.'
>
> ***Perception of Teachers (SPT):*** 0-11 'Abysmal,' 12-22 'In need of some retraining,' 23-33 'Moving in the right direction,' 34-44 'Model teachers/lecturers.'
>
> ***Academic Self-Perceptions (ASP):*** 0-8 'Feelings of total failure,' 9-16 'Many negative aspects,' 17-24 'Feeling more on the positive side,' 25-32 'Confident.'
>
> ***Perception of Atmosphere (SPA):*** 0-12 'A terrible environment,' 13-24 'There are many issues which need changing,' 25-36 'A more positive attitude,' 37-48 'A good feeling overall.'
>
> ***Social Self-Perceptions (SSP):*** 0-7 'Miserable,' 8-14 'Not a nice place,' 15-21 'Not too bad,' 22-28 'Very good socially.'

To ensure anonymity, participants' names or other identifying information were not collected, and access to the returned questionnaires was restricted to the principal investigator. Copies of the returned questionnaires were sorted into programmes and classes, and the responses rated as described above. All questionnaires were handled confidentially, in line with UNZABREC's guidelines. Data from the DREEM items and demographic section of the questionnaire were analysed with SPSS version 21 (IBM SPSS Statistics for Windows, Version 21.0 Armonk, NY: IBM Corp). Mean global DREEM scores and scores within subscales were determined. Mean scores for each of the 50 DREEM items were also determined and used to provide information on the specific issues in the learning environment. The study also performed a confirmatory factor analysis for data validity and Cronbach's alpha values for reliability.

3. RESULTS

3.1 Demographic Characteristics

Four hundred and seventy-one (471) questionnaires were distributed to participants from the selected programmes and 450 were returned corresponding to a response rate of 95.54%. Two (2) questionnaires were discarded, leaving 448 suitable for analysis. Of these, 239 (53.3%) were Medicine/Surgery students, 135 (30.2%) Pharmacy students, and 74 (16.5%) were Physiotherapy students. Table 1 describes the population and sampling frame.

The male participants were 264 (58.9%) while 184 (41.1%) were females. The mean age of the participants was 25.5 (SD = 4.2). By residential status, 266 (59.4%) resided on-campus in hostels, 91 (20.3%) resided off-campus in privately rented accommodations, while the remaining 91 (20.3%) resided at home with relations. Most students, 406 (90.6%), were

single, 41 (9.2%) were married, and one (0.2%) was widowed.

3.2 DREEM Scores

The mean global DREEM score for the 448 participants was 119.30 (59.65%; SD = 21.24), indicating a "more positive than negative" perception. Table 2 presents the total and subscale DREEM scores with the Cronbach's alpha for the study participants. All the subscales were rated positively with the subscale of academic self-perception (ASP) most positively rated (65.5%), while the subscale of social self-perception (SSP) was the least positively rated (53%).

Individual item analysis showed that no item had a mean score greater than 3.5. The highest scoring item was number 10: "I am confident about passing this year," with a mean score of 3.33. Forty (40) items had mean scores between 2.0 and 3.0. Six (6) items had scores less than 2.0, indicating areas requiring improvement. These items were number 3 – "There is a good support system for students who get stressed," number 9 – "The teachers are authoritarian," number 25 – "The teaching over emphasizes factual learning," number 27 – "I am able to memorize all I need," number 42 – "The enjoyment outweighs the stress of studying," and 46 – "My accommodation is pleasant." Table 3 presents the six DREEM items with mean score below 2.0.

Cronbach's alpha for the total DREEM scores was 0.899, while values for the subscales varied between 0.406 and 0.769. Confirmatory factor analysis showed that the 5-factor structure initially proposed for the DREEM instrument accounted for 35% of the variance with maximum factor loadings between 0.213 and

Table 1. Description of the study population, sampling frame and samples used in the study

SN	Study population	Sampling frame	Number of participants	%
1	Students enrolled in Bachelor of Medicine/Bachelor of Surgery	Students in Year 3 to year 7	239	53
2	Students enrolled in Bachelor of Pharmacy	Students in year 3 to year 5	135	30
3	Students enrolled in Bachelor of Bachelor of Science in Physiotherapy	Students in year 2 to year 5	74	17
Total	All undergraduate students enrolled in three participating programmes in the School of Medicine	Students in year 2 to year 7 of Medicine/Surgery, years 3-5 of Pharmacy, and years 2-5 of Physiotherapy programmes	448	100

