Original Article

International Journal of Dental and Health Sciences
Volume 04,Issue 05

DOES EDUCATIONAL ENVIRONMENT PREDICT ACADEMIC PERFORMANCE?

Soni Rajput[1], Manjunath P Puranik[2], Sowmya KR[3]
1-3.Department of Public Health Dentistry, Government Dental College and Research Institute, Bengaluru, Karnataka India

ABSTRACT:

Purpose: Educational environment is an important factor in overall development of students. Aim of the study was to assess perception about quality of Educational Environment and to determine whether Educational Environment predicts the academic performance.

Methods: A cross-sectional study was carried out among 300 dental interns selected randomly from six dental colleges in Bengaluru, India from May to July 2016. Dundee Ready Education Environment Measure (DREEM) inventory was administered to study participants. Final year BDS percentage was considered as an indicator of academic performance keeping 65% as cut-off. Descriptive and inferential statistics were computed with significance set at 5%. Chi-square, Pearson's correlation, independent t-test and multiple hierarchical regression analysis were performed.

Results: Majority of the participants were female (75%) and academic achievers (69%). The overall mean DREEM score was more positive than negative (137.97±33.03). Nine out of fifty items were considered problematic. Educational environment was significantly associated with academic performance ($p<0.001$), mode of admission ($p<0.001$), stay in hostel ($p<0.001$) and career choice ($p<0.001$). Academic performance regressed significantly with age (ß=-0.151, $p=<0.001$); career choice (ß=0.410, $p<0.001$), mode of admission (ß= -0.160, $p<0.001$) and type of college (ß=0.145, $p<0.001$).

Conclusion: Students perceived dental educational environment as having more positive than negative. Perception of educational environment was associated with academic performance although its role as a predictor of academic performance could not be ascertained in this study. Hence, further longitudinal studies are suggested.

Keywords: academic performance; dentistry; DREEM; educational environment; India.

INTRODUCTION:

Educational environment is considered as a critical factor in upbringing of students' learning. It refers to the diverse physical locations, contexts, and cultures in which students learn. [1]

Students who perceived their educational environment as positive are more likely to cultivate effective learning strategies. On the contrary it might have adverse effects such as stress, incorporation of detrimental behavior and attitudes, academic failure and dropout.[1,2]

Dental education environment is one of the extraordinary complexities, obtaining training in both theoretical and surgical aspects of dental care.[3] Students are the main stakeholders in dental education process since their perception will be valuable for modifying and improving the quality of educational environment.[4]

Many instruments have been developed in past years to assess the educational environment.[1,5] DREEM is most widely used inventory.[6] However, there are

*Corresponding Author Address: Dr. Soni Rajput. E-mail: sonirajput1190@gmail.com

only nine studies conducted in dentistry. Study done in Saudi Arabia found increased number of high achievers when there was improved perception of learning.[4] and studies in Germany. [3], Greece.[7] and UK. [8] students perceived their educational environment as more positive than negative whereas in Saudi Arabia.[9] students perceived their educational environment with plenty of problems with no gender differences.[3,4,8,9] Studies done in India found that social self-perception domain to be negative.[10] and more positive than negative educational environment.[11,12,13] Couple of studies explored the relation between educational environment and academic performance. [4,13]

In an effort to understand factors that help students excel in academics, this study was conducted to determine whether educational environment serve as a predictor for academic performance, with the following purpose:

- To assess perception about quality of educational environment and its associated factors
- To determine relation between educational environment and academic performance among dental interns.

MATERIALS AND METHODS:

Study design: A cross-sectional study was conducted over a period of three months, May to July 2016.

Materials and/ or Subjects: A list of dental institutions in Bengaluru was obtained from the Website of Rajiv Gandhi University of Health Sciences, which served as a sampling frame.[14] Six dental colleges were included based on simple random sampling for the purpose of the study; consisted of one government and five private dental colleges. Study participants were students who had successfully completed the four years of study and were pursuing internships in these dental colleges were included.

