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Research Protocol

Education Section

Effectiveness of CBME Electives for Undergraduates in a Government Medical College, West Bengal, India: A Research Protocol

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ABSTRACT

Introduction: The Competency-Based Medical Education (CBME) curriculum, introduced by the National Medical Commission (NMC), represents a transformative approach to undergraduate medical training in India. Within this framework, the incorporation of Electives enables students to explore areas of personal interest, enhance clinical and research competencies and foster professional development.

Need of the study: Although electives have been well-received, effective implementation requires active engagement from all stakeholders. Despite the completion of Electives postings by a few Bachelor of Medicine and Bachelor of Surgery (MBBS) batches, challenges persist in ensuring their optimal execution and efficacy. Previous studies have mainly employed observational methods, focusing on student or faculty perceptions. However, these evaluations have overlooked the perspectives of the Planning and Implementation Committee (PIC) members who play a vital role in shaping curriculum design, resource allocation and policy development.

Aim: This study aims to systematically evaluate stakeholder perceptions (students, faculty and PIC members) and implement targeted changes based on these insights.

Materials and Methods: This quasi-experimental study will be conducted at the Burdwan Medical College, Kolkata, West Bengal, India from March 2025 to December 2025, using three distinct self-administered semi-structured questionnaires including MBBS students from two consecutive batches (2020-21 and 2021-22), their preceptors and PIC members regarding the Elective module. An intervention involving the design of operational guidelines and induction sessions for students and faculty will precede Electives for the 2021-22 batch of students. Descriptive statistics (frequency, percentage, mean, median, standard deviation) will summarise responses to closed-ended questions. Inferential statistics such as paired t-tests and Chi-squared tests will be used for comparative analysis of responses from both participant groups. The p-value <0.05 will be considered significant. Open-ended responses will undergo thematic analysis to extract core insights and patterns.

Keywords: Competency-based medical education, Electives program, Perception, Preceptors

INTRODUCTION

Although electives have long been recognised as integral to undergraduate medical curricula globally, their inclusion in the Indian undergraduate medical curriculum is very recent [1]. The first batch of CBME curriculum (MBBS batch 2019-20) in India underwent electives in 2023 as per NMC guidelines, which stipulate a month-long electives following Phase III Part I, divided into two, two-week blocks. Block I involves rotation in a preclinical, paraclinical, basic science laboratory, or active research project, while Block II occurs within a clinical discipline or community setting. Institutions determine elective topics, preceptors and student allocations to electives. Preceptors are responsible for setting learning objectives, prerequisites and assessment plans. A minimum of 75% student attendance and logbook completion is mandatory; the assessment can be formative as per the MCI guidelines [2].

The electives within the CBME curriculum serve to enrich learners' educational journeys by offering different learning experiences. These electives are designed to foster research and community projects, promoting inquiry, self-directed learning, experiential engagement and innovative thinking, as outlined in the NMC electives booklet [2].

While the core curriculum remains essential, electives empower students to select topics aligned with their interests, allowing them to explore areas beyond the standard syllabus. This hands-on exposure to research, laboratory dynamics and community practices is said to equip learners with the knowledge to make informed decisions about pursuing specific subjects for their master's degrees. Even for those who opt not to continue in their elective-related fields, the skills acquired will remain valuable and applicable in future endeavours [3].

Despite broad adoption, the implementation and impact of electives remain understudied in India. Most published studies have focused on either student perceptions alone [3-6] or on student and faculty perceptions together [7,8]. These were mainly descriptive studies that used cross-sectional designs; there is no mention of re-evaluation of the programme after modifications were implemented. Therefore, this quasi-experimental study will aim to address these gaps by assessing the perceptions of all stakeholders (students, faculty and PIC members) regarding the elective programme implemented in a government medical college in West Bengal, incorporating need-based modifications such as formulation of operative guidelines and introduction of student as well as faculty (preceptor) induction programmes before elective postings of the next batch of MBBS students and reassessing the programme's outcome. Hence the objectives of the study are:

- To identify the gaps and opportunities for improvement within the electives programme based on stakeholder feedback.
- To implement the modifications proposed by stakeholders, such as designing operational guidelines and introducing induction sessions for students and faculty before the next Elective postings.
- To assess programme effectiveness following the implementation of these modifications.

