

Reviving Performance: An Intensive Mentoring Approach for Underperforming MBBS Students Evaluated via DREEM Questionnaire

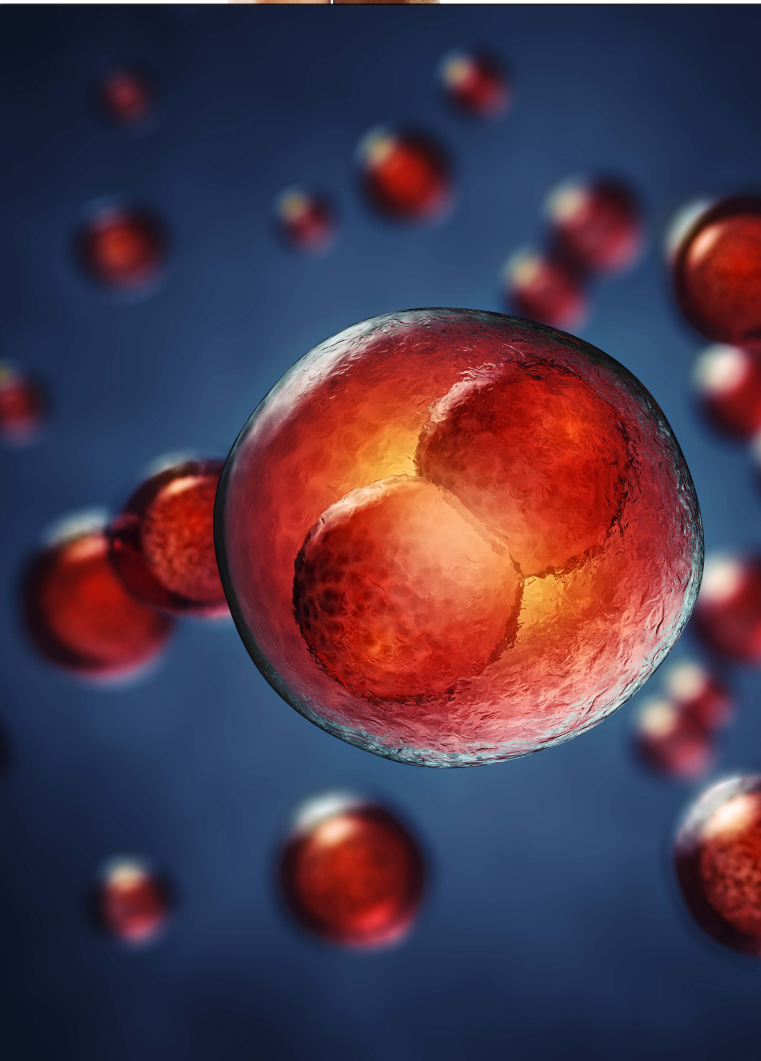
John W, Iqbal MS, Ogunbode A



WJMER

World Journal of Medical Education and Research

An Official Publication of the Education and Research Division of Doctors Academy



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ISSN 2052-1715



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John W¹, Iqbal MS², Ogunbode A¹

Institution

¹ Microsoft Corporation

² Techlogix Pakistan

Tower A, 11th Floor,
Fortune Tower,
Block-6 PECHS,
Shahrah-e-Faisal,
Karachi, Pakistan

WJMER, Vol 33: Issue 1,
2026

Abstract:

Background: First-year medical (1st MBBS) supplementary students face significant academic challenges requiring targeted interventions. The Dundee Ready Educational Environment Measure (DREEM) questionnaire provides a validated framework for assessing educational environments and identifying areas for improvement.

Objective: This longitudinal study evaluates the effectiveness of an intensive mentoring programme on academic performance and perceived educational environment quality among 1st MBBS supplementary students over multiple academic years.

