

# EVALUATING THE DENTAL LEARNING ENVIRONMENT: A STUDENT-CENTRIC PRESPECTIVE ACROSS PRE- CLINICAL AND CLINICAL YEARS USING DUNDEE READY EDUCATION ENVIRONMENT MEASURE (DREEM) TOOL

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## ABSTRACT

**Objectives:** *The learning environment has a profound role in students learning and success. It also has an integral role in the development of the curriculum. The aim of this study to evaluate the learning environment and compare dental students' perception of the learning environment of pre-clinical and clinical years.*

**Materials and Methods:** *This cross-sectional study was conducted from October 2023 to April 2024. A total of 170 both male and female BDS students from all four years at the Bacha Khan College of Denistry were included in the study. A stratified random Sampling Method was used. Students migrated from other colleges in the middle of the sessions and students currently working as interns or house officers were excluded from the study. Dundee Ready Education Environment Measure (DREEM), a 50-item questionnaire that uses a 5-point Likert scale (4 = strongly agree to 0 = strongly disagree) was used to measure strength of agreement with statements on five domains of learning. Learning (L), Teaching (T), Academic self-perception (ASP), Atmosphere (A) and Social self-perception (SSP). Frequency distributions and descriptive statistics were tabulated in IBM SPSS (version 21). Mean scores for each dimension of learning were used for analysis. Comparative analysis was done using independent sample t test.*

**Results:** *The DREEM questionnaire was completed by 147 students, 78 first and 2nd year students (preclinical training phase) while 69 3rd and 4th year students. 34.6% of the participants were male and 66.6% were female. The mean age of the participants was 21.4 years (SD=1.72). Tukey's post hoc analysis within the participants revealed a significantly lower DREEM score of the Final year compared with the 1st year ( $p < .003$ ), and 3rd year ( $p < 0.031$ ). The items within each domain with the biggest significant differences ( $p \leq 0.05$ ) was between Pre-Clinical Training Phase and Clinical training.*

**Conclusion:** *This study examined the educational setting in our institution. The students of Bacha Khan College of Dentistry showed a predominantly satisfaction with their educational environment. The primary results indicated that students in the early stages of their studies, namely those*

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## INTRODUCTION

Many students dream of becoming a dental professional, but face challenges during clinical years in mastering skills and patient management<sup>1</sup>. In de-

*in their pre-clinical years had positive opinions across all aspects of their learning environment. Overall, the findings from the study highlight the importance of understanding how students perceive their educational environment throughout different stages of their dental training. By delving deeper into these differences and correlations, educators and administrators can make informed decisions to enhance the curriculum and ultimately improve the learning experience for students. This implies that a more tailored and effective approach to dental education could lead to better outcomes and preparedness for future dental professionals.*

**Key words:** Dental curriculum, dental students, learning environment

veloping countries like Pakistan, limited resources, poor infrastructure, and inadequate training further complicate curriculum development, impacting the learning environment and students' overall performance, well-being, and academic success<sup>1,3</sup>.

With a paradigm shift in education towards student-based learning many assessment criteria have been developed in order to analyse the quality of education in different medical education facilities like medical, dental and nursing schools. Many tools and questionnaire have been introduced after thorough research which including DREEM (Dundee Ready Education Environment Measure), DCLEI (Dental Clinical Learning Environment Inventory), CLES (Clinical Learning Environment, Supervision, and Nurse Teacher Evaluation Scale), PHEEM (Postgraduate Hospital Educational Environment Measure), and SEEQ (Students' Evaluation of Educational Quality)<sup>4</sup>.

Dundee Ready Education Environment Measure (DREEM) is the most widely used quantitative instrument to measure the students' perception of the educational environment. DREEM has five subdomains: learning, teaching, academic self-perception (ASP), social self-perception, and atmosphere<sup>4,5</sup>. The use of DREEM is important in providing a consistent method to evaluate learning environment for standardization of educational curriculum (EC)<sup>4</sup>. With over 80 studies across 40 countries and a Cronbach's alpha ranging from 0.78 to 0.92<sup>4</sup> DREEM is the most complete and validated tool among the ones used to assess educational environments in dental schools worldwide and nationally<sup>5,6</sup>. Unlike DCLEI, which concentrates simply on clinical supervision and workload, it addresses all important facets of the learning environment including both non-clinical and clinical<sup>7,8</sup>. While SEEQ is confined to teaching efficacy, DREEM is the most flexible and fit for dentistry education; CLES and PHEEM while

highly dependable are only specialized for nursing and postgraduate environments<sup>9</sup>.

