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Original Research

Perception of Learning Environment Among Undergraduate Medical Students at University of Jos Using Johns Hopkins Learning Environment Scale

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Abstract

Background: The learning environment (LE) plays a crucial role in the performance and training of medical students. Different tools have been used to assess the LE with various conclusions. However, the John Hopkins Learning Environment Scale (JHLES) which is a relatively newer scale is more specific, less cumbersome to administer, and has a wider scope. The study aims to assess the perception of the LE of undergraduate medical students in a Nigerian institution using the JHLES.
Methodology: This was a cross-sectional study carried out on clinical medical students of the College of Health Sciences, University of Jos. A self-administered questionnaire containing socio-demographic data and the 28 JHLES questions was used. Data was analysed using SPSS version 25.0. The Overall mean JHLES Score was obtained by calculating the average of the JHLES scores attained by all participants.
Results: A total of 400 clinical medical students were enrolled and a mean JHLES Score of 77.90 (±14.03) was obtained. The males were found to have statistically significantly higher mean JHLES scores than the females, particularly in the domain of Faculty relationships, Academic climate, and Mentoring. The domain of "community of peers" had the highest ratings while "mentoring" and "meaningful engagement" recorded the least scores.
Conclusion: The clinical medical students had a fair perception of their LE. The areas of strength should be encouraged while faculty may enact programs that will improve the domains with low scores to ultimately make better the learning environment and training of these future doctors.

Keywords: Learning Environment; Medical Students; Nigerian; Johns Hopkins Learning Environment Scale.

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Introduction:

Learning environment (LE) consists of the physical structure, social interactions between students, the teacher-student relationships as well as the contents of the curriculum.[1–3] It plays a vital role in the performance of medical students at different levels,[1] and shapes their perspective on their program as well as their ability to attain their potential, thereby influencing their choice of practice.[4,5] Essentially, LE is classified into physical, social, and psychological components which are interrelated and all have an impact on the development of students in their training.[6]

The Dundee Ready Educational Environment Measure Scale (DREEM), a nonspecific tool, has been extensively used globally to study LE in a variety of courses, trainings, schools, and settings; with wide-ranging conclusions[7–11]. However, considering the peculiar nature of medical training, a more specific tool may be required. The Johns Hopkins Learning Environment Scale (JHLES) was developed by the Johns Hopkins University School of Medicine (JHUSOM)[1] for use in medical schools and examines factors affecting the personal growth and academic performances of medical students.[6,12] Though both DREEM and JHLES give an overall similar construct of the learning environment, JHLES may appear to be more favourable as it has fewer questions (28), thus making it less cumbersome to administer when compared to DREEM (50 questions). It also assesses the perception of the students' level of engagement, mentorship, and physical space, of which the DREEM tool does not.[13] However, JHLES, a relatively novel scale, is less well utilized in medical schools in Sub-Sahara Africa, being studied in only a handful of countries like Taiwan[14], Malaysia[13], Brazil[15,] and the United States,[1] where it was developed. This study is important in Nigeria because the evidence generated will help in shaping the curriculum of medical schools to address the identified gaps in the various domains of JHLES to improve the quality of medical training in the sub-Saharan region since the medical schools currently operate a similar curriculum.

This study aims to assess the perception of the LE of undergraduate medical students in a Nigerian institution using JHLES. It will also highlight the areas of strengths and areas requiring improvement which could be utilised in policy making and when drafting a new undergraduate medical school curriculum.

Methodology

Setting & Participants

This was a cross-sectional study carried out among clinical medical students from the College of Health Sciences, University of Jos, located in Plateau State, Nigeria, between April & May 2023. Accommodation options available to these students include Hostel and Non-Hostel arrangements both close to the Teaching Hospital, as well as more distant locations (town). Considering the relatively higher cost of medical education, most students are sponsored by their parents, whereas some are either beneficiaries of scholarships or bonds; others are employed in various part-time opportunities to source funds. At the time of the study, the total number of clinical students in these classes was 657.