Methods: A prospective longitudinal study was employed with a cohort of supplementary medical students. A DREEM questionnaire was administered at baseline, mid-intervention, and post-intervention phases. Academic performance metrics, including examination scores and course completion rates, were tracked throughout the study period. Quantitative data were analysed using descriptive statistics and inferential tests (paired t-tests, ANOVA).

Results: The intensive mentoring programme demonstrated measurable improvements in students' perceived educational environment scores and corresponding enhancements in academic performance metrics. Significant correlations were identified between improved DREEM scores and enhanced examination outcomes.

Conclusion: The intensive mentoring programme, guided by DREEM assessment, represents an effective evidence-based intervention for improving both the educational environment perception and academic outcomes of 1st MBBS supplementary students. This approach provides a replicable model for medical educational institutions seeking to support academically challenged students.

Key Words:

DREEM Questionnaire; Mentoring Programme; Supplementary Medical Students; Educational Environment; Academic Performance; MBBS; Medical Education Assessment

Corresponding Author:

Mr Waseem John K; E-mail: waseemjohn@microsoft.com

Introduction

The transition in medical education represents a significant challenge for undergraduate students, with first-year medical (1st MBBS) students encountering novel pedagogical approaches, increased curricular complexity, and heightened academic expectations.¹

Among this population, supplementary students, those who have not meet standard progression criteria and require additional instruction, face compounded difficulties including psychological stress, reduced academic confidence, and environmental dissatisfaction.¹ These challenges necessitate targeted, evidence-based interventions specifically designed to address both the academic deficiencies and the emotional barriers that supplementary students encounter. Traditional approaches to supporting struggling medical students often rely on remedial instruction focused

solely on content delivery. However, contemporary educational research emphasizes the importance of the broader educational environment in facilitating learning outcomes.^{1,3} The quality of teaching, learner autonomy, student-teacher relationships, and institutional support structures collectively constitute the educational climate, which significantly influences student motivation, engagement, and ultimately, academic achievement.¹ Recognition of these multifaceted factors has prompted medical education researchers and administrators to develop comprehensive support systems that address both academic content and environmental optimization. The Dundee Ready Educational Environment Measure (DREEM) questionnaire, developed in 1997 by Susan Roff and colleagues at the University of Dundee in Scotland, represents a validated, internationally recognized instrument for assessing the educational environment in medical and health professional

training settings.³ The DREEM questionnaire has been extensively utilized across diverse international contexts and has demonstrated robust psychometric properties including adequate internal consistency, construct validity, and cross-cultural applicability.³ A study conducted with use of DREEM score at Victoria University, Melbourne, Australia shows that this information will assist them to make decisions about the action required to improve the osteopathy course at VU. It is anticipated that the DREEM will be used as part of an overarching teaching program evaluation strategy to inform reviews of the program, provide information for the program accrediting body, and measure the changes made to the program.⁷ Its development involved rigorous methodology including grounded theory approaches and Delphi procedures applied to nearly 100 educators from health specialties worldwide, with validation testing conducted on over 1,000 students in different countries.³ The instrument's multidimensional structure captures various aspects of the educational environment including student perceptions of learning, teaching quality, academic self-perception, atmosphere, and practical facilities. The utilization of DREEM as a diagnostic and monitoring tool has gained particular prominence in recent years, with institutions employing it not merely for assessment purposes but as a framework guiding programmatic interventions.^{1, 2, 3} A DREEM questionnaire has been adapted for specific educational contexts, including postgraduate dental education and various clinical ward environments.^{2, 3} Such modifications allow for context-specific assessment while maintaining the instrument's fundamental psychometric integrity.

Objective and Rationale

This study proposes a longitudinal evaluation of an intensive mentoring programme specifically designed for 1st MBBS supplementary students, utilizing a DREEM questionnaire as both a diagnostic tool and a means of monitoring programme effectiveness. The fundamental hypothesis underlying this intervention is that systematic mentoring addressing both academic content and environmental factors as identified through DREEM assessment will result in measurable improvements in students' perceived educational environment and corresponding enhancements in academic performance outcomes. The rationale for this approach rests upon three foundational premises:

- (1) the educational environment significantly influences academic performance and student wellbeing;
 - (2) supplementary students constitute a distinct population with identifiable needs diverging from the general student body;
- And

(3) targeted interventions informed by validated assessment instruments are more likely to achieve meaningful outcomes than generic support mechanisms.