In Pakistan, research on the educational environment in dental schools is limited. To date, there have been fewer than 10 published studies specifically addressing this topic, and these often lack comprehensive assessment tools<sup>10,11</sup>. In addition Dental curriculum in Bacha Khan University is traditional, relying on teacher-centred methods. With the changing trends in teaching and learning it is the responsibility of all dental educators and institutions, to make learning environment comfortable and successful and at the same time meet the accreditation standards nationally and internationally. The objectives of this study are to evaluate the learning environment in dentistry in our institute and to compare the perception of the students towards the learning environment of pre-clinical and clinical years. Along with that, given the dearth of similar assessments in Pakistan, especially with a proven and thorough instrument like DREEM, this study also seeks to fill in this void. Applying DREEM in the framework of Pakistani dentistry schools will help the study to offer important new perspectives on learning environment, teaching efficacy, and general student happiness. This will not only add to the corpus of current knowledge but also assist in spotting and resolving difficulties Pakistani dentistry students have.

## MATERIALS AND METHODS

This cross-sectional study was conducted after approval from Institutional Ethical Board (Reference Number: 396/BKMC from October 2023 to April 2024. Both male and female students of BDS from all four years at the Bacha Khan College of Dentistry were included in the study which made the total sample size of 170 Students. A stratified random Sampling Method was used. Students migrated from other colleges in the middle of the sessions and students who are currently working as interns

or house officers were excluded from the study. The research sample was then divided into dental students in two levels pre-clinical (first year, second year) and clinical (third, fourth/ final year). Pre validated questionnaire extracted from a study conducted to validate DREEM in Pakistani Environment was used and distributed among students<sup>6</sup>. In addition, Nine questions were reversed for validity. This reverse scoring helps in validity by ensuring that responses are accurately aligned with the intended direction of measurement, reducing response bias and improving the consistency of the overall scale. Internal reliability was assessed, and the value of Cronbach’s Alpha as calculated by SPSS was 0.915.

The questionnaire was coded year-wise. Before data collection, all participants were provided brief description of the study ensuring participants' anonymity and confidentiality. Students were instructed to avoid discussion to avoid bias and requested for timely completion of the questionnaire.

The questionnaire consisted of two parts, Part 1 included questions regarding demographic details of the students which included age, gender, international or local student status, marital status, and living arrangements, while the second part consisted of questions regarding Students’ perceptions of the learning environment with the Dundee Ready Education Environment Measure (DREEM), a 50-item questionnaire that uses a 5-point Likert scale (4 = strongly agree to 0 = strongly disagree) to measure strength of agreement with statements on five domains of learning. The domains and maximum

scores (in parentheses) of this questionnaire were as follows: Learning (L) (48), Teaching (T) (44), Academic self-perception (ASP) (32) Atmosphere (A) (48) and Social self-perception (SSP) (28). A sum of the questions gives an overall environment score out of a maximum of 200.

Frequency distributions and descriptive statistics were tabulated in IBM SPSS (version 21).

The normality of data was assessed using the Kolmogorov-Smirnov Test, the data was found to be parametric. Mean scores for each dimension of learning were used for analysis. Comparative analysis was done using independent sample t test for comparing means among two groups (e.g clinical and preclinical) and One Way Anova (post hoc tukey) for comparing means between different years.

**RESULT**

The DREEM questionnaire was completed by 147 students from which 78 were first and 2nd year students (preclinical training phase) while 69 were 3rd and 4th year students. Regarding gender, 34.6% of the participants were male and 66.6% were female. The mean age of the participants was 21.4 years (SD=1.72) (Table 1).

