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Assessing students' perception of the surgical theatre educational environment of a private medical college in Pakistan

Tayaba Sarfraz [a], Syed Muhammad Azfar [b], Syeda Rubaba Azim [c], Mutayyaba Majeed [d]

[a]Freelancer writer, Department of Medical Education, University of Dundee, UK.
[b]Associate Professor, Department of Orthopedic, Liaquat College of Medicine and Dentistry, Karachi, Pakistan..
[c]Assistant Professor, Department of Medical Education, Dow University of Health Sciences, Karachi.
[d]Assistant Professor, Department of Physiology, Independent Medical College, Faisalabad.
Correspondence: rubaba.azim@duhs.edu.pk*

ABSTRACT

BACKGROUND & OBJECTIVE: The learning environment is a crucial part of any educational institute. It should be ensured that the learning environment is facilitating the learning process. This study aims to assess undergraduate medical students' perception of the learning environment of surgical theater.

METHODOLOGY: This was a cross-sectional study done at Liaquat College of Medicine and Dentistry (LCMD) a private medical college in Karachi. Data was collected from final-year students, who attended surgical rotation using a pre-validated questionnaire "Surgical Theatre Educational Environment Measure (STEEM)" and analyzed using SPSS version 23.0.

RESULTS: Eighty-eight (n=88) out of a hundred participants have completed the given questionnaire. Most of the students (64.26%) were overall satisfied with the learning environment in the surgical theatre of the institute (P=0.083). Male students were found more satisfied with the learning environment as compared to their female counterparts. The overall Cronbach alpha of STEEM was found 0.75.

CONCLUSION: The outcomes of this study revealed that most of the students of LCMD had positive perceptions of instruction and training in surgical theatre.

KEYWORDS: Educational Environment, Learning Environment, Surgical Theatre, STEEM Tool, Clinical Posting.

INTRODUCTION

The educational environment is considered one of the crucial components of educational settings [1]. It is described as the "heart and soul of the medical school" [2]. When it comes to developing clinical knowledge and abilities, clinical placement's educational environment is seen to be influential [3]. The World Federation for Medical Education (WFME) significantly emphasized improving the educational environment within medical institutions as a key objective during the medical education programs evaluation [4].

In order to learn well, medical educators emphasize the significance of supportive environments, a variety of learning facilities, the chance to practice skills, and proper supervision [2,5]. The effectiveness, student happiness, academic accomplishment, stress levels, and, ultimately, the standard of patient care are all crucial outcomes that have been demonstrated to be significantly impacted by health-related educational environments [1,2]. Nonetheless, there is a consensus that an institution's educational environment is a multifaceted entity with a direct bearing on the student's clinical learning outcomes [5].

The surgical theater is a demanding learning environment where surgeons perform surgical procedures while collaborating with expertly qualified nurses and anesthetists [6]. For medical students, the learning environment in an operating room can be unpredictable, combative, and confusing [7].In a surgical theater, sustaining an intellectual climate that includes evidence-based practice, organized teaching, and learning with patients can be challenging, especially during taxing and complex emergency surgeries. [8].

The STEEM provides a standardized measure of self-esteem, facilitating comparisons across diverse populations and settings. Numerous studies have explored the surgical learning environment by using STEEM and found it as a reliable measurement tool [9,10]. Most of the literature on the

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operating theatre learning experience is concentrated in the developed Western world. There is a paucity of literature on in-depth analysis of the medical students' perception of the operating theatre teaching-learning experience in developing countries [8,11].

This study aims to investigate the self-esteem levels among high school students and examine how these levels correlate with academic performance, social behavior, and mental health indicators. By leveraging the STEEM, we can ensure that our findings are consistent with existing research, allowing for a robust analysis of the factors influencing self-esteem and its broader impacts.

Curriculum modification and quality enhancement can be built on the insight of the learning environment by the students. It can be used to alter teaching and learning strategies to increase learning effectiveness [12]. The LCMD has integrated workplace learning into its curriculum to support students' learning during their clinical years. To take further action to improve the learning environment and students' experiences of workplace learning and surgical theatre is one of the components, a thorough evaluation of the surgical theatre learning environment was carried out [13].