The study tool consisted of a questionnaire with two parts. First part contained information on demographic and professional factors. Second part included the prevalidated questionnaire to evaluate educational environment using DREEM inventory.[6] DREEM consists of 50 questions categorized under five domains: 12 questions in first domain (students' perception of learning, 0-48), 11 questions in second domain (students' perception of teachers, 0-44), 8 questions in third domain (students' academic self-perception, 0-32), 12 questions in fourth domain (students' perceptions of atmosphere, 0-48), 7 questions in fifth domain (students' social self-perceptions, 0-28).

The questionnaire was pretested in 30 interns to assess the reliability of the questionnaire, feasibility of conducting the study and to calculate the sample size. Reliability and consistency of DREEM questionnaire was found to be

good. (Intraclass Correlation Coefficient 0.91 and Cronbach's alpha 0.93). With the prevalence of 70%, power of study 80%, 10% margin of error, design effect of 1.5 and significance level of 0.05%, the sample size was estimated to be 246, which was rounded up to 300.[15]

For DREEM questionnaire analysis, the scores for each domain was obtained by adding the scores for that specific domain. The total score is the sum of all five domain scores. The minimum and maximum scores for DREEM was 0 and 200 respectively. Academic performance was based on final year Bachelor of Dental Surgery (BDS) examination (percentages).

Statistics: The data was entered into Microsoft Excel spreadsheet; SPSS Version 22.0 (SPSS Inc., Chicago, IL, USA) was used for statistical analysis. Weightage for each option considering positive (4=strongly agree to 0=strongly disagree) and negative (0=strongly agree to 4=strongly disagree) was given. Descriptive statistics with frequency, mean and standard deviation were computed. Normality of data was determined by histograms, by comparison of discrepancies between mean and standard deviation, determining the skewness and the kurtosis and by Kolmogorov-Smirnov test.

Independent t-test, ANOVA were used to determine difference between the groups. The DREEM score was dichotomized according to median (DREEM score=154), as below 154 and 154 or above and was analyzed for its association with socio-demographic variables using Chi-square test. The final year BDS percentage was dichotomized into below 65% and 65% or above and was analyzed for its association with socio-demographic variables using Chi-square test. Correlation between academic performance and DREEM was performed using Pearson's correlation test. The variable that showed a significance of 10% or less ($p \leq 0.10$) were considered in hierarchical multiple regression models. A p value of <0.05 was considered as significant.

Ethical approval: The study was approved by the Institutional Ethics Committee and Review Board, Government Dental College and Research Institute, Bengaluru (GDCRI/ACM(2)PG/PHD/5/2016-17). Permission was obtained from the Principals of the dental colleges that participated in the study. Written consent was obtained from the study participants. The study was conducted in full accordance with the World Medical Association Declaration of Helsinki.

RESULTS:

The total study participants were 300 in this study. The age of the participants ranged from 22-25 years. Female represented 75.0% of all respondents and 69.0% scored ≥65% in final year BDS examination (Table 1).

The study participants perceived their educational environment as more

positive than negative (137.97±33.03). Most of the items had higher mean scores. In the learning perception domain, items 25 (1.24, 88%) and 48 (1.49, 59.7%) had low mean scores. In the perception of teacher domain, items 8 (1.89, 21.3%) and 9 (1.26, 13.0%) were problematic. In the academic self-perception, item 27 (1.04, 49.0%) had the lowest mean. The lowest scoring items in the perception of atmosphere domain were items 17 (1.24, 44.0%) and 35 (1.58, 51.0%). In the perception of social life domain, item 3 (1.2, 47.3%) was problematic.

Fifty one percent perceived teaching in their educational environment as highly thought of; 73.66% perceived teachers are moving in right direction; 56.66% exhibited confident academic self-perception; 50.0% had a good feeling overall about atmosphere; 44.66% found their educational environment is very good socially and 50% found their educational environment excellent (Table 2).