Tukey's post hoc analysis within the participants revealed a significantly lower DREEM score of the Final year compared with the 1st year (p < .003), and 3rd year (p< 0.031) (Figure 1). Scores for each section among the participants among different years of professional examination is listed in Table

**Table 1: Participants’ descriptive data**

Training Phase	Year	Age		Gender	
		Mean	Std. Deviation	Female	Male
Pre-Clinical	1	20.372	1.1745	27	51
	2				
Clinical	3	22.594	1.4785	23	46
	4				

**Table 2: Average DREEM scores by year and domain**

Training Phase	Dream Domains (Mean ± Std. Deviation)					
	Prof. Year	Learning (L)	Teaching (T)	Academic Self Perception (ASP)	Atmosphere (A)	Student Self Pre-ception (SSP)
Pre- Clinical	1	42.3 ± 11.3	37.6 ± 8.01 b	29.7 ± 6.9	42.8 ± 7.48	23.7 ± 5.5
	2	41.9 ± 8.3	38.08 ± 4.7 b	29.6 ± 4.4	38.2 ± 6.79	22.9 ± 4.6
Clinical	3	41.4 ± 8.2	37.6 ± 5.39 b	30.5 ± 4.8	41.02 ± 7.47	23.85 ± 4.63
	4	36.3 ± 8.9	35.2 ± 7.47 b	25.7 ± 6.06	38.03 ± 7.18	21.3 ± 5.13

2. When compared among male and female students no statistically significant difference was noted between groups using independent sample t Test. (p Value > 0.05) (Table 3). Similar comparison when made between hostilities and Day Scholars showed a significant difference between Academic Self

Perceptions of Students (P value < 0.05) (Table 4)

The items within each domain having the highest significant differences ( $p \leq 0.05$ ) between Pre-Clinical Training Phase and Clinical training, included the following: L “I am encouraged to participate in class” and “the teaching helps to develop me in class” are presented as supporting information in Table 5.

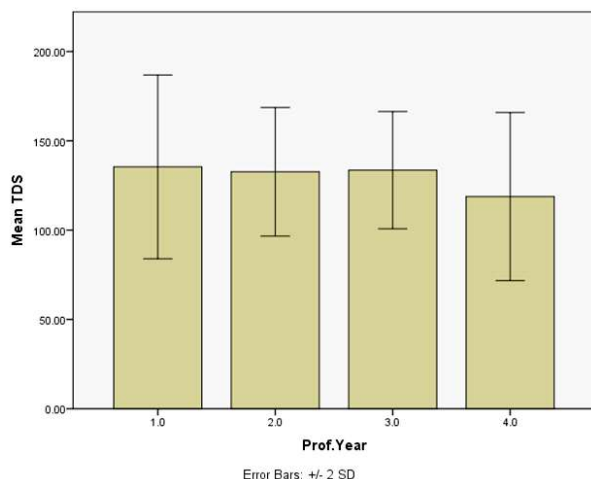


Fig 1: Main total DREEM scores by year in the programme.

### DISCUSSION

With the advent of modern techniques, the education sector has flourished the most. Students of the modern era have so much at the reach of their hands thus making the work of teachers even more difficult, education systems around the world are keeping up with the uprising trends and a paradigm shift from teacher-based learning to more student-centred and focused learning<sup>1,2</sup>. Our study aimed to examine possible variations in students' perception of learning throughout the dental curriculum. This would demonstrate the potential impact that the pre-clinical training, clinical training phases, and the transition

Table 3: Average DREEM Domains Scores by Gender

DREEM Domains	Gender	Mean	Std. Deviation	P – Value Within groups
L	Female	40.8557	9.90369	0.98
	Male	40.8200	8.81485	
T	Female	37.7938	6.92811	0.21
	Male	36.3800	5.67447	
ASP	Female	29.7835	6.16649	0.96
	Male	28.0800	5.11835	
A	Female	40.4536	7.89781	0.7
	Male	39.9600	6.59920	
SSP	Female	23.1340	5.08599	0.99
	Male	23.1400	4.93637	