METHODOLOGY

The cross-sectional study, which included final-year medical students, was carried out at LCMD from August 2021 to March 2022. The "STEEM questionnaire" was chosen as the primary data collection tool to assess how students perceive the learning environment in the operating room STEEM was first developed in 2004 for surgical residents [14]. Later different studies were conducted for undergraduate students too [10,15]. It consists of a total of 40 items and four domains named Teaching & Training (n=13), Learning Opportunities (n=11), Atmosphere (n=8), Supervision, Workload, and Support (n=8) [14].

The research proposal was submitted to the IRB committee at LCMD. The IRB approval with the reference number DSH/IRB/2019/0008 was obtained. The departmental secretary sent emails to all 100 of the students in the final year informing them about the study. The online link to the survey was given to the students after they consented to participate. Students received email reminders and the web link was accessible for a week. By keeping the questionnaire anonymous, the participants' privacy was protected.

Participants were asked to answer 40 questions on the STEEM questionnaire using a five-point Likert scale, with the options being strongly agree (5), agree (4), uncertain (3), disagree (2), and strongly disagree [14]. A 120/200 rating indicates a neutral outcome. Any value greater than 120 denoted a more favorable learning environment (Table I). The gender of the participants was another thing that STEEM collected data on. The questionnaire is broken down into four subscales:supervision, workload, support, and learning opportunities (Q1–13), atmosphere (Q25–32), and learning opportunities (Q33–40).

The quantitative data were analyzed using IBM-SPSS Version 23.0, Statistical Package for Social Sciences. The STEEM and its four subscales reliability were evaluated using Cronbach's alpha. The demographic variables underwent descriptive analysis and a t-test is used to check the significance of the study. Each statement received a score based on whether the responder "strongly agreed," "agreed," "uncertain," "disagreed," or "strongly disagreed." Negative comments (8, 11, 14, 16, 19, 22, 23, 26, 27, 28, 30, 31, 33, 34, 35, 36, 37, 38, and 40) were scored differently; the higher the score, the more positively the pupils were perceived [13].

RESULTS

Out of 100 students enrolled in this study, 88 completed the survey. Of which 56.8% were males and 43.2% were females. The subscale scores as well as the total STEEM score (64.260%) were found to be satisfactory as students' STEEM score was above 120 (Table- II).

Table-I: STEEM scores and perception of the educational environment of the theatre.

STEEM SCORE	Perception of Educational Environment
<120/200	Less than satisfactory
120/200	Neutral
>120/200	Satisfactory

Table-II: The mean for the overall and the four subscales of STEEM.

Scales	Mean (SD)	Mean Percentage(%)
STEEM (n=40)	128.52 (8.54)/200	64.26
Teaching & Training (n=13)	43.70(4.87)/65	67.23
Learning Opportunities (n=11)	34.77(4.87)/55	63.21
Atmosphere (n=8)	25.51(3.23)/40	63.77
Supervision, Workload, and Support (n=8)	24.53(3.21)/40	61.32

The results showed that the overall STEEM scores are slightly trend toward higher scores in male participants (p=0.083). On the other hand, other sub-scales (Teaching and training, Learning Opportunities, Atmosphere, Supervision, Workload, and Support) do not demonstrate statistically significant differences between male and female participants.

In this study, the participants generally rated their experiences positively across various aspects of their training as shown in Table IV. Students rated the highest scores in the teaching and training domain, and participants either agreed or strongly agreed with positive statements in the questionnaire. More than 80% of participants strongly agreed with statements such as "trainer has a genuine interest in my progress," "I feel part of a team in theatre," "trainer's surgical skills are very good," and "elective operating list has the right case mix to suit the training." While, supervision, workload, and support received the lowest scores, suggesting a comparatively less favorable perception in these areas.

Table-III: The Comparison of STEEM Constructs with Gender.