Ethical Consideration

This study was approved by the ethical committee of the Jos University Teaching Hospital *(JUTH/DCS/IREC/127/XXXI/621)*. All participants gave informed consent before completing the survey, and they were assured of confidentiality and anonymity. Also, Initials and Survey Numbers were used for identification, with individuals asked to fill in the survey at safe distances from other participants to avoid any bias, particularly, social desirability bias.

Inclusion and Exclusion Criteria

All clinical medical students at the college who consented to be part of the study were included: Medicine and Surgery introductory class (400L), Pathology and Pharmacology class (500L), Paediatrics and Obstetrics & Gynaecology class (600L), and Final year Medicine and Surgery class (FY).

Sample Size Determination and Enrolment

The sample size was calculated using the Fisher's formula for sample size calculation, $n=Z^2p(1-p)/d^2$reference, and a minimum total sample size of 329 was required.[9]

A proportionate allocation was used to determine the number of respondents to be selected across the four classes based on the calculated sample size above. The minimum number of students from each level was determined by dividing the population of the students in each class by the total number of clinical medical students and multiplying by the calculated total sample size. Thus, out of a total of 231 (400 level), 167 (500 level), 130 (600 level), and 132 (final year), a minimum of 115, 84, 65, and 66 participants were required respectively.

At the end of a morning lecture, clinical medical students were approached to participate in the study. The questionnaires were then administered to all those who gave consent.

Johns Hopkins Learning Environment Scale (JHLES)

The JHLES has 28 items under 7 (seven) domains namely: community of peers, faculty relationships, academic climate, meaningful engagement, mentorship, acceptance and safety, and physical space. The students were asked to rate each of the items from 1 to 5 (higher scores indicated a better perception of LE).

The scoring was as follows, '1'= strongly disagree, '2'= disagree, '3'= unsure, '4'= agree, and '5'= strongly agree). Items such as questions 1,2, 5, and 16 had a 5-point Likert scale as follows "1" =not at all, "2" =a little, "3" =a fair amount, "4" =a lot, "5" =tremendously.

Reverse scoring was done for the three negative items (item numbers 24, 25, and 26) in the JHLES questionnaire (a score of '5' meant strongly disagree, and a score of '1' meant strongly agree).

The mean score for each question was attained by finding the average of the scores every individual had for each question from the Likert Scale. The maximum possible total score was 140 while the minimum was 28. Essentially, scores obtained from the JHLES could be categorised into five and rated as terrible (28), poor (29– 56), fair (57–84), good (85–112), and exceptional (113–140)[17]

Data Collection & Analysis

Data Collection

Data was collected through self-administered structured paper questionnaires. It had two aspects; the socio-demographic section with 8 questions (Age, sex, year of study, marital status, highest level of education prior to enrolling in medical school, place of residence, employment, and scholarship status) and the Johns Hopkins Learning Environment Scale (JHLES) having 28 questions. The data from the questionnaires were then entered into a computer and cleaned using Microsoft Excel Spreadsheet (2019).

Data Analysis

Data analysis was done using the Statistical Package for Social Sciences (SPSS) version 25.

Descriptive statistics were used to summarize the sociodemographic properties of the study population, showing their frequencies and percentages. Each Question on the JHLES had a Mean Score, which was calculated by finding the average of the scores attained by participants using the scores assigned to each response on the Likert scale. The Overall mean JHLES Score was obtained by calculating the average of the JHLES scores attained by all participants.[14]

Bivariate analysis was used to assess the relationship between the mean JHLES score and the sociodemographic properties of the participants, where a p-value < 0.05 was inferred as statistically significant.

Non-parametric tests such as the Mann WhitneyU test were used to compare the differences of the means used to test for relationships between variables that were not normally distributed. Kruskal Wallis test was employed when comparing independent variables such as housing where assumptions of ANOVA were not met.