Null hypothesis (H_0): There is no significant difference in student and preceptor perceptions of the electives programme before and after implementing the intervention package.

Alternative hypothesis (H_1): There is a significant improvement in student and preceptor perceptions of the electives programme after implementing the intervention package.

REVIEW OF LITERATURE

Among the many changes within CBME, the introduction of "electives" stands out as one of the most crucial and contemporary changes [9,10]. An elective is a learning experience: a voluntary option to research, unearth, involve and understand an area of interest in the medical curriculum that enhances 'transformative learning' for the given learner (student) [1,11]. The study by Lumb A and Murdoch-Eaton D explored the role of electives in medical education, emphasising their flexibility and potential to enhance learning [1].

In their study on the perception of medical students regarding the implementation of the elective module, Vidja K et al., reported that most students rated elective experiences as "good". The majority of students mentioned that the objectives of the elective module were largely met, the faculty were helpful and responsive and that they actively participated in the electives. They found electives to be a good academic activity, with opportunities for creativity and teamwork and found the electives time duration to be appropriate. However, there were concerns about getting faculty signatures in the logbooks [3]. Sinha N et al., studied the perception of MBBS students towards 'electives' across the phases. The authors observed limited student awareness regarding electives, even in the batch that was supposed to pursue electives, highlighting gaps in knowledge of related guidelines [4]. Kaur G et al., found that the electives were viewed favourably by the students, with their proactive engagement seen as critical for maximising electives' benefits [5]. Likewise, Manzoor A et al., documented high satisfaction among students and faculty concerning the learning environment during the programme. They had also discussed the challenges felt by students and faculty [7]. Sethi S et al., emphasised the positive reception of the programme by the students. Their study highlighted the potential of electives in undergraduate medical curricula by pointing out the possible determinants of students' satisfaction [6]. Inamdar P et al., concluded that both faculty and students found the module satisfactory, with potential for further improvement and refinement [8].

Most existing literature employs cross-sectional quantitative approaches and none have included perspectives of the elective PIC members. Considering their central role in planning and implementing electives, understanding their experiences is vital for programme improvement. Therefore, this study aims to assess the effectiveness of the elective modules implemented within the undergraduate CBME curriculum, incorporating feedback from the stakeholders involved in the programme (students, faculty and PIC members).

MATERIALS AND METHODS

A quasi-experimental pre-post design with non equivalent groups (two consecutive MBBS batches and their preceptors) will be conducted at the Burdwan Medical College, Kolkata, West Bengal, India from March 2025 to December 2025. Institutional Ethics Committee (IEC) approval (BMC/IEC/470, March 20, 2025) has been obtained. Informed consent will be secured from all participants.

The study will include two groups of participants: 1) MBBS students from batch 2020-21 who have already completed elective postings, their preceptors and PIC members; 2) MBBS students from batch 2021-22 and their preceptors, following modifications in the electives programme as per the feedback of the first group of participants.

Inclusion and Exclusion criteria: Subjects who will give consent to participate in the study will be included; those who fail to submit complete questionnaires will be excluded.

The total strength of MBBS students in each batch is 200 and 20 faculty members are appointed as p receptors for each batch of MBBS. There are 10 members in the electives PIC/PIC.

Sample size calculation: Following Cohen's conventions, small effect sizes of d=0.20 were considered, for a paired pre-post design, the required sample size for detecting a standardised mean difference was estimated using:

A two-sided significance level of 0.05 and a statistical power of 80% were assumed,

$n=(Z1-\alpha/2+Z1-\beta)^2/d^2$

Calculation for d=0.20:

$Z1-\alpha/2=1.96$, $Z1-\beta=0.84$

Sum=2.80, $(Sum)^2=7.84$

$d^2=0.04$

$n=7.84/0.04=196$

Since each batch contains 200 students, all will be invited to ensure adequate power:

Batch 2020-21 and their preceptors = Pre-intervention group;

Batch 2021-22 and their preceptors = Post-intervention group.