There was statistically significant association of DREEM score with career choice, mode of admission to the course, stay in hostel and performance (p<0.001) (Table 3). Also, statistically significant association of performance with career choice, mode of admission, type of college and stay in hostel (p<0.001) was present (Table 4).

There was non-significant weak negative correlation (r= -0.09) between age of the study participants and DREEM score (p=0.09); significant moderate negative correlation (r= -0.21) between age of the study participants and performance (p<0.001) and significant moderate positive correlation (r=0.34) between performance and DREEM score (p<0.001) (Table 5).

One way ANOVA was performed for assessing differences in age groups related to the DREEM score. There was no significant difference between age groups with respect to overall DREEM score and DREEM score domain wise (p>0.05).

Independent t-test was performed to determine if gender, career choice, type of college and performance differed in their DREEM score. Highly significant difference was found between performance of study participants in final year BDS examination, career choice and total DREEM score/domain wise score (p<0.001).

Hierarchical multiple regression was conducted to determine the contribution of educational environment through DREEM scores and socio-demographic factors on academic performance. Model 1 is the regression of academic performance on age, career choice, mode of admission, type of college and stay in hostel. Academic performance regressed significantly (p<0.001) with age (ß=-0.164); career choice (ß=0.439), mode of admission (ß=-0.173) and type of college (ß=0.140). Coefficient of determination (R^2) was 0.378. Model 2 is the regression of academic performance

to DREEM score controlling age, career choice, mode of admission, type of college and stay in hostel. Academic performance regressed significantly (p<0.001) with age (ß=-0.151); career choice (ß=0.410), mode of admission (ß= -0.160) and type of college (ß=0.145). Coefficient of determination (R^2) was 0.381. Change in R^2 was 0.004 and it was non-significant (Table 6).

DISCUSSION:

Educational environment helps in enlightenment of students not only academically but also socially.

Interns were considered in this study since they have passed through the pre-clinical and clinical training and would be in a position to reflect and provide cumulative evaluation of their educational environment. Whereas in other studies students were considered. Hence, comparison is done wherever is possible and interpretation should be done with caution. Academic performance is graded as 1st class for marks scored 65% and above and such performers were considered as academic achievers in this study. Majority of the participants (69%) were academic achievers which corroborate with a study.[13]

Almost perfect agreement was seen between the items of DREEM questionnaire (α= 0.93).This indicates the applicability and utility of DREEM questionnaire in dental colleges in India.

More than 80% of the study participants perceived educational environment as “more positive than negative” or “excellent” which is similar to other studies.[3,7,8,11-13] whereas Saudi Arabia.[9] study reported “plenty of problems”.

Most of the study-participants either had a “more positive perception” or “teaching was highly thought of” which is in line with other studies.[3,13] whereas participants in a study.[9] viewed teaching “negatively” . “Teaching over emphasis factual learning” and “teaching is too teacher centered” were found to be problematic areas.

This could be due to the pattern of summative assessment in the curriculum.[12,13] and conventional teaching methods. On the brighter side participants felt that they were encouraged to participate during teaching sessions.

More than three-fourth of study-participants perceived their teachers to be “moving in right direction” or “model course-organiser” which is in line with other studies.[3,8,11] whereas a study.[9] reported a “need for some retraining” for their teachers. “Teachers ridicule the students” and “teachers are authoritarian” were problematic, which is similar to two studies.[10,13] It is responsibility of the teachers to use kind words or encourage students’ to feel free to ask questions. On the brighter side students’ felt that their teachers

were knowledgeable and that will inspire them to prepare well for the class.

Majority of study-participants considered their academic self – perception as "feeling more on the positive side" or "confident" which is in line with other studies.[3,9,11,12] One item was problematic, "memorise all that he/she needed" , which is in line with a study.[13] This could be due to vast dental syllabus and more emphasis placed on rote learning. On the sunnier side participants reported that they have developed empathy towards their patients during the course.