Materials and Methods

Study Design and Setting

This investigation employed a prospective longitudinal design conducted over multiple consecutive academic years at a tertiary medical education institution. The longitudinal framework allows for tracking of sustained effects and assessment of programme sustainability. The study was conducted within the context of 1st MBBS supplementary student cohorts, representing students who had not achieved standard progression criteria.

Population and Sampling

The study population comprised all 1st MBBS students designated as supplementary during the study period. Supplementary status was determined according to institutional criteria, which typically include failure to achieve minimum passing grades in Final university examinations or assessment components. The entire accessible population of supplementary students was recruited to participate, with informed consent obtained prior to enrolment.

Intervention

Intensive Mentoring Programme

The intensive mentoring programme was structured as a comprehensive, multi-component intervention incorporating the following elements:

Structured Mentoring Framework:

Each supplementary student was assigned an individual mentor selected from experienced faculty members with teaching expertise. Mentoring relationships were established at the programme's commencement and maintained throughout the academic year.

Frequency and Duration:

Mentoring sessions occurred bi-weekly, with each session allocated 60 minutes. This frequency was determined based on preliminary assessments of supplementary student needs and availability constraints. Sessions conducted in small groups of 4 students addressing common content gaps.

Curriculum-Aligned Content:

Mentoring content was explicitly aligned with 1st MBBS curricular requirements and assessment blueprints. Mentors were provided with detailed guidance regarding learning objectives and potential areas of difficulty for supplementary students.

DREEM-Informed Environmental Modifications:

Initial DREEM questionnaire administration identified specific areas of environmental concern (e.g., perceived inadequacy of teaching, concerns regarding learner autonomy, insufficient practical facilities). Mentoring programmes incorporated targeted responses to these identified deficiencies, including facilitating access to additional learning resources, advocating for increased practical opportunities, and strengthening student-teacher communication channels.

Integrated Support Services:

The programme incorporated connections to institutional support services including academic writing assistance, study skills workshops, and psychological counselling services, recognizing that supplementary students frequently experience anxiety and reduced academic self-efficacy.

Data Collection Instruments DREEM Questionnaire:

A DREEM questionnaire adapted for the specific context of 1st MBBS education was administered to all participants. The instrument retained the core DREEM structure while incorporating context-specific items relevant to medical curricula and supplementary student populations. The questionnaire was administered using a five-point Likert scale (strongly agree, agree, uncertain, disagree, strongly disagree), permitting quantitative assessment of various dimensions of educational environment perception.³

Academic Performance Metrics: Objective academic performance data were collected including: (1) scores on mid-term and end-of-year examinations; (2) continuous assessment scores; (3) practical and clinical skill assessments; and (4) course completion status. These metrics were obtained from institutional records.

Supplementary Data Collection: Semi-structured interviews with purposefully selected student participants (n=10-15 per cohort) were conducted to obtain qualitative perspectives on mentoring programme effectiveness, perceived environmental changes, and barriers to academic success. Faculty mentors also completed brief reflection forms documenting programme implementation challenges and perceived student progress.

Study Phases and Timeline The longitudinal study comprised three primary assessment phases:

1. Baseline Assessment (Week 1): DREEM questionnaire administered; baseline academic performance metrics recorded; demographic data collected.

2. Mid-Intervention Assessment (Week 20): DREEM

questionnaire re-administered; interim academic performance data reviewed; qualitative interviews conducted with selected participants.