Study Procedure

Three separate semi-structured, self-administered questionnaires (comprising closed and open-ended items) are drafted for students, preceptors and PIC members [ANNEXURE I, II, III]. Student and preceptor questionnaires are designed based on existing literature and expert review [Annexure I, II] [3-8]. The questionnaire for PIC members is drafted by the authors [Annexure III]. Validation of the questionnaires is done by three senior faculty members of the Institution. Based on their feedback, minor changes will be made in the questionnaires, followed by a pilot study involving 20 Batch 2019-2020 MBBS students, three preceptors and two PIC members (10% of the sample size) who will not be included in the main study. Instrument reliability will be established using Cronbach's alpha ≈ of 0.9 following piloting.

As per NMC guidelines, Elective topics for both blocks will be distributed to 200 MBBS students of Batch 2020-21 three months before the elective postings. Each Block comprises of 10 topics, proposed by various departments and selected by the PIC [Table/Fig-1]. For each topic, at least one preceptor will be nominated by the respective departments. The students will then be divided into two groups, Group-A and B, of 100 students each, with 10 students assigned per topic. Group-A attended Block-I postings and Group-B attended Block-II; after two weeks, the groups will be switched. A 75% attendance and logbook review by the preceptors are compulsory [2]. These will be reviewed manually by the investigators.

Three separate questionnaires will be shared with the first group of participants (students of the MBBS batch 2020-21, their preceptors and the PIC members) as Google Forms. Quantitative and qualitative data from these responses will be analysed and used to guide targeted revisions in the electives programme. For quantitative data, 5-point Likert scale responses or dichotomous questions will be employed, as outlined in [ANNEXURE I,II]. Responses from all participants will remain confidential and anonymised.

Subsequently, a one-month period of interventions will take place, including the formulation of operational guidelines for stakeholders and induction sessions for students and preceptors ahead of the 2021-22 batch electives. After the PIC develops the operational guidelines for both preceptors and students, a full-day electives sensitisation workshop will be organised by PIC members for the preceptors. During this workshop, they will be trained in electives

S. No.	Elective topics	Subject
Block I		
1.	Body donation, embalming and cadaver preservation in different clinical scenario.	Anatomy
2.	Immunoassay in clinical Biochemistry	Biochemistry
3.	Ethical perspective of use of AI in medical education	Physiology
4.	Laboratory Detection and Antimicrobial susceptibility of blood stream infection in a tertiary care hospital	Microbiology
5.	Infection prevention and control measures in operation theatres	
6.	Cytology - Utilisation of cytopathology for rapid screening of neoplastic lesions.	Pathology
7.	Pharmacovigilance	Pharmacology
8.	Skill development in effective vaccine management	Community medicine
9.	Institution based health care delivery assessment	
10.	Deposing evidence in a court of Law	Forensic medicine
Block II		
1.	Biometry in day to day practice	Ophthalmology
2.	Hearing Assessment	ENT
3.	Study of pattern of injury in patients admitted with road traffic accident	Surgery
4.	ECG technique and interpretation	Medicine
5.	High risk obstetrics	Gynaecology-Obstetrics
6.	Low back pain: Approach	Orthopaedics
7.	Triage in paediatric emergency room	Paediatrics
8.	Management of trauma care in emergency room and OT	Anaesthesia
9.	Concepts of mental health	Psychiatry
10	Interpretation of basic radiographic images	Radiology

[Table/Fig-1]: List of elective topics for each block.

topic selection, designing electives modules specific to their departments and implementing electives in accordance with the operational guidelines. The list of proposed electives topics will be provided to the PIC, who will then finalise the new selection of electives topics for the 2021-22 batch.