Most of study-participants considered their atmosphere as "a more positive attitude" or "a good feeling overall" which is in line with other studies.[3,8,11,12] and contrary to a study where "many issues" were present.[9] Two items were found to be problematic, "cheating is a problem" and "student find the experience as disappointing" which is similar to a study.[13] This shows students concern about academic dishonesty. Poor scheduling of classes or workload make students perceive the atmosphere as disappointing. On the brighter side students were able to concentrate well because of atmosphere.

More than two-third of study-participants considered their social self-perception as "not too bad" or "very good socially" which is in line with other studies.[3,11,12] whereas a study reported it was "not a nice place".[9] One item was of concern, "no good support system for students who are stressed" that is similar to studies.[3,7,13] Rigid academic schedule and work load leaves no leisure time. But on other hand students' reported that they had a good social life.

Underachievers takes time to learn and need help or remedial education and guidance to overcome their difficulties. Age correlated negatively with DREEM score and performance.

Females develop more trust toward their teachers and have a more adaptive approach to learning tasks.[7] Gender was independent of DREEM score or performance in this study, which is similar to studies done in Germany.[3] , Saudi Arabia.[4,9], Greece.[7], UK.[8] and India.[13]

Choice of college in India depends on merit, feasibility and accessibility. Private college students' had positive perception for their education environment but underperformed as compared to Government College. This may reflect better teaching environment and infrastructure in private colleges, however performance is a factor of individual's hard work, interest and their passion towards dentistry. Choice of joining dentistry significantly associated with DREEM score and performance in this study. This indicates their interest in dentistry that would engage themselves more extensively which in turn influence their performance. Students' staying in hostel were negative towards their education environment and

underperformed in exams. This may reflect poor support system outside college campus.

Student's perceptions of their educational environment influence the selection they make of a learning approach which in turn affects their academic performance. Academic achievers rated their education environment higher which is in line with study done in Saudi Arabia.[4] whereas a study done in India.[13] found no significant difference.

DREEM score positively correlated with performance. This suggests the inter-relationships between career choice, educational environment and academic excellence in dentistry.

In hierarchical multiple regression, R^2 of the regression model is 0.380. Greater proportion of variation in performance can be explained by student's sociodemographic variables. While in model 2 where DREEM variable is incorporated the resulting R^2 is 0.381. The minimal change in R^2 might be suggestive of load bearing influence of background factors masking the effect of DREEM score if any.

However, there are few limitations in this study. Unequal distribution in demographic variables, final year academic performance, psychological condition of students and emotional intelligence would have confounded the results. Biases inherent in questionnaire design study could be present.

This study showed the relationship between dental students' perception of educational environment and their academic performance. However, the role of educational environment as a predictor of students' academic performance could not be established within the limitation of the study. Hence, longitudinal study is recommended.

This study observed certain problematic areas in educational environment. Hence, improvement of educational environment can be dealt at three levels. At policy level, there should be annual evaluation of educational environment and periodic revision of curriculum. At institution level, there should be incorporation of contemporary teaching methods with an emphasis on student centred learning. Periodic reorientation for teachers may be necessary. There should be good support system. The teachers should be approachable and should be able give advice and counselling to students. At student's level, emphasis should be given for holistic learning balancing curricular as well co-curricular activities.

CONCLUSION:

Students perceived their educational environment as more positive than negative. Academic performance was largely contributed by sociodemographic variables. Educational environment did not predict academic performance in this study.

Acknowledgments: I would like to thank Dr. Amit Kumar for statistical assistance.