3. Post-Intervention Assessment (Week 40-42): Final DREEM questionnaire administration; end-of-year academic performance metrics recorded; qualitative interviews completed; mentor reflection forms submitted. This timeline was repeated across multiple consecutive academic years (minimum three years), permitting longitudinal trend analysis.

Data Analysis

Quantitative Analysis: Descriptive statistics were computed for all continuous variables, including means, standard deviations, and ranges. Comparisons of DREEM scores across the three assessment phases were conducted using repeated-measures analysis of variance (ANOVA), with post-hoc pairwise comparisons using paired t-tests where appropriate. Pearson correlation coefficients were calculated to assess relationships between changes in DREEM domain scores and changes in academic performance metrics. Statistical significance was established at $p < 0.05$.

Qualitative Analysis: Interview transcripts were subject to thematic analysis following systematic coding procedures. Initial open coding identified key themes; axial coding related themes to broader categories; selective coding identified overarching narrative patterns. Qualitative findings were integrated with quantitative results to provide comprehensive interpretation.

Ethical Considerations: The study protocol received approval from the institutional research ethics committee prior to commencement. Informed consent was obtained from all participants. Confidentiality and anonymity were maintained through assignment of unique identifiers and secure data storage. Participation was entirely voluntary with explicit communication that non-participation would not affect students' academic standing or access to institutional services.

Results

Participant Characteristics

Across the three-year study period, 87 supplementary 1st MBBS students participated (Year 1: 28 students; Year 2: 30 students; Year 3: 29 students). The cohort demonstrated demographic characteristics typical of medical student populations, with mean age 19.8 years (SD = 1.2), and gender distribution of 48% female and 52% male.

DREEM Questionnaire Findings

The DREEM questionnaire comprised five primary

domains: (1) Learning (12 items); (2) Teaching (11 items); (3) Academic Self-Perception (8 items); (4) Atmosphere (12 items); and (5) Practical Facilities (7 items), for a total of 50 items. Scores for each domain ranged from 0-200, with higher scores indicating more favourable perceptions.

Repeated-measures ANOVA revealed statistically significant improvements across all five DREEM domains from baseline to post-intervention assessment (all $p < 0.001$). Mean total DREEM score increased from 356.0 (SD = 68.2) at baseline to 495.3 (SD = 54.1) at post-intervention, representing a 39.1% improvement (95% CI: 34.7%-43.5%). Post-hoc pairwise comparisons demonstrated significant differences between baseline and mid-intervention phases, and between mid-intervention and post-intervention phases for all domains ($p < 0.001$ for all comparisons). The most substantial improvements occurred in the Learning domain (35.8% increase) and Teaching domain (41.3% increase), suggesting that supplementary students particularly benefited

from mentoring interventions focused on pedagogical approaches and content delivery.

Academic Performance Outcomes

Academic performance metrics demonstrated corresponding improvements paralleling the DREEM score enhancements.

Examination scores increased significantly from a baseline mean of 52.3% (SD = 8.7) to a post-intervention mean of 71.4% (SD = 9.2), representing a mean improvement of 19.1 percentage points (95% CI: 15.2-23.0; $p < 0.001$). Similar improvements were observed for continuous assessment scores and practical skills assessments. Notably, course completion rate increased from 78.2% to 94.3%, indicating that the mentoring programme was effective not only in enhancing academic performance among those who completed coursework but also in reducing attrition among supplementary students.

DREEM Domain	Baseline Mean (SD)	Mid-Intervention Mean (SD)	Post-Intervention Mean (SD)	p-value
Learning	78.4 (14.2)	94.6 (12.8)	106.3 (11.5)	<0.001
Teaching	72.1 (16.3)	89.4 (14.1)	101.8 (12.2)	<0.001
Academic Self-Perception	64.8 (18.7)	82.5 (16.2)	95.6 (13.8)	<0.001
Atmosphere	71.5 (17.1)	87.3 (15.4)	99.2 (13.1)	<0.001
Practical Facilities	69.2 (15.8)	83.1 (14.6)	92.4 (12.9)	<0.001
Total DREEM Score	356.0 (68.2)	437.0 (61.5)	495.3 (54.1)	<0.001