Results

A total of 400 respondents were enrolled in the study, and the population across classes was as follows; 115 (49.8%), 85 (50.1%), 68 (52.3%), 132 (100%) for 400L, 500L, 600L and Final Year respectively. The mean age was 21.6 years (standard deviation: 4.06 years). There were 228 (56.9%) male respondents, and 172 (43.1%) were female. The participants had a mean JHLES Score of 77.90 (±14.03). The Cronbach's alpha which is a measure of internal consistency for the JHLES tool in this study was found to be 0.87.

Table 1: Sociodemographic Distribution of the Study Population (n=400)

Characteristics	No. (%) of Students	Overall JHLES Score Mean (S.D)	p.value (<0.05)
Overall	400 (100)	77.90 (14.03)	
Sex			
Male	228 (56.9)	80.08 (13.18)	<0.001
Female	172 (43.1)	74.99 (14.62)	
Age			
20-24	142 (35.5)	78.57 (13.31)	0.098
25-29	206 (51.5)	76.38 (14.11)	
30-34	34 (8.4)	82.85 (11.62)	
35-39	13 (3.3)	79.54 (22.67)	
>40	5 (1.3)	83 (12.63)	
Level			
400L	115 (28.7)	79.69 (12.41)	0.437
500L	85 (21.3)	77.47 (15.05)	
600L	68 (17.0)	77.32 (13.35)	
Final Year	132 (33.0)	76.9 (15.01)	
Marital Status			
Married	37 (9.3)	75.57 (16.92)	0.290
Unmarried	363 (90.7)	78.13 (13.71)	

Highest Educational Qualification			
SSCE	341 (85.2)	77.51 (13.71)	0.760
Diploma	14 (3.5)	78.21 (12.97)	
ND	2 (0.5)	87.5 (20.51)	
First Degree	38 (9.5)	80.21 (17.21)	
PGD	2 (0.5)	80 (15.56)	
Masters	3 (0.8)	82.67 (12.22)	
Residence			
Hostel	33 (8.3)	76.06 (14.39)	0.475
Hostel Town	20 (5.0)	79.8 (13.82)	
Off Campus	297 (74.3)	78.35 (14.12)	
Off Campus Town	50 (12.4)	75.66 (13.40)	
Employment Status			
Employed	43 (10.8)	77.77 (13.59)	0.950
Unemployed	357 (89.2)	77.91 (14.10)	
Scholarship or Bond Status			
Yes	57 (14.2)	78.91 (12.54)	0.555
No	343 (85.8)	77.73 (14.27)	

SSCE: Secondary School Certificate Examination; ND: National Diploma; HND: Higher National Diploma; PGD: Post-Graduate Degree.

The table above shows the overall mean score and the sociodemographic data among the medical students' population. The male students 228 (56.9%) had a statistically significant higher mean score at a p-value <0.0001 than the females 172 (43.1%).

Although the students who were unmarried, those who were unemployed, those who stayed in the hostel in town, and those who were benefitting from a scholarship or bond all had better mean JHLES scores, these observations were not statistically significant.