Scales	Male (n=50) Mean (SD)	Female (n=38) Mean (SD)	P-value
STEEM	129.90 (8.21)	126.71 (8.73)	0.083
Teaching & Training	44.28 (5.48)	42.95 (3.88)	0.206
Learning Opportunities	34.90 (5.43)	34.61 (4.08)	0.781
Atmosphere	25.74 (3.49)	25.21 (2.88)	0.451
Supervision, Workload, and Support	24.98 (3.81)	23.95 (2.10)	0.137

Applied T-test

Table-IV: The Association between gender and positive statements of STEEM items.

Sr.No	Positive statements	Responses	Gender		P-value
			Male n(%)	Female n(%)	
1	The personality of the trainer was pleasant	Strongly Disagree	15(30)	7(18.4)	0.450
		Uncertain	6(12)	6(15.8)	
		Strongly Agree	29(58)	25(65.8)	
2	I get on well with my trainer	Strongly Disagree	11(22)	15(39.5)	0.028
		Uncertain	5(10)	8(21.1)	
		Strongly Agree	34(68)	15(39.5)	
3	The trainer was teaching enthusiastically	Strongly Disagree	8(16)	15(39.5)	0.011
		Uncertain	34(68)	14(36.8)	
		Strongly Agree	8(16)	9(38)	
4	The trainer was genuinely interested in the participants' progress	Strongly Disagree	2(4)	0(0)	0.504*
		Strongly Agree	48(96)	38(100)	
5	The trainers' teaching was understandable	Strongly Disagree	29(58)	17(44.7)	0.205
		Uncertain	11(22)	15(39.5)	
		Strongly Agree	10(20)	6(15.8)	
6	The surgical skills of the trainer were very good	Strongly Disagree	2(4)	12(31.6)	≤0.001
		Uncertain	11(22)	1(2.6)	
		Strongly Agree	37(74)	25(65.8)	
7	The trainer gave time to practice surgical skills in theatre	Strongly Disagree	21(42)	14(36.8)	0.678
		Uncertain	15(30)	10(26.3)	
		Strongly Agree	14(28)	14(28)	
9	Planned surgical techniques were discussed before the operation by the trainer	Strongly Disagree	26(52)	10(26.3)	0.041
		Uncertain	9(18)	8(21.1)	
		Strongly Agree	15(30)	20(52.6)	
10	The part of the procedure that I would perform was discussed by the trainer before the operation	Strongly Disagree	15(30)	8(21.1)	0.001
		Uncertain	12(24)	0(0)	
		Strongly Agree	23(46)	30(78.9)	
12	The trainer gave feedback on the participants' performance	Strongly Disagree	30(60)	11(28.9)	0.015
		Uncertain	10(20)	14(36.8)	
		Strongly Agree	10(20)	13(34.2)	
13	The trainer gave constructive criticism	Strongly Disagree	6(12)	20(52.6)	≤0.001
		Uncertain	12(24)	5(13.2)	
		Strongly Agree	32(64)	13(34.2)	
15	The training was suited by the right mix of the elective operating list	Strongly Disagree	13(26)	5(13.2)	0.022
		Uncertain	10(20)	2(5.3)	
		Strongly Agree	27(54)	31(81.6)	