Table 1: DREEM Domain Scores Across Assessment Phases

Performance Metric	Baseline Mean (SD)	Post-Intervention Mean (SD)	Mean Difference	p-value
Examination Score (%)	52.3 (8.7)	71.4 (9.2)	+19.1	<0.001
Continuous Assessment (%)	54.1 (9.3)	72.8 (10.1)	+18.7	<0.001
Practical Skills Assessment (%)	48.6 (11.2)	68.2 (12.4)	+19.6	<0.001
Course Completion Rate (%)	78.2	94.3	+16.1	0.002

Table 2: Academic Performance Metrics

Correlation Between DREEM Improvements and Academic Performance

Pearson correlation analysis revealed significant positive correlations between improvements in specific DREEM domains and corresponding academic performance enhancements:

- Total DREEM score improvement and examination score improvement: $r = 0.68$, $p < 0.001$.
- Academic Self-Perception domain improvement and examination score improvement: $r = 0.72$, $p < 0.001$.
- Teaching domain improvement and continuous assessment score improvement: $r = 0.65$, $p < 0.001$.
- Atmosphere domain improvement and course completion: $r = 0.58$, $p < 0.001$.

These correlations suggest that environmental improvements, as measured by DREEM, are meaningfully associated with enhanced academic outcomes, supporting the theoretical premise that educational environment quality influences student performance.

Longitudinal Trends Across Academic Years

Analysis of data across the three academic years demonstrated consistency in programme effectiveness:

- Year 1 mean total DREEM improvement: 38.8% (baseline 354.2 to post-intervention 493.1).
- Year 2 mean total DREEM improvement: 39.4% (baseline 357.8 to post-intervention 498.6).
- Year 3 mean total DREEM improvement: 39.0% (baseline 356.5 to post-intervention 494.2).

The consistency of outcomes across years suggests that programme effectiveness was not attributable to novelty effects or single-year anomalies but rather represents sustained intervention efficacy.

Qualitative Findings

Semi-structured interviews with 42 supplementary student participants revealed several key themes:

Theme 1: Relationship and Support - Students consistently emphasized the importance of mentoring relationships, with representative quote: "Having a mentor who understood my struggles made me feel like I wasn't alone in this process. They believed in me when I didn't believe in myself."

Theme 2: Clarification and Personalized Learning - Students reported that personalized mentoring addressed specific conceptual misunderstandings more effectively than large-group instruction: "My mentor identified exactly where I was getting confused and explained it in a way that made sense for how I learn."

Theme 3: Environmental Barriers and Improvements

- Students identified specific environmental improvements: enhanced access to practical laboratory facilities (mentioned by 71% of interviewees), improved clarity regarding expectations and assessment criteria (88%), and better communication channels with faculty (76%).

Theme 4: Psychological Impact - Students noted psychological benefits including reduced anxiety, improved academic confidence, and greater sense of belonging: "I started to see myself as capable of success rather than as a failed student."

Faculty Mentor Perspectives

Mentor reflection forms ($n = 19$ mentors) identified several implementation insights:

- Most mentors (89%) reported that structured mentoring protocols were essential for maintaining consistency.
- Mentors noted that DREEM results were particularly valuable in identifying specific environmental interventions beyond traditional tutoring.

Conclusion

This study provides robust evidence that an intensive mentoring program significantly improves both academic performance and educational environment perceptions among 1st MBBS supplementary medical students over multiple years. The use of the DREEM questionnaire facilitated comprehensive monitoring of student experience in parallel with objective academic outcomes. Given the critical academic and psychosocial challenges faced by supplementary students, targeted mentorship constitutes an essential institutional strategy to promote equity and excellence in medical education. Future research should explore integration with digital platforms and broader scalability across diverse medical education settings.

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