



Evaluation of the educational environments of undergraduate medicine and pharmacy programmes at the University of Zambia

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Abstract

Background: Situational factors influence learners' approaches to learning and determine learning outcomes. The study determined issues in the learning environments of medical and pharmacy students at the University of Zambia with a view to providing information for improvement.

Methods: A quantitative observational design based on the Dundee Ready Educational Environment Measurement (DREEM) inventory was used to survey undergraduate students' perceptions of their learning environments. A total of 270 students – 135 in years 3 to 7 of medical school and 135 in years 3 to 5 of pharmacy school – at the University of Zambia participated. Total, subscale, and single item DREEM scores were analysed and compared.

Results: Mean total DREEM score for all participants was 119/200 (± 20.4). Scores for the subscales varied from 15/28 (± 3.6) for social self-perception to 21/32 (± 3.9) for academic self-perception. The total and subscale scores were not significantly different between Medicine and Pharmacy at $P > 0.05$. Six areas of concern were observed in both programmes: lack of a social support system for stressed students, dictatorial staff, overemphasis on factual learning, tense teaching atmosphere, curriculum issues, and unpleasant accommodations. Medical students were particularly about tense classrooms and lack of feedback; pharmacy students were more likely to be concerned about curriculum issues.

Conclusion: The study showed that although the educational climates of healthcare programmes in medical schools may be comparable, specific programme concerns can be significantly different. Strategic planning to improve schools should consider both general perceptions and specific issues in individual programmes.

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Introduction

Medical and pharmacy education have become very complex in the 21st century, with challenges confronting both the structure and delivery of effective education. The expansion in the knowledge base across all health professions, combined with rapid and continuing advances in teaching and assessment methods and the evolution and application of new technologies in education, exert unprecedented pressure on teaching and learning in health professions education. To complicate these further, the societal and regulatory institutions have higher expectations of medical and pharmacy graduates than

previously.¹ In order to be able to produce medical doctors and pharmacists with competencies that are required to address the expanding roles of these professions, educational institutions need to provide effective learning environments for the proper academic and professional development of learners.

According to Ezeala,² a learning environment includes all situational factors that affect learning, such as the quality of instructions given to learners, curriculum structure, resources available for teaching and learning, organizational culture, and the style of institutional leadership. Studies have shown that the quality of the

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learning environment influences student motivation and learning outcomes, and this can have an effect on the professional competence of graduates.³⁻⁵

Many studies have been conducted on the measurement of learning environments in medical and pharmacy educational programmes.⁶⁻⁸ The enthusiasm seen in this area of scholarship may be related to the challenges mentioned above, the need for quality assurance in educational programmes, and the importance attached to learners' satisfaction in evidence-based strategic planning in medical schools.⁹ Measurements of learning environments have been utilized in different ways including comparing different training sites, different curricular models, and to guide strategic planning.¹⁰

At the time of this study, the University of Zambia has an undergraduate medical and pharmacy education program in the School of Medicine. The study therefore examined undergraduate students' perceptions of the learning environments in the 2 programmes with the aim of understanding factors that enable or hinder teaching and learning and identifying any differences in the 2 learning contexts. Using a quantitative descriptive design and the Dundee Ready Educational Environment Measure (DREEM tool), this study compared the general perceptions and the specific issues in both programmes. This information is needed for planning and continuous quality improvement.

Materials and Methods

Study design and description of the DREEM inventory

The study adopted a quantitative cross-sectional design using the DREEM questionnaire. The epistemological stance was therefore primarily positivism. The DREEM tool was developed by Roff et al in 1997 through a Delphi process.¹¹ Participants in this study responded to the DREEM items based on a 5-point Likert scale ranging from strongly agree (4) to strongly disagree (0). The 50 items instrument includes 5 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) seven items. Nine items in the DREEM were negative statements. McAleer and Roff¹² recommended a guide for the rating and interpretation of the DREEM scores. According to this guide, items with positive statements were rated as follows: strongly disagree 0, disagree 1, uncertain 2, agree 3 and strongly agree 4. For the nine items with negative statements, strongly disagree rated as 4, disagree 3, uncertain 2, agree 1, and strongly agree 0. Accordingly, the maximum mark for the global DREEM scores was 200 for the 50 items and represented "an ideal educational environment." For other scores, 0-50 would interpret as "Very Poor," 51-100 "Plenty of Problems," 101-150 "More Positive than Negative," and 151-200 "Excellent". Within the 5 subscales, scores were interpreted as follows:

i. 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";

ii. Perception of Teachers (SPT):