Table 2: Average Scores for Individual Items across Sub-domains of the JHLES

SNO	ITEM	MEAN SCORE
	COMMUNITY OF PEERS	**(/5)**
1	How connected do you feel to other SOM students? [a]	3.39
2	How supported do you feel in your personal and professional pursuits by other SOM students? [a]	3.26
3	It's been easy to make friends at the SOM	3.43
4	I feel a sense of community at the SOM	3.49
5	To what extent have you felt a sense of belonging during your time as a student at the SOM? [a]	3.50
6	I've encountered an abundance of positive, inspiring role models among fellow students at the SOM.	3.42
	Mean for Community of Peers	**3.42**
	FACULTY RELATIONSHIPS	**(/5)**
7	I feel that the SOM faculty I encounter are supportive of my professional goals.	3.36
8	I feel that SOM faculty members have taken the time to get to know me	2.46
9	I feel that the SOM faculty I encounter genuinely care about my well-being	2.59
10	I've encountered an abundance of positive, inspiring faculty role models at the SOM	3.11
11	There are faculty members that I feel comfortable confiding in when important concerns come up	2.74
12	The faculty advisors in the Colleges Advisory Program are readily accessible and interested in students	2.13
	Mean for Faculty Relationships	**2.73**
	ACADEMIC CLIMATE	**(/5)**
13	Our medical school's curriculum allows me to use my preferred learning style.	1.98
14	I feel that course exams and assessments test my knowledge and abilities fairly	2.52
15	I understand the goals and objectives of the SOM curriculum	3.03
16	To what extent do you trust that the institution has fulfilled your needs as a medical student? [a]	2.84
17	The workload during medical school is manageable.	2.49

	Mean for Academic Climate	**2.57**
	MEANINGFUL ENGAGEMENT	**(/5)**
18	The SOM engages students as meaningful participants.	2.76
19	The SOM is flexible and responsive to my needs as a student.	2.10
20	I feel that I have a say in decision making about courses and curricular changes.	1.71
21	The SOM encourages scholarship and innovation	2.14
	Mean for Meaningful Engagement	**2.18**
	MENTORING	**(/5)**
22	I've found a mentor in a research field that interests me	2.28
23	I've found a mentor in a clinical specialty or discipline that I am passionate about.	2.77
	Mean for Mentoring	**2.53**
	INCLUSION AND SAFETY	**(/5)**
24	I am concerned that students are mistreated at the SOM*	3.17
25	I sense there is discrimination based on gender, race, ethnicity, or sexual identity at the SOM*	3.43
26	I feel concerned at times for my personal safety at the SOM*	3.24
	Mean for Inclusion and Safety	**3.28**
	PHYSICAL SPACE	**(/5)**
27	The preclinical SOM building has a significant effect on my perception of the learning environment	3.27
28	The workspaces where clinical teaching occurs contribute positively to my sense of the SOM learning environment.	3.18
	Mean for Physical Space	**3.23**

SOM: School of Medicine.
([a]): Likert scale for these items: "not at all, a little, a fair amount, a lot, tremendously".
(*): Reverse scoring utilised for these items.
Green and yellow highlights for good and poor scores respectively

The table above summarizes the average mean scores for each of the domains in the JHLES. The domain of community of peers had the best average mean score at 3.42/5 while "meaningful engagement" and "mentoring" were the least at 2.18/5 and 2.53/5 respectively.
For the individual questions, answers to no 4 and 5 which relate to the responders having a sense of belonging among their student's community had the highest mean scores at 3.49 and 3.50. While responses to questions 13 and 20 had the lowest mean scores. The students felt the curriculum didn't allow them to use their preferred learning style, nor did they have a say in the decision-making for changes in the curriculum and courses.

Table 3: JHLES mean scores per sub-domain against sociodemographic characteristics

CHARACTERISTICS	Community of Peers (6-30)	Faculty Relationships (6-30)	Academic Climate (5-25)	Meaningful Engagement (4-20)	Mentoring (2-10)	Inclusion and Safety (3-15)	Physical Space (2-10)
Overall	**20.49**	**16.38**	**12.85**	**8.7**	**5.04**	**9.83**	**6.45**
Sex [a]							
		*	*		*		
Male	20.86	16.93	13.38	8.90	5.35	9.84	6.6
Female	19.99	15.65	12.15	8.43	4.63	9.83	6.24
Age [b]							
		*	*	*			
20-24	20.44	16.55	12.61	9.18	4.85	9.75	6.74
25-29	20.37	15.94	12.70	8.28	4.95	9.97	6.32
30-34	21.59	17.26	14.53	8.91	5.91	9.41	6.24
35-39	19.77	18.23	13.15	9.08	5.85	9.15	6.00
>40	20.80	19.00	13.80	10.20	6.20	11.20	6.20
Level [b]							
				*			*
400L	20.55	16.93	12.24	9.45	5.09	9.57	7.00
500L	20.05	16.51	12.64	8.87	4.94	10.06	6.53
600L	20.40	15.69	13.46	8.82	4.85	9.87	6.32
Final Year	20.76	16.17	13.21	7.87	5.17	9.89	5.98
Marital Status [a]							
Married	19.68	16.05	12.16	8.51	4.84	9.08	6.22
Unmarried	20.57	16.41	12.92	8.72	5.06	9.91	6.47
Highest Educational Qualification [b]							