Table 2. Total and subscale DREEM scores and Cronbach's alpha values for the 448 participants

	Mean (%)	SD	Rating category based on the guide	Cronbach's alpha values
Global score (max 200)	119.30 (59.65)	21.24	More positive than negative	0.899
SPL (max 48)	29.87 (62.08)	5.77	A more positive perception	0.714
SPT (max 44)	26.29 (59.75)	5.44	Moving in the right direction	0.720
ASP (max 32)	20.96 (65.50)	4.21	Feeling more on the positive side	0.528
SPA (max 48)	27.26 (56.79)	6.91	A more positive attitude	0.769
SSP (max 28)	14.86 (53.07)	3.59	Not too bad	0.403

Table 3. Items with mean score below 2.0/4.0 (areas of concern)

Item #	Item statement	Mean score	Std. dev.	Subscale
3	There is a good support system for learners who get stressed	1.1585	.93377	Social self-perception
9	The teachers are authoritarian	1.7188	1.04546	Perception of teachers
25	The teaching over emphasizes factual learning	1.6250	.96354	Perception of learning
27	I am able to memorise all I need	1.6853	1.08953	Academic self-Perception
42	The enjoyment outweighs the stress of the course	1.8147	1.18116	Perception of atmosphere
46	My accommodation is pleasant	1.5826	1.38782	Social self-perception

0.695. However, 15 factors had Eigen values greater 1.0. Pearson correlation showed positive linear correlation between individual item's scores from the three programmes, with correlation coefficients of 0.869 between Physiotherapy and Medicine ($p < 0.05$), 0.890 between Physiotherapy and Pharmacy ($p<0.05$), and 0.897 between Medicine and Pharmacy ($p<0.05$).

3.3 Developing a Strategy for Improvement

The six items with scores below 2.0/4.0 were thematised into four strategic issues including inadequate social support system for the students, unsatisfactory teaching and mentoring methods, unpleasant accommodation, and inadequate physical facilities. Based on these, strategic objectives were raised for each issue. Through literature review, strategic options were identified for each objective, and targets were suggested for each (see Table 4).

4. DISCUSSION

A global DREEM score of 119.3 recorded in this study compares favourably with reports from similar studies Mohsena et al. [5]. Demiroren et al. [6] recorded a global score of 117.63 among undergraduate medical students in Turkey, and Buhari and others [7] reported a global score of 108.4 from Nigeria. Subscale scores from this study were also comparable to values reported by the studies reported above. Despite this congruency with a number of studies, the global score of 119.3 (59.65%) probably indicates that the students were barely satisfied with their learning environments, and some specific aspects needed to be improved.

Strategic planning begins with environmental scanning to determine the strengths and weaknesses of an organization's internal environment, and to define the opportunities and threats posed by the external environment [8]. Quality assurance, which is a topical issue in health professions education, is built on good strategic management [9]. Since the primary goal of healthcare educational institutions is to educate the most talented and most competent professionals that are able to secure the healthcare needs of their communities [8], understanding and addressing learners' needs through learning environment survey should be a vital component of strategic planning. This study has explored the learners' needs, and utilised the issues determined therefrom to propose a strategic plan for development. The study recognized six issues including lack of a good support system for students who get stressed, authoritarian attitude of the teachers, overemphasis on factual learning, inability to memorize, inability to cope with the stress of studying, and unpleasant accommodation. These issues are similar to reports from other studies, including reports by Odole et al. [10], Palmgren [11], and Riquelme et al. [12].

Following are discussions on the strategic issues.

4.1 Inadequate Social Support for Stressed Students

Education in the healthcare professions is associated with much stress, and dysfunctional stress could lead to significant morbidity [13]. Students' coping strategies largely determine stress outcome, and in the light of this, training the students in engagement coping strategies might be a useful supportive approach for stress management. Other strategies recommended by this article include engagement of more counsellors in the students' centre, and training student-counsellors to enhance peer counselling and mentoring.

