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Exploring the Perception of the Educational Environment among Health Sciences Students at The University of Rwanda: A Mixed Methods Study

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ABSTRACT

The educational environment (EE) plays a very important role in effective learning. However, information about the quality of the EE at the University of Rwanda (UR) is limited. We aimed to explore the perception of health sciences students about their EE at UR. We used a mixed methods design. Of 606 health sciences students in total, 241 participants were recruited for a quantitative survey using the Dundee Ready Education Environment Measure (DREEM) questionnaire. Additionally, we purposively recruited 10 participants for the qualitative data collection using an interview guide. We used descriptive statistics, independent samples *t*-test and analysis of variance (ANOVA) test to analyse the quantitative data. The interview verbatims were transcribed and analysed using a thematic approach. The overall mean score of DREEM was 133.74 ± 20.00 which indicates a more positive environment. Female students had higher score than males in the academic ($p = 0.005$) and social ($p = 0.001$) self-perception sub-domains. There were also differences in academic self-perception ($p = 0.008$) and learning atmosphere ($p = 0.002$) across the departments. The qualitative interviews revealed some specific problems that need to be addressed such as the shortage of financial means during clinical placements; occasional lack of lecturers; insufficient time for hands-on-practice; insufficient chairs in classrooms; and delays in providing feedback to students. Health sciences students at the UR had a positive perception towards their EE. However, there is a need for more efforts to make the environment more positive.

Keywords: *Dundee ready education environment measure, Educational environment, Health sciences students, Mixed methods, University of Rwanda*

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INTRODUCTION

Health care students experience a variety of learning activities in their educational environment (EE) which is usually complex and unique (1). The EE can be described as the spirit and personality of an educational institution (2), and consists of three major components including the physical environment, the emotional climate and the intellectual climate (3). There is a connection between EE as experienced by the students and their achievement, satisfaction and success in medical schools (4–6). Consequently, the World Federation for Medical Education has considered EE as one of the targets for the evaluation of medical education programmes to help adjust, manage and change training programmes with the aim of improving learning quality (7).

The University of Rwanda (UR) was established in 2013 through the merger of Rwanda's seven previously independent public institutions of higher education. The objectives of the merger were to improve the quality of education through the combination of the resources and effectively respond to current national and global needs. The UR has six colleges which also have different schools. The School of Health Sciences is part of the College of Medicine and Health Sciences and consists of eight undergraduate programmes. Although several studies have explored the strengths and weaknesses of EEs around the world (4, 6, 8–12), there is very limited information relevant to the UR. A recent study (13) explored the perception of the EE in the UR, but it was limited to physiotherapy students only. Also, as it used a quantitative descriptive approach only, it did not provide participants with opportunities to tell their stories outside the boundaries of structured measurement scales, and so to describe more deeply their views about their EE. We aimed to explore the perception of the EE among health sciences students at the UR. We hope that the study results will inform the responsible stakeholders about the areas

in need of change to achieve a desirable and convenient EE for all the students.

METHODS

Ethical Statement

Ethical clearance and permission to conduct the study were respectively granted by the research committee of the School of Health Sciences (Ref. No. 061/UR-CMHS-SHS/2018) and the Principal of the College of Medicine and Health Sciences, University of Rwanda (Ref. No. 172/UR-CMHS/18). The students were formally briefed about the study and were informed that participation was voluntary and that they had the right to withdraw from the study at any time. Additionally, the data collection was anonymous.

Study Design

We used a concurrent mixed methods design consisting of a quantitative cross-sectional survey and a qualitative method by in-depth interviews. The quantitative cross-sectional approach provided participants with opportunities to evaluate their EE with structured measurement scales while the qualitative in-depth interviews enabled them to deeply clarify their experiences regarding their EE.

Participants

The study population (N) consisted of 606 students registered in all academic levels in the School of Health Sciences, College of Medicine and Health Sciences, UR, academic year 2017–2018. The sample for the quantitative data collection was determined in three stages. First, the sample size was calculated using a formula (14) which is recommended when nothing is known about the behaviour of a population: $n = N / (1 + Ne^2)$ where e was 0.05, giving $n = 241$ participants. Second, we determined the number of students to recruit from each department and

academic level based on their proportions within the total population. Third, a systematic approach called an Nth name selection technique was used to select the required number of participants from each department and academic level. The sampling interval was determined based on the size of the class and a starting number was chosen randomly.

The sample for qualitative data collection consisted of 10 participants drawn from the quantitative sample. The qualitative sampling procedure was mainly purposive, and we selected the participants that represent male and female students, all departments and all academic levels as much as possible. These characteristics were found to be significantly associated with the perception of EE among students (15) and were expected to contribute to a richer variation of the views about the study topic.