0-11 "Abysmal";
12-22 "In need of some retraining";
23-33 "Moving in the right direction"; and
34-44 "Model teachers/lecturers";

iii. 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";

iv. 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";

v. Social Self-Perceptions (SSP):

0-7 "Miserable";
8-14 "Not a nice place";
15-21 "Not too bad"; and
22-28 "Very good socially"

Study setting

The School of Medicine at the University of Zambia commenced operations in 1966 and has several undergraduate and postgraduate degree programmes. These include 2 flagship programmes: Bachelor of Medicine and Surgery and Bachelor of Pharmacy. The Bachelor of Medicine and Surgery programme operates with a seven years competency-based traditional curriculum and all students re admitted on fulltime basis. The students in years 3 to 7 attended the Ridgeway Campus of the university and receive clinical training at the University Teaching Hospital (UTH). The Pharmacy programme operates a 5 years competency-based traditional curriculum, and students in years 3 to 5 attend the Ridgeway Campus and receive clinical training at UTH.

Samples, sample size, and sampling process

Participants were drawn from undergraduate students of the Bachelor of Medicine and Surgery (in years 3-7) and Bachelor of Pharmacy (in years 3-5). Any student registered for these programmes and attending the School of Medicine on a full time basis at the Ridgeway Campus at the time of this study was eligible to participate. The study excluded first- and second-year students in both programmes who were still attending classes at the Great East Road Campus of the university. Sample size for the study was calculated using a margin of error of 5%, confidence level of 95%. Total enrolment in the both programmes was 852 with a response distribution of

50%. This gave a sample size of 265. Equal numbers of participants were drawn from each programme for easy statistical comparison and to avoid analytical bias. In all, 140 questionnaires were distributed to students in each programme for a total of 280; the extra number was to compensate for possible non-response and improperly filled copies. To avoid sampling bias, the study adopted stratified random sampling (stratified according to year of study for each programme), and for each year level, simple randomization was used to select participants. An information sheet, detailing the purpose of the study and the involvement of participants, was handed to each potential participant. After carefully reading the information sheet, each consenting student signed a consent form and then completed the questionnaire unassisted, which was comprised of a demographic section and the 50 items in the DREEM inventory. Names of participants and other identifying information were not collected. Access to the completed questionnaires was restricted to the investigators.

Data analysis

Completed copies of the questionnaires were sorted and scored as recommended.¹² All questionnaires were handled confidentially, in line with University of Zambia Ethics Committee guidelines. Data from the DREEM and demographic section of the questionnaire were analysed quantitatively with SPSS version 21 (IBM SPSS Statistics for Windows, version 21.0, Armonk, NY: IBM Corp). The numbers of participants from both programmes were harmonized using the SPSS randomization function.

Mean global DREEM scores and mean scores within subscales were determined. Normality of data distribution was checked by Shapiro-Wilk test. Upon confirming that the distribution was not normal, the Mann-Whitney-U test for nonparametric samples and Mood's independent samples median test were used to compare the scores between the 2 programmes. Mean scores for each of the 50 DREEM items were also determined and compared to provide information on the specific issues in the learning environment. Cronbach's alpha values were calculated for internal consistency of the dataset.

Results

Demographics

From the Medicine and Surgery programme, 138 participants satisfactorily completed the questionnaire and 2 abstained, while 135 participants from the Pharmacy programme satisfactorily completed the questionnaires and 5 did not. Thus, the response rate across both programmes was 97.5%. To make the numbers from the 2 programmes equal, 135 returned questionnaires from Medicine were randomly selected as described above. Thus, the total number of participants whose responses were included in the analysis was 270. Participants from the Medicine programme included 31 (23 %) in year 3, 38

(28 %) in year 4, 23 (17 %) in year 5, 18 (13 %) in year 6, and 25 (19 %) in year 7. Fifty-four (54, 40 %) were females, while 81 (60 %) were males. Their mean age was 24.4 years (SD=3.5) with a minimum of 19 and a maximum of 38. Ninety-five students (70 %) resided in university hostels on campus, 27 students (20 %) resided in privately rented accommodations off-campus, and 13 (10 %) lived at home with relatives.

Of the 135 respondents from the Pharmacy programme, 42 (31%) were in year 3, 37 (27 %) were in year 4, and 56 (42%) were in year 5. The mean age of the pharmacy participants was 26.7 (SD = 4.0) years, with a minimum of 21 and a maximum of 37. The pharmacy participants were significantly older than the medicine participants, $P < 0.001$. Male participants were 85 (63 %) while females were 50 (37%). Sixty-five (48 %) resided in university hostels on campus, 22 (16 %) lived off-campus in privately rented accommodations, and 48 (36 %) resided at home with relatives.