This will be followed by a one-day session on 'Student Orientation of electives' conducted by PIC members, where students will learn about the purpose of the electives, its benefits for learners, how to select electives topics and the operational guidelines. They will also be provided with the updated list of electives topics. Subsequently, online counselling will be offered to assist with electives topic selection. The sensitised group of students from the 2021-22 batch will then undertake a one-month electives posting, in accordance with NMC guidelines, under the supervision of trained preceptors. During these postings, students will receive ongoing support from PIC members.

The same questionnaires, as used with non sensitised students and untrained preceptors, will be shared with the second group of participants-namely, sensitised students of the MBBS batch 2021-22 and trained preceptors as Google Forms. Quantitative and qualitative data collected from these responses will be analysed and compared with data from the first group.

Outcomes

Improvement in the structural indicators, students' compliance, preceptors' preparedness and the satisfaction level of students and preceptors will be assessed. Responses to open-ended questions will be analysed thematically and presented in the coding matrix [Table/Fig-2]. The month-wise schedule of the research protocol has been presented in [Table/Fig-3].

A) Coding matrix template for student and faculty responses to open-ended questions:

Main theme	Subthemes/ Codes	Representative Quotations (Example student/ Faculty responses)	Interpretation/ Inference

B) Coding Matrix Template for PIC members responses to open-ended questions.

Main theme	Subthemes/ Codes	Representative quotations (Example faculty responses)	Interpretation/ Inference
1. Planning challenges			
2. Implementation issues			
3. Resource and infrastructure constraints			
4. Faculty awareness and orientation			
5. Suggestions for improvement			

[Table/Fig-2]: Coding matrix template.

STATISTICAL ANALYSIS

Data will be analysed using Jamovi software (version 2.6.44.0). Descriptive statistics (frequency, percentage, mean, median, standard deviation) will summarise responses. A paired t-test will be used for intragroup comparison and a Chi-square test will be used to compare categorical data (frequencies and percentages) between the groups. A p-value <0.05 will indicate statistical significance.

S. No	Timeline-> Task	Nov 24	Dec 24	Jan 25	Feb 25	March 25	April 25	May 25	June 25	July 25	Aug 25	Sept 25	Oct 25	Nov 25	Dec 25
1.	Finalisation of the topic	■	■												
2.	Protocol submission			■	■										
3.	IEC Approval			■	■	■									
4.	Review of literature		■	■	■	■	■	■	■	■					
5.	Data collection					■	■	■	■						
6.	Data entry					■	■	■	■	■					
7.	Data analysis					■			■	■	■	■			
8.	First draft of report											■	■		
9.	Final report													■	■

[Table/Fig-3]: Month-wise schedule of the research protocol.

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[ANNEXURE 1]: STUDENT FEEDBACK QUESTIONNAIRE ON ELECTIVES.

Section 1: Factual/Logistical Information

1. The duration of Electives program in your institution
2. How many blocks were there during Electives
3. How many topics could you choose and attend during electives
4. Topic of your Block I electives
5. How many students were there in your group in Block I?
6. Topic of your Block II electives
7. How many students were there in your group in Block II?
8. Did you use the electives duration to make up for the pending assignments? (Yes/No)
9. Did you use the Electives duration for clinical postings? (Yes/No)
10. Did you set the objectives for yourself for the topic chosen for Block I? (Yes/No)
11. Was there any formative assessment during Block I Electives? (Yes/No)
12. Were you able to achieve the objectives you had set for yourself for Block I? (Yes/No)
13. Did you set the objectives for yourself for the topic chosen for Block II? (Yes/No)
14. Was there any formative assessment during Block II Electives? (Yes/No)
15. Were you able to achieve the objectives you had set for yourself for Block II? (Yes/No)
16. Did you complete the Electives? (Yes/No)
17. How frequently was your logbook reviewed by the faculty assigned? (Regularly/intermittently/at the end)
18. How frequently did you update the logbook? (Regularly/intermittently/at the end)
19. Was your logbook signed by the HOD at the end of the electives? (Yes/No)
20. What was your attendance in Electives? (<75%/ 75-80%/ 80%)