Materials

Dundee Ready Education Environment Measure (DREEM)

DREEM was developed (16) as a generic instrument for measuring students' perceptions of their EE and was found to have high concurrent validity ($r = 0.84$) and internal consistency reliability ($r = 0.93$) coefficients (17). It consists of 50 statements and gives a universal score of a maximum of 200. It is capable of measuring five separate elements directly relevant to the EE: learning, lecturers, academic atmosphere, as well as social and academic self-perception (16). For each item on the questionnaire, students provided a score ranging from 0 to 4 (0 = strongly disagree, 1 = disagree, 2 = unsure, 3 = agree and 4 = strongly agree).

Qualitative interview guide

An interview guide consisted of the following main question: "What is your point of view about the university learning conditions?" The guide also had probes that aimed to obtain an in-depth description

of the perceived experiences, and they were related to all DREEM domains and individual items.

Data Collection

Both quantitative and qualitative data were collected from April to June 2018.

Quantitative data collection

The students were requested to provide their demographic details and mark their responses to each of the 50 statements.

Qualitative data collection

Interviews were conducted in English in a convenient locations to ensure good quality recordings and without possible interruptions and distractions. They were face-to-face and took around 40 minutes in average for each participant. All interviews were audiotape-recorded, and one researcher was taking field notes.

Data Analysis

Quantitative data analysis

Out of a total of 50 DREEM questions, nine negative items (Items 4, 8, 9, 17, 25, 35, 39, 48, and 50) were scored in a reverse manner prior to analysis and interpretation (6). The quantitative data were then analysed using the Statistical Package for the Social Sciences (IBM Corp., USA) Version 24. First, we computed the descriptive statistics including frequency, mean and standard deviations of the perceptions' scores for individual items, sub-domains and total DREEM. A guide to score interpretation was provided in a similar publication (12).

Second, we performed analytical statistical tests to explore the relationship between the perception scores and participants' gender using independent samples *t*-test and participants' department and academic level using one-way analysis of variance (ANOVA) test. For minimising the risk for Type I error, we used the Bonferroni

correction method to determine the critical p -value (alpha). As we had three independent variables in the analysis, we divided $p = 0.05$ by 3 and we got the Bonferroni critical value $p = 0.017$ as the level of significance.

Qualitative data analysis

The qualitative data were analysed using a thematic approach. Tape-recorded interviews were transcribed, and common concepts were coded to generate themes that were then classified into broader categories according to the DREEM sub-domains. To enhance trustworthiness of the findings, we used peer checking by having three authors read the raw data and having in-depth discussions on the findings.

RESULTS

Of 241 questionnaires that were distributed, 237 were completed and returned, giving the response rate of 98.34%. The mean age of the study participants was 22.7 (± 2.0) years. Only 29% of the participants were females. Table 1 shows the quantitative survey participants by gender, academic level and department.

For the qualitative in-depth interviews, of 10 participants, six were in third year and seven were males as illustrated in Table 2.

The total mean DREEM score from the students' perception was 133.74 ± 20.00 out of a total of 200 points (Table 3), which can be interpreted as a "more positive than negative" perception of the EE at the UR. The mean scores for all the students also indicated that all the DREEM sub-domains were perceived as "more positive than negative". Generally female students had higher mean scores than male students in total DREEM score and all sub-domains, but the differences were statistically significant only for the academic ($p = 0.005$) and social ($p = 0.001$) self-perception sub-domains. The results also indicated that there were differences in perception of the EE across the departments. However, the differences were statistically significant only for the domains of academic self-perception ($p = 0.008$) and teaching atmosphere ($p = 0.002$).

Qualitative Results

Generally, the interview participants expressed that they were satisfied with their education at the UR:

Table 1: Distribution of the quantitative survey participants by gender, academic level and department

	n	Age, Years		Gender, n (%)	Academic level, n (%)			
		Mean (\pm SD)	Range	Male	Year 1	Year 2	Year 3	Year 4
All	237	22.7 (± 2.0)	18–33	168 (70.9)	58 (24.5)	78 (32.9)	68 (28.7)	33 (13.9)
Anesthesia	28	21.8 (± 1.6)	19–26	20 (71.4)	17 (60.7)	11 (39.3)	–	–
BLS	72	22.9 (± 1.8)	18–27	53 (73.6)	16 (22.2)	18 (25.0)	21 (29.2)	17 (23.6)
CMCH	37	22.9 (± 1.5)	20–28	29 (78.4)	–	22 (59.5)	9 (24.3)	6 (16.2)
MIS	24	22.1 (± 1.7)	18–25	15 (62.5)	7 (29.2)	7 (29.2)	10 (41.7)	–
OT	15	24.0 (± 2.0)	21–27	11 (73.3)	–	4 (26.7)	6 (40.0)	5 (33.3)
Ophthalmology	25	22.6 (± 2.8)	20–33	17 (68.0)	9 (36.0)	6 (24.0)	10 (40.0)	–
P&O	7	24.1 (± 2.0)	22–28	4 (57.1)	–	2 (28.6)	5 (71.4)	–
PT	29	22.3 (± 2.3)	19–28	19 (65.5)	9 (31.0)	8 (27.6)	7 (24.1)	5 (17.2)

Notes: Biomedical Laboratory Sciences (BLS); Clinical Medicine and Community Health (CMCH); Medical Imaging Sciences (MIS); Occupational Therapy (OT); Prosthetics and Orthotics (P&O); Physiotherapy (PT); Standard Deviation (SD); Frequency (n); Percentage (%).