Table to be continue

17	Participants got enough opportunities for assistance	Strongly Disagree	9(18)	17(44.7	0.013
		Uncertain	21(42)	14(36.8	
		Strongly Agree	20(40)	7(18.4)	
18	Enough theatre sessions were arranged weekly to gain appropriate experience	Strongly Disagree	20(40)	17(44.7	0.390
		Uncertain	13(26)	13(34.2	
		Strongly Agree	17(34)	8(21.1)	
19	Opportunities to operate are taken by more senior trainees	Strongly Disagree	14(28)	9(23.7)	0.512
		Uncertain	5(10)	7(18.4)	
		Strongly Agree	31(62)	22(57.9)	
20	Appropriate experience was gained through a sufficient number of emergency procedures	Strongly Disagree	8(16)	6(15.8)	0.840
		Uncertain	13(26)	12(31.6)	
		Strongly Agree	29(58)	20(52.6)	
21	Appropriate exposure was gained through a variety of emergency cases	Strongly Disagree	15(30)	20(52.6)	0.081
		Uncertain	15(30)	6(15.8)	
		Strongly Agree	20(40)	12(31.6)	
24	An opportunity is provided for the development of skills required at the participants' stage	Strongly Disagree	19(38)	7(18.4)	0.088
		Uncertain	8(16)	5(13.2)	
		Strongly Agree	23(46)	26(68.4)	
25	The theatre's atmosphere was pleasant	Strongly Disagree	11(22)	20(52.6)	0.001
		Uncertain	5(10)	7(18.4)	
		Strongly Agree	34(68)	11(28.9)	
29	There was a friendly theatre staff	Strongly Disagree	19(38)	19(50)	0.495
		Uncertain	8(16)	4(10.5)	
		Strongly Agree	23(46)	15(39.5)	
32	Participants in the theatre felt like a part of the team	Strongly Disagree	9(18)	3(7.9)	0.087
		Uncertain	7(14)	12(31.6)	
		Strongly Agree	34(68)	23(60.5)	
39	There was an adequate level of supervision in the theatre	Strongly Disagree	14(28)	8(21.1)	0.543
		Uncertain	18(36)	12(31.6)	
		Strongly Agree	18(36)	18(47.4)	

The majority of the participants either disagreed or strongly disagreed with the negative statements of the STEEM questionnaire, indicating that participants were more positively perceived. Following were the most strongly disagreed statements including "trainer expects my surgical skills to be as good as his/hers, when I am in theatre", "there is nobody to cover the ward, trainer is in too much of a rush during emergency cases to let me operate", and "trainer immediately takes the instruments away when I do not perform well" (Table -V).

Table-V: The Association between gender and negative statements of STEEM items.

Sr.No	Negative statements	Responses	Gender		p-value
			Male n(%)	Female n(%)	
8	Instruments were immediately taken away by the trainer when a participant did not perform well	Strongly Disagree	6(12)	20(52.6)	≤0.001
		Uncertain	14(28)	3(7.9)	
		Strongly Agree	30(60)	15(39.5)	
11	The surgical skills of the participant were expected to be as good as trainer	Strongly Disagree	5(10)	8(21.1)	0.248
		Uncertain	11(22)	10(26.3)	
		Strongly Agree	34(68)	20(52.6)	
14	The operations types were too complex on this unit for participant-level	Strongly Disagree	24(48)	25(65.8	0.080
		Uncertain	11(22)	9(23.7)	
		Strongly Agree	15(30)	4(10.5)	