Figure 1 shows the box plots of the ages of the participants.

Total and subscale DREEM scores

The mean global DREEM score for all participants was $119/200 \pm 20.4$ (59 %). The total and subscales DREEM scores for both programmes, with the alpha coefficients, are shown in Table 1.

The Shapiro-Wilk test for normality of distribution indicated deviation from normality ($P < 0.05$) across the global and the 5 subscales of DREEM scores. Mood's independent samples median test showed that the median scores for Medicine and Pharmacy were not statistically different ($P > 0.05$). Similarly, a Mann-Whitney U test for similarity of data distribution between Medicine and Pharmacy showed that the distributions were similar ($P > 0.05$). The total DREEM score for Medicine was $117/200 \pm 23.9$ (59 %), while that for the Pharmacy was $120/200 \pm 16.1$ (60 %). Table 2 shows the total and subscale scores, while Table 3 shows that the median scores and data distribution in the 2 programmes were not different

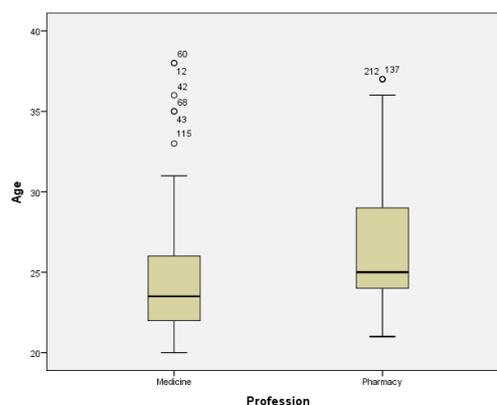


Figure 1. Ages of participants from Medicine ($\bar{x}=24.4$) and Pharmacy ($\bar{x}=26.7$) programmes, ($P < 0.001$).

Table 1. Descriptive statistics of DREEM data for the 270 participants

| Category | N | Mean | SD | Rating | Cronbach's alpha |
|--------------------------|-----|---------|------|-----------------------------------|------------------|
| Total DREEM | 270 | 119/200 | 20.4 | More positive than negative | 0.904 |
| Perception of learning | 270 | 30/48 | 5.6 | A more positive perception | 0.718 |
| Perception of lecturers | 270 | 26/44 | 5.3 | Moving in the right direction | 0.713 |
| Academic self-perception | 270 | 21/32 | 3.9 | Feeling more on the positive side | 0.617 |
| Perception of atmosphere | 270 | 27/48 | 6.8 | A more positive attitude | 0.771 |
| Social self-perception | 270 | 15/28 | 3.6 | Not too bad | 0.431 |

Table 2. Total and subscale DREEM scores for the 270 participants

| | Profession | N | Mean | SD | Rating | Cronbach's alpha |
|--|------------|-----|------|------|-----------------------------------|------------------|
| Total Score | Medicine | 135 | 117 | 23.9 | More positive than negative | 0.915 |
| | Pharmacy | 135 | 120 | 16.1 | More positive than negative | 0.843 |
| Perception of learning | Medicine | 135 | 29 | 6.7 | A more positive perception | 0.760 |
| | Pharmacy | 135 | 30 | 4.1 | A more positive perception | 0.484 |
| Perception of lecturers/ organizers | Medicine | 135 | 26 | 6.0 | Moving in the right direction | 0.74 |
| | Pharmacy | 135 | 27 | 4.4 | Moving in the right direction | 0.644 |
| Academic self-perception | Medicine | 135 | 20 | 4.2 | Feeling more on the positive side | 0.634 |
| | Pharmacy | 135 | 21 | 3.6 | Feeling more on the positive side | 0.555 |
| Perception of Atmosphere | Medicine | 135 | 27 | 7.5 | A more positive attitude | 0.781 |
| | Pharmacy | 135 | 28 | 6.0 | A more positive attitude | 0.710 |
| Social self-perception | Medicine | 135 | 15 | 3.8 | Not too bad | 0.438 |
| | Pharmacy | 135 | 15 | 3.4 | Not too bad | 0.384 |