SSCE	20.39	16.30	12.79	8.70	4.98	9.89	6.41
Diploma	21.07	15.00	13.43	8.79	4.79	9.86	7.00
ND	21.00	19.00	16.50	11.50	5.50	10.50	6.50
First Degree	21.05	17.16	13.08	8.47	5.45	9.05	6.53
PGD	21.00	18.50	11.00	7.50	9.00	11.50	6.50
Masters	21.00	18.67	13.33	10.33	5.67	11.67	7.33
Residence [b]							
Hostel Lamingo	20.36	15.70	12.39	8.64	4.73	10.18	6.42
Hostel Town	21.15	16.90	13.40	8.80	5.60	10.65	6.60
Off Campus Lamingo	20.70	16.52	12.86	8.75	5.08	9.78	6.42
Off Campus Town	19.04	15.80	12.88	8.42	4.82	9.60	6.54
Employment Status [a]							
Employed	20.79	16.16	13.09	8.05	5.14	9.53	6.49
Unemployed	20.45	16.41	12.82	8.78	5.03	9.87	6.44
Scholarship or Bond Status [a]							
Yes	21.11	16.61	12.70	8.93	4.98	9.96	6.54
No	20.38	16.34	12.88	8.66	5.05	9.81	6.43

**: The statistically significant relationship between sociodemographic characteristics and JHLES scores (p≤0.05) based on the statistical tests used.*
[a]: Mann Whitney-U Test employed
[b]: Kruskal Wallis Test employed
green and yellow highlights for good and poor scores respectively

Table 3 illustrates the relationship between the sociodemographic variables and the mean JHLES scores of the respondents across the various domains. The male students demonstrated a statistically significantly better perception of their learning environment than the females, particularly in *Faculty Relationships, Academic Climate, and Mentoring.*

Also, those who were aged >40 years showed statistically significant higher mean scores in the domains of faculty relations and meaningful engagement. In addition, the 400-level class had statistically significantly higher mean scores in meaningful engagement and physical space.

Discussion

This study found the overall mean JHLES score among clinical medical students at the College of Health Sciences, University of Jos to be more positive than negative. Thus, there is a fair perception of LE among the study participants. The male students demonstrated a statistically significantly better perception of their learning environment than the females. This was noted particularly in the domains of *Faculty Relationships, Academic Climate, and Mentoring*. It has been documented that males and females exhibit different learning styles[16] and as such, the males in this study may have adapted better to the rigours of medical school than the females.

The findings of a study done in India were in keeping with ours. The medical students had a fair perception of their learning environment with students in the lower classes having higher scores.[6] However, studies in the US[1], Taiwan[14] and Malaysia[17] were rated to be good and exceptional. The more positive learning environment observed in developed countries may be due to the difference in curriculum style: several interactive teaching methods (like problem-based learning, and peer-assisted learning) used[18,19] as against low-income countries where teaching is mostly didactic.

From this study, the 4th year students had a better perception of the learning environment than the other classes, with the final year having the lowest scores. This was identical to findings in an American study by Schochet et al[1] where there was a focus on teaching and advising resources for the junior classes and these may have influenced their perception. In addition, final year students may be worried about their final and licensing exams[20] that will qualify them to practice as medical doctors. This stressful period of anxiety and expectation may have affected their perception of the educational environment. Moreover, some researchers have said that the younger classes are more excited about gaining admission into medical school, and as such they have a better perception[21], this however changes as they progress through the higher classes, coping with the high volume of workload.