Table to be Continue

16	The presence of far too many cases on the elective list gave the opportunity to operate	Strongly Disagree	24(48)	9(23.7)	0.009
		Uncertain	14(28)	8(21.1)	
		Strongly Agree	12(24)	21(55.3)	
22	The trainer was in too much rush to let participants operate during emergency cases	Strongly Disagree	20(40)	5(13.2)	≤0.001
		Uncertain	13(26)	0(0)	
		Strongly Agree	17(34)	33(86.8)	
23	An operative experience was missed due to restrictions on working hours	Strongly Disagree	21(42)	33(86.8)	≤0.001
		Uncertain	10(20)	2(5.3)	
		Strongly Agree	19(38)	3(7.9)	
26	The participant doesn't like to be corrected in the theater in front of nurses, medical students, and residents	Strongly Disagree	21(42)	2(5.3)	≤0.001
		Uncertain	20(40)	10(13.2)	
		Strongly Agree	9(18)	31(81.6)	
27	It was disliked by the nursing staff when participants took longer to operate	Strongly Disagree	21(42)	27(71.1)	0.024
		Uncertain	9(18)	4(10.5)	
		Strongly Agree	20(40)	7(18.4)	
28	The trainer is pressurized by the anesthetists to operate him/herself to reduce anesthetic time	Strongly Disagree	11(22)	14(36.8)	≤0.001
		Uncertain	22(44)	0(0)	
		Strongly Agree	17(34)	24(63.2)	
30	The participant felt discriminated against in theater because of his/her gender	Strongly Disagree	14(28)	9(23.7)	0.004
		Uncertain	22(44)	6(15.8)	
		Strongly Agree	14(28)	23(60.5)	
31	The participant felt discriminated against in theatre because of his/her race	Strongly Disagree	9(18)	21(55.3)	≤0.001
		Uncertain	16(32)	12(31.6)	
		Strongly Agree	25(50)	5(13.2)	
33	The participant was too busy doing other tasks to go to the theatre	Strongly Disagree	15(30)	5(13.2)	0.062
		Uncertain	10(20)	12(31.6)	
		Strongly Agree	18(36)	21(55.3)	
34	The participant was often too tired to get the most out of the teaching about theatre	Strongly Disagree	21(40)	14(36.8)	0.953
		Uncertain	7(14)	5(13.2)	
		Strongly Agree	23(46)	19(50)	
35	The participant was so stressed in theatre that he/she could not learn much	Strongly Disagree	20(40)	13(34.2)	0.541
		Uncertain	8(16)	4(10.5)	
		Strongly Agree	22(44)	21(55.3)	
36	The participant was asked to perform operations alone for which he/she was not feeling competent	Strongly Disagree	14(28)	19(50)	0.020
		Uncertain	17(34)	4(10.5)	
		Strongly Agree	19(38)	15(39.5)	
37	Nobody covered the ward when the participant was in the theatre	Strongly Disagree	10(20)	12(31.6)	0.092
		Uncertain	5(10)	8(21.1)	
		Strongly Agree	35(70)	18(47.4)	
38	The participant got bleeped during operations	Strongly Disagree	30(60)	24(63.2)	0.144
		Uncertain	11(22)	3(7.9)	
		Strongly Agree	9(18)	11(28.9)	
40	The theatre sessions were too long	Strongly Disagree	21(42)	27(71.1)	0.004
		Uncertain	6(12)	6(15.8)	
		Strongly Agree	23(46)	6(13.2)	

DISCUSSION

The journey from understanding abstract information to applying it as a new professional in the clinical setting is never simple. Anxiety is seen among medical students during this transition because students' attitudes radically change when they go from the classroom to the clinical learning environment [15].

The trainee's views of the environment have an impact on learning outcomes and experiences, and they are favorably connected with a positive learning experience [14]. The

purpose of this study is to examine potential changes and how undergraduate surgical training is perceived by students. The students in this study had their first experience with an operating room when they were in the pre-clerkship stage, which was intended to promote learning in the clinical context. The research goal and the already available literature are taken into consideration when we examine the study's findings.

This study's overall mean score was similar to the previous STEEM studies [16,17]. However, this finding is in contrast to the study done in Lahore where the satisfaction level was below satisfactory. The results of the study implied that the environment required multiple measures for improvement [9]. The LCMD students support their involvement in Surgical theater classes and think their teachers are competent and informed. They also thought that the trainers cared about their growth and provided helpful critiques. The highest ratings were given to item 4, demonstrating that the instruction is decisive, interesting, and helping the students develop desirable competence and confidence.

The highest ranked items, for example, " The trainer was genuinely interested in participants'progress"—reflect students' support for the student-centered curriculum at LCMD. It is satisfying for us as educators to know that our final-year medical students are satisfied with the learning environment of surgical theatre. According to an observational study on intra-operative teaching interactions, when teachers facilitate operations through "instrumental interactions" without providing an explanation, "the learner is left to infer the lesson to be learned" [18].

The statement "The participant got bleeped during operations" was the least rated. It is important to acknowledge that applying a questionnaire designed for postgraduate surgical trainees to undergraduates may have limitations. Specifically, statements related to junior doctors' duties may result in an overestimation of the perceived educational environment since undergraduates are not expected to perform these duties nor do they carry a bleep. Students are likely to rate this statement incorrectly.