Table 2: Distribution of the qualitative participants by gender, academic level and department

Participant code	Gender	Academic level	Department
P1	Male	2	Occupational Therapy
P2	Male	2	Physiotherapy
P3	Male	2	Anesthesia
P4	Female	3	Occupational Therapy
P5	Female	3	Occupational Therapy
P6	Male	4	Physiotherapy
P7	Female	3	Medical Imaging Sciences
P8	Male	3	Biomedical Laboratory Sciences
P9	Male	3	Clinical Medicine and Community Health
P10	Male	3	Clinical Medicine and Community Health

I am very happy and generally, I can say that the education in the UR is good.

Responding to different probes, several themes emerged as barriers or weaknesses in their education system. These were categorised in the five DREEM sub-domains.

Lecturing

The interview results revealed that there were some areas that needed to be improved such as lack of lecturers sometimes, insufficient time for hands-on-practice, and shortage of financial means during clinical placement. Examples of the participants' expression are provided below:

I cannot say lecturing is good or bad. There are many problems. For example, sometimes lecturers don't teach students regularly.

...the lecturers teach more theories than practical skills".

Regarding clinical placements, students are struggling because of lack of financial resources.

Lecturers

The qualitative results indicated that the participants viewed their lecturers as being knowledgeable and moving in the right direction. For instance, a participant said:

Our lecturers have knowledge and skills about what they teach.

However, some participants complained about lecturers who do not provide enough explanation during classes and those who delay providing feedback to students:

Some lecturers tell the students to go and read without enough explanation!

Most of the time we do the exams without knowing the continuous assessment marks.

Academic self-perception

Different interview participants expressed that they were confident with their knowledge and skills. A participant said:

I got a lot of skills and now I know how to handle many cases related to my programme.

Academic atmosphere

Participants revealed many barriers related to atmosphere such noise from car traffic for one campus located in Kigali City and lack of enough chairs:

In Remera Campus there is a lot of noise outside which is a barrier for students to be attentive in class.

Table 3: Comparison of the participants' perceptions by sex, academic level and department

Maximum	Total DREEM score				Domain score				
	Students' perception of learning	Students' perception of lecturers	Students' academic self-perceptions	Students' perception of atmosphere	Students' social self-perceptions	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
200	48	44	32	48	28	32	48	28	28
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
133.74 (±20.00)	33.87 (±4.61)	28.38 (±6.18)	24.49 (±4.65)	31.39 (±6.80)	15.99 (±4.17)				
Overall perceptions mean scores									
Participants' perceptions mean scores by sex^a									
Female	138.80 (±20.13)	34.04 (±4.46)	29.71 (±6.55)	25.90 (±4.36)	17.53 (±3.72)				
Male	132.07 (±19.77)	33.81 (±4.67)	27.91 (±6.00)	23.94 (±4.66)	15.39 (±4.20)				
t-score, p-value	t (139) = 1.739, 0.084	t (187) = 0.302, 0.763	t (206) = 1.863, 0.064	t (216) = 2.845, 0.005	t (204) = 2.097, 0.037				t (220) = 3.514, 0.001
Participants' perceptions mean scores by academic level^b									
Year 1	123.23 (±16.72)	32.82 (±4.24)	26.78 (±5.27)	22.90 (±4.67)	15.29 (±3.73)				
Year 2	135.46 (±19.67)	33.94 (±4.66)	28.53 (±6.60)	24.47 (±4.47)	16.21 (±4.38)				
Year 3	137.36 (±18.83)	34.58 (±4.61)	29.02 (±6.54)	25.14 (±4.58)	16.80 (±4.36)				
Year 4	135.74 (±23.10)	34.07 (±4.98)	29.16 (±5.55)	25.80 (±4.72)	15.12 (±3.81)				
p-value	0.028	0.317	0.242	0.023	0.146				
Participants' perceptions mean scores by department^b									
Anesthesia	129.00 (±16.23)	33.57 (±4.40)	27.00 (±5.57)	23.62 (±4.08)	16.21 (±3.38)				
BLS	129.74 (±19.58)	32.63 (±4.27)	27.66 (±5.67)	23.29 (±5.14)	14.66 (±4.70)				
MIS	134.69 (±18.79)	34.89 (±3.95)	29.53 (±6.82)	24.62 (±3.60)	16.96 (±3.72)				
CMCH	138.12 (±19.18)	34.87 (±4.98)	29.08 (±5.57)	24.66 (±4.58)	15.97 (±3.56)				
OT	139.64 (±11.17)	33.58 (±3.20)	29.08 (±3.23)	27.33 (±3.13)	17.00 (±4.04)				
Ophthalmology	135.31 (±14.02)	34.94 (±3.53)	28.14 (±6.47)	26.55 (±3.70)	16.71 (±3.41)				
P&O	148.75 (±22.05)	38.33 (±4.03)	31.83 (±11.51)	28.20 (±1.48)	19.50 (±5.13)				
PT	132.00 (±29.72)	33.32 (±5.98)	28.59 (±7.55)	24.00 (±5.27)	16.41 (±4.29)				
p-value	0.421	0.057	0.641	0.008	0.044				