Table 4: Average DREEM Domains Scores by Type of Accommodation

	Accommodation	Mean	Std. Deviation	P-Value Within Groups
L	Day Scholar	39.4286	9.63481	0.11
	Hostelite	41.9048	9.34431	
T	Day Scholar	36.3175	7.24419	0.11
	Hostelite	38.0595	5.89946	
ASP	Day Scholar	27.8095	6.14307	0.01
	Hostelite	30.2500	5.46153	
A	Day Scholar	39.8889	7.10999	0.57
	Hostelite	40.5833	7.74474	
SSP	Day Scholar	23.2857	4.99170	0.71
	Hostelite	23.0238	5.06578	

**Table 5: DREEM questionnaire main scores by question and differences between training phases**

Domain	Sr.	Question Statement	Preclinical Mean (S.D)		Clinical Mean (S.D)	
L	1	I am encouraged to participate in class*	3.8	1.3	3.1	1.3
	7	The teaching is often stimulating	3.6	1.1	3.3	1.2
	13	The teaching is student-centered	3.3	1.3	3.1	1.2
	16	The teaching helps to develop my competence	3.6	1.3	3.3	1.2
	20	The teaching is well focused	3.6	1.2	3.6	1.1
	22	The teaching helps to develop my confidence *	3.7	1.1	3.3	1.3
	24	The teaching time is put to good use	3.5	1.2	3.2	1.2
	25	The teaching over-emphasizes factual learning	3.5	1.0	3.2	1.1
	38	I am clear about the learning objectives of the course	3.4	1.3	3.3	1.2
	44	The teaching encourages me to be an active learner	3.7	1.3	3.4	1.2
	47	Long-term learning is emphasized over short-term learning	3.4	1.2	3.4	1.2
	48	The teaching is too teacher-centered	3.2	1.0	3.0	1.1
T	2	The teachers are knowledgeable	4.0	1.2	4.0	1.1
	6	The teachers are patient with students	3.3	1.1	3.4	1.0
	8	The teachers ridicule the student	3.0	1.2	2.8	1.2
	9	. The teachers are authoritarian	3.4	1.3	3.1	1.3
	18	The teachers have good communication skills with students	3.8	1.2	3.6	1.2
	29	The teachers are good at providing feedback to students	3.7	1.2	3.4	1.3
	32	The teachers provide constructive criticism	3.2	1.2	3.3	1.3
	37	The teachers give clear examples	3.7	1.3	3.6	1.0
	39	The teachers get angry in class	3.1	1.4	2.9	1.4
	40	The teachers are well prepared for their classes	3.9	1.1	3.9	1.0
	50	The students irritate the teacher	2.9	1.4	2.8	1.3
ASP	5	Learning strategies which worked for me before continue to work for me	3.5	1.2	3.2	1.0
	10	I am confident about passing this year	4.0	1.2	3.8	1.2
	21	I feel I am being well prepared for my profession	4.0	1.0	3.7	1.1
	26	Last year's work has been a good preparation for this year's work	3.6	1.2	3.4	1.1
	27	I am able to memorise all I need		1.2	3.4	1.1
	31	I have learned a lot about empathy in my profession		1.1	3.8	1.1
	41	My problem-solving skills are being well developed here		1.2	3.6	1.2
A	45	Much of what I have to learn seems relevant to a career in healthcare		1.0	3.8	.9
	11	The Atmosphere is relaxed during the preclinical learning		1.3	3.3	1.3
	12	This school is well time tabled		1.2	3.5	1.2
	17	Cheating is a problem in this school		1.4	2.7	1.4
	23	The atmosphere is relaxed during these lectures		1.2	3.3	1.1
	30	There are opportunities for me to develop interpersonal skills		1.1	3.4	1.2
	33	I feel comfortable in class socially		.9	3.6	1.3
	34	The atmosphere is relaxed during seminars/tutorials		1.2	3.5	1.1
	35	I find the experience disappointing		1.2	2.7	1.3
	36	I am able to concentrate well		1.1	3.4	1.1
	42	The enjoyment outweighs the stress of studying dentistry		1.3	3.4	1.2
43	The atmosphere motivates me as a learner		1.2	3.3	1.1	
49	I feel able to ask the questions I want		1.3	3.5	1.3	

<b>SSP</b>	3	There is a good support system for students who get stressed	1.5	2.7	1.4
	4	I am too tired to enjoy this course	1.2	3.1	1.4
	14	I am rarely bored on this course	1.3	3.1	1.1
	15	I have good friends in this school	1.2	3.5	1.2
	19	My social life is good	1.2	3.6	1.2
	28	I seldom feel lonely	1.2	3.2	1.3
	46	My accommodation is pleasant	1.4	3.6	1.3

Note: Items scored in a reverse order (4, 8, 9 17, 25, 35, 39, 48 and 50). Italic items scored inversely according to the DREEM's design. \*p ≤ .05

between them may have on students' perception of learning.