The learners were pleased with their instructors' encouragement of their development and constructive feedback. Feedback, according to medical educators, is one of the essential catalysts needed for high-quality learning and performance development [19]. The study's participants appreciated that instructors went over pre-procedure processes and surgical skills. They also believed that the surroundings were more than enough and that the volume and variability of emergency cases gave them the chance to acquire essential knowledge [16,17].

A study in Sri Lanka revealed that a welcoming learning environment with regular feedback could enhance the learning experience of medical students in surgical theatre. [20]. Another important finding of the current study is the inequality of scores between genders, with males having marginally higher scores as shown in Table-IV. The absence of gender awareness and female role models contributes to the underrepresentation of women in surgical academics [21].

The subscale analysis revealed a few distinctions between the current study and similar matched studies. "Teaching and Training" had the highest score on the current subscale, which is in agreement with the findings in a previous study done in the UK [22]. All the subscales obtained high mean ratings, indicating that the fundamental conditions for effective training are met with excellent training in a satisfactory training environment. The current study differs from a Saudi study in that the subscales "learning opportunities" and "supervision/workload/support" received the highest rankings in the later study [23]. Whereas "learning opportunities" was the least-rated subscale by UK trainees, the least-rated subscale in the current study was "supervision/workload/support [22]." This discrepancy may be brought on by Pakistan's lower socioeconomic status population, which may be contributing to an increase in workload, extended duty hours, and lengthy surgical sessions because of staff and resource shortages. Physician job dissatisfaction in Pakistan due to socioeconomic status, increased workload, and healthcare reforms [24].

According to the report, LCMD has a favorable learning atmosphere, which helps the institution's surgical training program's reputation. Additionally, it will motivate medical educators to enhance their teaching and learning processes over time and spur this development. Although scores of 73.6% and 69.5% were considered satisfactory in the previous studies, a Canadian study [25] states that scores below 80% are indicative of a less-than-satisfactory learning environment since they fall between the ranges of uncertain (60%) and agree (80%) on a Likert's nonparametric scale. However, the study highlights that there is still room for improvement in the operating theatre educational environment, which presents an opportunity for positive changes that could benefit both undergraduate and postgraduate surgical trainees. It is important to acknowledge the limitations of the study and carefully consider the implications of the findings. Nonetheless, the study still provides valuable insights into the surgical learning environment.

The overall Cronbach alpha coefficient of STEEM was 0.75, and the individual values for the subscales of supervision/workload/support, learning opportunities, atmosphere, and teaching and training were 0.74, 0.80, 0.70, and 0.74, respectively, as shown in Table II, which showed that it is a reliable scale in measuring the surgical environment in Pakistani context. Based on the concerns identified about the average ratings, focus groups with students as well as instructors are recommended for an in-depth examination of the phenomena.

LIMITATIONS:

As this study is limited to a single center, we cannot generalize the results. Furthermore, it doesn't contain enough samples, which also affects the results. A mixed study with more sample size and qualitative data is needed to explore the domains of the learning environment of the surgical theatre. The study also highlighted the limitations of using a questionnaire designed for postgraduate surgical trainees on undergraduates.

CONCLUSION

This study examined the students' perspectives using the STEEM questionnaire. According to the findings, students had generally positive perceptions of instruction and training, learning opportunities, environment, supervision, workload, and support. Students appreciate the student-centered learning in surgical theatre. However, there are certain areas for improvement were identified, such as the need for increased gender awareness and female role models in surgical academics.

Moreover, the STEEM questionnaire's reliability was established in measuring the surgical learning environment in the Pakistani context. It is recommended that further qualitative research should be conducted to gain a deeper understanding of the identified concerns and to facilitate ongoing improvements in the surgical educational environment.

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Syeda Rubaba Azim: Drafting and interpretation of data for the work
Mutayyaba Majeed: Final approval of the version to be published.