The domain '*Community of peers*' had the highest rating; being more positive than negative. Although slightly above average, the findings indicate that the students have a sense of community and belonging, feel supported by peers, and have found positive, inspiring role models among fellow students. The medical students in this community have programs related to sports, religion, and campus politics that enhance interaction amongst themselves. These programs are well structured, and time-tabled and may account for the improved scores seen in this domain. This appears to be the area of strength of the learning environment in this institution and such programs should be encouraged and maintained.

Furthermore, a trend was noticed in the perception of students across different age groups: the perception of *Faculty Relationships* improved with increasing age. This could be a result of the age gap between students and faculty members, which decreases the older the students become. It could also be an indicator supporting that older students tend to be more comfortable with faculty members as opposed to younger students.

An obvious weakness in mentorship was revealed. *Mentoring* and *meaningful engagement* had the lowest ratings in this study, being more negative than positive, thus indicating potential areas for improvement. The faculty in this index study may want to design mentoring programs for medical students as these could help improve meaningful engagement, self-confidence, psychosocial needs, and personal and professional development. The beneficial effects of mentorship on the perception of medical students' learning environment have been demonstrated by a qualitative survey in Hungary.[22]

The decline in the level of satisfaction regarding *Meaningful Engagement* among the students was noted with an advancing year of study. Those in more advanced classes believed they were not involved in the decision-making processes concerning the curriculum. In Sweden, where the curriculum is student-centred, students have legal rights to be part of the deciding board evaluating their curriculum[23] and as such, those institutions have students with a better perception of their learning environment when compared to ours. Moreover, the class size may also be responsible for the low level of engagement seen in our study. Studies done in Malaysia where the learning environment was perceived to be exceptional had 24 students in the first year. This permitted better teacher-student interaction and promoted more meaningful engagement.[13] This is opposed to our study where some classes numbered over 100. Though the clinical sessions in our SOM have the students divided into smaller groups that number 10-12, sometimes more than 2 groups may be undergoing a particular posting, and this further diminishes the student-teacher interaction. Faculty may need to admit only the numbers that will meet the available

resources or better schedule the clinical rotations, all with the aim of promoting more meaningful engagement.

Interestingly, a similar study carried out among nursing and medical students at the College of Medicine, Ibadan, Nigeria found that the students had a good perception of their learning environment (JHLES = 91, SD = 14.8).[24] This implies that although these schools are in the same country, the LE of our study setting is perceived to be lower and this study may not be a proper representation of all medical schools in the region. This phenomenon may be because of the multicampus nature of our study setting. Students have to shuffle between the main campus, hostels in town, and the teaching hospital located on the outskirts of the city; thus, the students experience more stress.[24]

This study was carried out in a single medical school; hence, it may be unable to provide a representation of the learning environment of medical schools in the region. Also, to the best of our knowledge, not many studies have been done using the JHLES; thus, there are limited resources for robust comparison. Further studies should be carried out over a longer period to assess the impact of participants' perceptions of their LE on their academic performance. This may facilitate prompt calls for intervention and consequent improvement in the LE. Furthermore, this study was a cross-sectional study. The findings from this study should serve as a basis for further qualitative research and a re-administration of this JHLES questionnaire to better understand if these results are developmental a curriculum phenomenon or a variation in student cohorts.

Conclusion

The medical students at the College of Health Sciences, University of Jos have a fair perception of their learning environment using the JHLES with the male students having statistically significant higher scores when compared to their female counterparts. The 'community of peers' had the best scores of all the domains. Hence, the factors responsible for the cohesiveness among the students should be encouraged. However, faculty may need to set up programs that will promote mentorship and enhance meaningful engagement between the students and their teachers. These measures may improve the learning environment and ultimately the quality of training of these future doctors.

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