Table 3. Comparison of data distribution and median values of medicine and pharmacy DREEM data using non-parametric tests

| Domain | Null Hypothesis | Non-parametric test | P value |
|--------------------------|------------------------------------|---|---------|
| Total DREEM score | 1. The medians are the same | Independent samples median test | 0.465 |
| | 2. Data distributions are the same | Independent samples Mann-Whitney U test | 0.350 |
| Perception of learning | 1. The medians are the same | Independent samples median test | 0.622 |
| | 2. Data distributions are the same | Independent samples Mann-Whitney U test | 0.584 |
| Perception of teachers | 1. The medians are the same | Independent samples median test | 0.269 |
| | 2. Data distributions are the same | Independent samples Mann-Whitney U test | 0.171 |
| Academic self-perception | 1. The medians are the same | Independent samples median test | 0.712 |
| | 2. Data distributions are the same | Independent samples Mann-Whitney U test | 0.265 |
| Perception of Atmosphere | 1. The medians are the same | Independent samples median test | 0.807 |
| | 2. Data distributions are the same | Independent samples Mann-Whitney U test | 0.276 |
| Social self-perception | 1. The medians are the same | Independent samples median test | 0.806 |
| | 2. Data distributions are the same | Independent samples Mann-Whitney U test | 0.749 |

($P > 0.10$).

Specific item scores

Despite similarities in the global and subscale scores between both programmes, item-by-item analyses revealed several areas that needed improvement in each programme. These were items with scores less than 2.0/4.0. Analysis of the combined data from both programmes indicated that six items had issues. These issues were lack of a good support system for stressed students (item 3), authoritarian attitude of the lecturers and programme organizers (item 9), overemphasis on factual learning

(item 25), inability of learners to memorise all needed information (item 27), stress from studying (item 42), and unpleasant accommodations (item 46). Three other items showed ambivalence with scores of 2.0/4.0. Details are presented in Table 4.

After a critical analysis of the items in each of the programmes, the study observed significant differences in the perceptions of the students from each programme. While authoritarianism (item 9), a tense learning atmosphere (item 11), and poor feedback culture (item 29), were serious concerns to medical students, pharmacy students were more concerned about curriculum issues

Table 4. Mean scores on individual items (showing only items with scores <2.0/4.0)

| Item No. | Item Statement | All (/4.0) | Medicine (/4.0) | Pharmacy (/4.0) | P values for median scores |
|----------|--|------------|-----------------|-----------------|----------------------------|
| 03 | There is a good support system for learners who get stressed | 1.2 | 1.1 | 1.2 | 1.00 |
| 09 | The lecturers/organizers are authoritarian | 1.8 | 1.6 | 2.0 | 0.024* |
| 11 | The atmosphere is relaxed during teaching | 2.0 | 1.9 | 2.0 | 0.615 |
| 12 | The course is well timetabled | 2.0 | 2.2 | 1.7 | 0.014* |
| 13 | The teaching is learner centred | - | 2.2 | 1.9 | 0.006* |
| 14 | I am rarely bored on this course | 2.0 | 2.1 | 1.9 | 0.216 |
| 25 | The teaching over emphasizes factual learning | 1.6 | 1.7 | 1.6 | 0.715 |
| 27 | I am able to memorise all I need | 1.7 | 1.5 | 1.8 | 0.051 |
| 29 | The teachers are good at providing feedback to students | - | 1.8 | 2.3 | 0.034* |
| 42 | The enjoyment outweighs the stress of studying | 1.7 | 1.8 | 1.6 | 0.024* |
| 46 | My accommodation is pleasant | 1.7 | 1.6 | 1.7 | 0.626 |

(items 12, 13, and 25).

Discussion

The aim of this study was to assess and compare the quality of the educational environments of medicine and pharmacy programmes of the University of Zambia. Its findings show that the students were marginally satisfied with the learning environments of the programmes. This is similar to reports from other studies that measured the quality of learning environments of medical schools in developing countries. For example, Mayya and Roff¹³ reported a global DREEM score of 107/200 (53.5%) from Kasturba Medical College in India, while Zawawi and Elzubier¹⁴ reported a global score of 100/200 (50%) from Saudi Arabia. Studies by Buhari et al¹⁵ at the College of Medicine of the University of Ilorin, Nigeria and Schoeman et al¹⁶ from the University of the Free State, South Africa, were examples of reports from medical schools located in sub-Saharan Africa. The results of the present study agree with these reports from developing countries, but contrast sharply with reports of studies carried out in more advanced countries. For example, Miles and Leinster¹⁷ reported a global score of 143/200 (71.5%) from the University of East Anglia in the United Kingdom, while Dunne et al¹⁸ reported 124/200 (62%) from a study of various United Kingdom medical schools. These findings imply that concerted effort is needed to improve the learning context of medical and pharmacy students at the University of Zambia in particular, and possibly other medical schools located in sub-Saharan Africa.