Table 4. Proposed strategies for improving the learning environment

Strategic issue	Objective	Strategic options	Strategic targets	Performance indicators
Inadequate social support system: Social support system for stressed students is perceived as inadequate	1.1 To upgrade counselling services available to students in the School of Medicine	1. Engage more counsellors in the students' centre 2. Train student-counsellors and enhance peer counselling and mentoring	Recruit one (1) qualified counsellor for each programme by the end of 2017. Each class to have at least 2 trained peer mentors and counsellors by end of 2023	1. Number of students receiving counselling; 2. Number of student-counsellor actively supporting their peers;
	1.2 To train students in stress coping strategies	3. Introduce stress management training for students 4. Provide recreation and relaxation centres at convenient sites in the School	Each student to have training in stress coping strategies before entering the clinical years	Number of students adopting positive coping strategies
	1.3 To train or retrain faculty on mentoring and student support skills	5. Introduce faculty development programme on mentoring and counselling skills	All teaching staff to have at least 1 relevant CPD training each year	Number of staff with good student support skills
Substandard teaching and mentoring: Lecturers' attitudes are perceived as authoritarian, and teaching as overemphasizing factual learning; concerns about lack of feedback and student engagement	1. To develop participatory classroom environments	1. Faculty development in effective teaching methods that promotes self-directed learning 2. Faculty exchange programmes with partner international universities;	Each programme to fully transit to student-centred teaching by 2021	Level of student participation in class activities and decisions
	2. To provide student-centred self-directed learning programmes	1. Faculty development in curriculum development and implementation	Curricula reviewed every 2 years with a focus on student-centeredness	Number of programmes fully implementing learner-centred teaching

Strategic issue	Objective	Strategic options	Strategic targets	Performance indicators
Unpleasant accommodation: Off-campus and on-campus accommodation rated as unpleasant	1. Determine the causes of dissatisfaction with residential accommodation	Undertake a survey to determine causes of dissatisfaction with residential accommodation	Establish causes of dissatisfaction by 2019	Survey report
	2. Expand residential facilities available to students	1. Build more hostels	Double the number residential spaces by 2022	Number of new hostel facilities available to students
		2. Engage venture capitalists and entrepreneurs to construct and run hostel facilities		
		3. Rent private buildings and use them as hostels for students		
Inadequate physical facilities: Classrooms, laboratories, and library facilities reported as inadequate	1. To provide more teaching and learning facilities	1. Engage with stakeholders for funding to accomplish the project	Build a state of the art teaching and learning centre in the School by 2025	A state of the science teaching and learning centre in the Ridgeway Campus

4.2 Teacher Authoritarianism

Authoritarian posture of the lecturers is also a pervading issue in medical education. Constructivism posits that teaching and learning centres around the learner [14]. The widespread observation of authoritarianism in medical and health sciences education causes concern over the effectiveness of the many innovations whose aims include making education learner-centred and self-directed. Perhaps attention should shift to the teachers [15]. The article recommends faculty development through training and exchange programmes.

4.3 Overemphasis on Factual Learning

Anne Ditcher [16] and Caroline Kreber [17] noted that students' perception of heavy workload and inappropriate assessment methods correlate strongly with surface approaches to learning. Problem-based learning has been implemented in many medical schools as a means of reducing factual overemphasis and promote learning in context [18], but Berkson [19] argues that PBL may be subject to monotony and factual overload like other instructional methods. Prevailing reports of 'overemphasis on factual learning' from many studies on learning environments challenge the effectiveness of currently adopted measures.

4.4 Unpleasant Accommodation

Not many studies have reported unpleasant residential accommodation as an issue in medical schools. It is not clear what students perceived as unpleasant in their accommodation in this study, so this article recommends a study to understand what makes their accommodation 'unpleasant'. Amole [20] examined students' satisfaction in four Nigerian universities and concluded that the correlates of satisfaction are many and include social densities in the hostels, the kitchenette, bathroom, storage facilities, and configuration of the halls.

5. CONCLUSION

This study identified the issues within the learning environment of undergraduate medical and health sciences students using the DREEM

questionnaire. It used the issues as the basis for proposing a strategy for improvement. Four strategic issues were identified, and evidence-based strategic options and targets were proposed.

The limitations of the study include its quantitative design. A mixed methods study incorporating a significant qualitative component could provide more in-depth exploration of the issues. Although the study focused on one medical school, the article recognises that strategic planning is an individual institution's affair. Notwithstanding, a nation-wide study could enhanced the generalizability of the findings.

CONSENT

Both authors declare that written informed consent was obtained from the participants for publication of this paper.

ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
http://sciencedomain.org/review-history/19008