Notes: Standard Deviation (SD)

^a Independent samples t-test, level of significance was set at 0.017

^b One-way analysis of variance (ANOVA) test, level of significance was set at 0.017

Some students don't find chairs!
It's very difficult to find where to
sit.

Social self-perception

Regarding social self-perception, all the participants said that they had friends on campus and enjoyed interacting with their classmates:

Social environment is good,
students respect each other.

By contrast, all interview participants said that their accommodation was not good because of too many students living in one small room:

Definitely my accommodation is
not pleasant because I am living in
a small room with many colleagues.

DISCUSSION

Overall, the students perceived their EE as being more positive than negative across all the five domains. This was consistent with the findings from similar studies conducted in India (15), Iran (10), and Philippines (11). However, the total mean score in our study (133.74) was higher than the ones found in Iran [106] (10), India [120.2] (15), and Philippines [121.26] (11), and this difference may suggest that the Rwandan students had a better EE or had an attitude of being more appreciative of their EE.

We found that females scored higher than males in academic ($p = 0.005$) and social ($p = 0.001$) conditions. Studies in Saudi Arabia (18) and Pakistan (19) also reported that female students scored higher in DREEM mean total and subscales. Some experts argue that women have stronger interpersonal communicative skills, and this makes them more appreciative of the positive perception of EEs (19). However, there were differences in sample size proportions in our current study (female participants were 29% only), and we should compare such perception differences

between male and female participants with caution. Studies in India (20) and Sri Lanka (21) have reported different results, and this is likely due to socio-cultural elements of communities under study (10).

We also found that the participants from the departments of Prosthetics and Orthotics, and Occupational Therapy responded more positively than those from other departments regarding statements assessing academic-self ($p = 0.008$) and institutional atmosphere ($p = 0.002$) perceptions. In contrast, in a similar study (22) conducted at Yazd University of Medical Sciences in Iran, there were no differences between the mean total scores in different departments. Our findings may indicate the variations in the EE domains across the departments of the School of Health Sciences, UR. However, the departments of Prosthetics and Orthotics ($n = 7$) and Occupational Therapy ($n = 15$) had smaller sample sizes than other departments, and hence, there could have been an overestimation of perception mean scores for the two departments.

The quantitative results were corroborated by the qualitative ones, and these highlighted some specific issues that need to be addressed. For instance, the quantitative finding that the social domain had the lowest perception score (14.58/28), and which was consistent with results from other similar studies (13, 23), was confirmed by the qualitative findings. During the interviews, it appeared that the most overwhelming challenge for the students in general was the overpopulation in the students' rooms as mentioned by all the interview participants.

Other qualitative participants' specific concerns were the need for financial support during clinical placement, enough chairs in classrooms, and timely provision of feedback to students.

To the best of our knowledge, this was the first study that explored the perception of the EE among health sciences students at the UR. Our study sample involved

students from all the departments and academic levels in the School of Health Sciences. Additionally, we used a mixed method to collect the data for our aim, and the qualitative findings helped to confirm the quantitative ones and to deeply explore the weaknesses and strengths within the school. We used a standardised instrument for the quantitative survey and during the data analysis we adopted the Bonferroni correction method to control the Type I error.

However, our study is also subject to some limitations. First, the interpretation of the interview verbatims was not validated by the participants, but we used the peer checking technique to minimise the individual biases and to ensure accuracy during data analysis. Second, there were no first-year students among the qualitative interview participants while they could perhaps have some special issues to report as the new members of the university community. Finally, our study involved students from the School of Health Sciences only and the results cannot be generalised to the whole UR.

CONCLUSION

This study has revealed that the overall perception of the students in the School of Health Sciences, UR about their EE was more positive than negative and indicated that there were several areas that required more efforts for making the environment more positive. This study provided the initial data that could be used as a basis for further studies and interventions towards the improvement of the academic learning environment in the UR.

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