Our Study showed a majority of female students as compared to males which is particularly the case with medical and dental students enrolled in Pakistan showing a prevalence of female students predominating the health care fields<sup>23</sup>. This also was in accordance with the other studies conducting a DREEM scale-based investigation of student perception<sup>1,6,9,13,14</sup>.

There are multiple tools available now a days to assess the perception of a student which include the Student Perception Questionnaire (SPQ), perception of Assessment SEEQ, DCLEI etc, but our study used the Dundee Ready Education Environment Measure (DREEM); a widely used tool for evaluating the educational environment of medical and other health schools. This was per other studies conducted by Carlos M. Serrano et al 2020, and Jamali S et al 2019<sup>13,14</sup>.

Based on the DREEM interpretation rules, participants in this research generally had a more favorable than negative experience throughout their undergraduate education. (Table 5)

This finding is consistent with similar studies conducted in different dental schools<sup>1,15,16</sup>. Stormon et al reported in their study conducted at Queensland the same findings in a similar study to ours, and it stated that the sample of Australian Students in their study was generally positive about their overall learning experiences<sup>1</sup>.

A decline of overall DREEM scores was seen in both the pre-clinical training phase and the clinical training phases where both the higher educational years i.e. final year and second year of BDS students showed a decline in learning perceptions as compared to 3rd year and 1st year of BDS respectively. Prior research has yielded similar findings, indicating a consistent pattern of students' opinion of the learn-

ing environment (LE) deteriorating throughout the dental curriculum. Additionally, there is evidence of a more unfavourable learning experience during the clinical years of their dental program<sup>13,14</sup>.

While comparing across genders it was seen in our study that the male students showed an overall decline in all the domains of the DREEM tool as compared to the female students which was closely aligned with most previous dental studies completed globally. This score surpasses the scores achieved by dental students in Saudi Arabia, Riyadh city<sup>17</sup>, India, Bhubaneswar city<sup>18</sup> and Manipal city<sup>19</sup>. However, it falls short of the results reported in New Zealand, Otago<sup>20</sup>. It is at par with the scores acquired in both Nigeria, Maiduguri and Germany<sup>21,22</sup>.

The observed discrepancies in scores between Pre-clinical and Clinical training phase at the item level provide insight into the potential factors contributing to the decline in students' learning experience as they progress towards Clinical training phase. The most significant disparities were primarily observed in relation to factors pertaining to the teacher and the influence of students.

This study had multiple merits. This study was conducted as a cross-sectional study, which enabled researchers to obtain a momentary representation of the target population's impression of Education Environment. Cross-sectional studies are a cost-effective and an efficient approach to gather valuable information in a short period of time. The findings from this study can be used to inform strategies and interventions aimed at enhancing the educational experience for students by addressing areas of weakness identified in the study. The ultimate goal is to improve student success and overall outcomes.

Furthermore, examining student viewpoints and experiences through focus groups or interviews may provide insightful information about program areas

that need improvement. Qualitative data gathering techniques can help to provide a more comprehensive picture of the dentistry program's advantages and disadvantages. Although quantitative techniques of data collecting can yield insightful information, they might not adequately convey the overall efficacy of implementing a year-long system in a dentistry program.

The future recommendation findings from this study can be used to compare investigations to track progress and make improvements in dental education remains to be seen using other research methods and including teachers perspective.

## CONCLUSION

This study examines the educational setting in our institution,. Our analysis indicates that the students of in all years of their curriculum had positive opinions across all aspects of their learning environment particularly the pre-clinical years. Overall, the findings from the study highlight the importance of understanding how students perceive their educational environment throughout different stages of their dental training.

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