Roff¹⁹ suggested that schools operating under a traditional curriculum model tend to score less than 120/200 (60%). Zawawi and Elzubier¹⁴ confirmed this, and noted that schools operating under a problem-based learning (PBL) curriculum model often got higher DREEM scores than their traditional counterparts. Whereas curriculum models may be an important determinant of learning environment quality, several other factors related to curriculum delivery and instructor behaviour

might be significant. In this study, analysis of scores by item revealed that major issues affecting the learning environments of medical and pharmacy education at the University of Zambia included lack of social support systems, authoritarian posture of lecturers and programme organizers, and unpleasant accommodations, in addition to curriculum issues such as an overemphasis on factual learning and inefficient scheduling.

Lack of social supports for stressed students, teacher authoritarianism, and overemphasis on factual learning are reported often in studies from medical schools located in developing countries.^{13,20} Stress is a major issue in medical and other healthcare professions education programmes globally.^{21,22} The coping strategies adopted by learners determine the outcomes of stressful events. For this reason, proper support for stressed students, including relevant training in stress coping strategies, could positively affect the outcome of a stressful event.²³

Factual learning is necessary in any educational programme. However, an overemphasis on factual learning may lead to adoption of surface learning approaches by students, which could result in poor learning outcomes.^{24,25} Many medical and health professions education programmes adopted PBL as a mean of reducing factual overload.²⁵ But Berkson²⁶ argued that PBL might be subject to the same monotony and factual overload characteristic of other instructional methods if not properly implemented.

The adoption of constructivism as an educational philosophy in medical and health professions education places the learner at the centre of teaching and learning.²⁷ It gives the learner the opportunity to reflect, learning from multiple perspectives, and to construct his or her own meaning from experiences. However, the preponderance of research reports indicating classroom dictatorship in African medical schools is worrisome and challenges claims of effectiveness of educational innovations in recent years. Ellis²⁸ suggested that successful implementation of constructivism in the classroom depends on the belief and self-perception of the teachers. In the light of this suggestion, this paper indicates that the emphasis could

be shifted to re-orientation of teachers to basic principles of student-centred teaching and adult learning.

Although perceptions of the pharmacy and the medical students appeared to be similar when viewed through the global and subscale DREEM scores, single item analyses revealed that their perceptions on specific issues differed significantly. These differences suggest that the educational climates of medicine and pharmacy programmes at the University of Zambia are different. The implication of this for practice is that plans for improving each of the programmes should address the specific needs of the students in each programme. Medical students' concerns about tense learning atmospheres and lack of a culture of feedback in the programme should be noted, for example. Feedback is an important accompaniment of formative assessment, and lack of effective feedback may lead to poor learning outcomes.

One limitation of this study is that it recruited participants from only one institution, and a nationwide study could have been more appropriate. However, the University of Zambia School of Medicine is the premier and oldest medical school in the country, and takes the lead among the 3 medical schools offering medicine and pharmacy programmes in Zambia. Therefore, the findings of this study may be generalizable to other institutions in Zambia and indeed to institutions in similar settings in sub-Saharan Africa.

Undergraduate students in pharmacy and medicine were studied; as such, these findings may not be applicable to students in other undergraduate or postgraduate programmes. For a comprehensive understanding of the educational environment of an institution, all programmes should be studied at both undergraduate and postgraduate levels, and other stakeholders, such as academic and support staff, should be included. Furthermore, extending the study design to include a qualitative component could provide a more in-depth understanding of the issues raised.

Conclusion

The conclusions from the findings reported in this study are that the overall perceptions of the students appear to be positive and similar, but subtle differences exist in specific issues pertaining to the learning environments of the 2 programmes. Despite the limitations of the study, it provided valuable information that could be used for development planning and for comparative evaluation of other programmes at the University. Evaluation of the educational climate of each programme could provide information for a more effective intervention.

Ethical approval

The Research Ethics Committee of the Department of Health Studies, University of South Africa (Unisa) approved the study (certificate number REC-012714-039). The University of Zambia Biomedical Research Ethics Committee (UNZABREC)

also granted approval for the study (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. One of the authors of the DREEM inventory gave permission to use the instrument. The authors were aware of the ethical dimensions of power differentials in conducting a survey among students. For this reason, they were not directly involved in the teaching of the students participating in the programmes before or during the time of this study. Furthermore, they were not directly involved in data collection but rather used the services of research assistants.

Competing interests

The author was a Professor at the University of Zambia but did not participate in teaching in these programmes at the time of the study.

Authors' Contributions

Both authors contributed equally to this work. CCE wrote the final manuscript.

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