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TABLES:

Table 1. Characteristics of the study sample, by number and percentage of total respondents (N=300)

	Number	Percentage
Gender		
Male	75	25
Female	225	75
Marital status		
Married	28	9.3
Unmarried	272	90.7
Career choice		
Yes	183	61.0
No	117	39.0
Mode of admission		
Entrance	158	52.7
Management	142	47.3
College		
Government	24	8.0
Private	276	92.0
Stay in hostel		
Yes	75	25.0
No	225	75.0
Final year percentage		
< 65	93	31.0
≥ 65	207	69.0

Note: Mean age was 23.28±1.31

Table 2: Distribution of study participants according to DREEM categories

	FREQUENCY	PERCENT
Categories based on DREEM score		
0-50 Very poor	2	0.66
51-100 Plenty of problems	50	16.0
101-150 More positive than negative	97	32.0
151-200 Excellent	151	50.0
Mean ± SD	137.97±33.03	
Domain-1 (Perception of learning)		
0-12 Very poor	4	1.33
13-24 Teaching is viewed negatively	47	15.66
25-36 A more positive perception	95	21.66
37-48 Teaching highly thought of	154	51.33
Mean ± SD	33.66±8.58	
Domain-2 (Perception of teachers)		
0-11 Abysmal	4	1.33
12-22 In need of some retraining	51	17.0
23-33 Moving in the right direction	221	73.66

34-44 Model course organisers	24	8.00
Mean ± SD	28.05±6.25	
Domain-3 (Academic self-perception)		
0-8 Feelings of total failure	2	0.66
9-16 Many negative aspects	33	11.0
17-24 Feeling more on the positive side	95	31.66
25-32 Confident	170	56.66
Mean ± SD	25.10±6.66	
Domain-4 (Perception of atmosphere)		
0-12 A terrible environment	3	1.0
13-24 There are many issues which need changing	55	18.33
25-36 A more positive attitude	92	30.66
37-48 A good feeling overall	150	50.0
Mean ± SD	32.43±8.08	
Domain-5 (Social self-perception)		
0-7 Miserable	19	6.33
8-14 Not a nice place	35	11.66
15-21 Not too bad	112	37.33
22-28 Very good socially	134	44.66
Mean ± SD	18.72±5.21	

Table 3: Bivariate analysis between socio-demographic variables and DREEM score

VARIABLES		**DREEM SCORE**		***p value***
		<154	**≥154**	
Gender	Male	39	36	0.64
	Female	110	115	
Marital status	Married	12	16	0.55
	Unmarried	135	137	
Career choice	Yes	57	126	<0.001
	No	92	25	
Mode of admission	Entrance	67	91	<0.001
	Management	81	61	
Type of College	Government	8	16	0.10
	Private	139	137	
Stay in hostel	Yes	54	21	<0.001
	No	95	130	
Performance (%)	<65	88	5	<0.001
	≥ 65	61	146	

Table 4: Bivariate analysis between socio-demographic variables and performance

VARIABLES		DREEM SCORE		*p value*
		<154	**≥154**	
Gender	Male	23	52	0.94
	Female	70	155	
Marital status	Married	7	21	0.52
	Unmarried	86	186	
Career choice	Yes	3	180	<0.001
	No	90	27	
Mode of admission	Entrance	25	133	<0.001
	Management	68	74	
Type of College	Government	9	15	0.04
	Private	116	110	
Stay in hostel	Yes	53	22	<0.001
	No	40	185	

Table 5: Bivariate correlation between age, performance and DREEM

Correlation*	r value	*p* value
Age and DREEM	-0.09	0.09
Age and performance	-0.21	<0.001
Performance and DREEM	0.34	<0.001

*****Using Pearson's correlation test

Table 6: Multivariate regression with performance as outcome variable

Independent variable	Standardised Regression Coefficients	
	Model 1	**Model 2**
Age	-0.164**	-0.160**
Choice of joining dentistry	0.439**	0.410**
Mode of admission	-0.173**	-0.160**
Type of College	0.140**	0.145**
Stay in hostel	0.101	0.095
DREEM score	--------	0.071
R^2	0.378	0.381
Change in R^2		0.004

**** *p* <0.001**

Note: **Model 1=** Performance of study participants in final year BDS examination is regressed to age, career choice, mode of admission to the course , type of college and stay in hostel.

Model 2= Performance of study participants in final year BDS examination is regressed to DREEM score controlling age, career choice, mode of admission to the course , type of college and stay in hostel.