Section 2: Likert Scale/Rating-Based Questions

1. Did you enjoy electives postings thoroughly?
2. Do you have a better idea about the electives' topic chosen for Block I?
3. Would you like to pursue postgraduation in the topic chosen for electives in either block?
4. How many points would you give to Block I Electives on a scale of 5?
5. How many points would you give to Block II Electives on a scale of 5?
6. The electives provided me active learning through discussion/participation (Block I)
7. Formative Assessment on the topics for Block I was up to the mark
8. Do you feel that you have a better idea about the electives' topic chosen for Block II?
9. Block II (clinical elective) was adequately supervised
10. Block II provided adequate opportunities for hands-on clinical work
11. Formative Assessment on the topics for Block II was up to the mark
12. Should Electives continue for the future batches?
13. The elective is worth the time and effort
14. Do you think Electives is a good way to make learners oriented about various possibilities after MBBS
15. Do you think Electives promote self-directed learning
16. Do you think electives improve decision-making regarding future career choice
17. Do you think Electives help in gaining detailed knowledge not normally taught in routine teaching
18. Do you think Electives provide an edge to students planning to go abroad
19. Do you think Electives help to learn the concepts of research
20. Do you think inclusion of the Electives program in the MBBS curriculum is justified

Section 3: Open-Ended Questions

12. What changes would you suggest in the Electives program in your institution for the future batches?
13. What should be the method of selection of Electives by the students?
14. What in your opinion is the purpose of introducing Electives in CBME curriculum?

[ANNEXURE II]: PRECEPTORS' PERCEPTION QUESTIONNAIRE ON ELECTIVES (CBME CURRICULUM)

Section 1: Faculty Details

1. Your Department
2. Your Designation
3. Were you an internal preceptor for Electives?

Section 2: Planning of Electives

4. How many students were allotted to you in each group?
5. What was the topic of your Elective?
6. What were the prerequisites for your topic?
7. Have you planned for the Electives beforehand? (yes/No)
8. Have you set the objectives for the topic to be taught beforehand? (yes/no)
9. Have you planned to provide the reading material to the learners? (yes/no)
10. Have you planned the assessment? (yes/no)
11. Logbooks were updated regularly and checked (Yes/No)

Section 3: Execution and Supervision

(Please rate the following statements on a 5-point Likert scale: Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

12. Electives were adequately supervised.
13. The set objectives were achieved by the learners.
14. Learners have enjoyed Electives postings thoroughly.
15. Formative Assessment on the topics was up to the mark.

Section 4: Learner Outcomes and Value of Electives

(Please rate the following statements on a 5-point Likert scale: Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

16. Electives provide active learning for the learners through discussion/participation.
17. Learners have adequate opportunities for hands-on training (e.g., case presentations, operations, research work, etc.,).
18. The electives are worth the time and effort.
19. Electives promote self-directed learning.
20. Learners gain in-depth knowledge not normally taught in routine teaching.
21. Electives are a good way to orient learners about various possibilities after MBBS.
22. Electives help learners improve decision-making for future career choices.
23. Electives provide an edge to students planning to go abroad after MBBS.
24. Learners learn the concepts of research.
25. Electives should be continued for future batches.

Section 5: Purpose and Suggestions (Open-ended)

26. What are your suggestions for improvement of Electives' program in your institution?

[ANNEXURE III]: PERCEPTION OF PLANNING & IMPLEMENTATION COMMITTEE

Section 1: Faculty Details

1. Department: _____
2. Designation: _____
3. I am a member of:
    - Electives Committee
    - Curriculum Committee

Section 2: Institutional Readiness & Scope

4. How many departments in your college were involved in implementing electives?
    - 1-5
    - 6-10
    - 10-15
    - 15-20

5. Were faculty in your college aware of the electives module before implementation?

- Yes
- Mostly
- Partially
- No

6. Were the faculty ready to implement the electives module as per NMC guidelines?

- Yes
- Mostly
- Partially
- No

Section 3: Planning & Implementation Challenges (open-ended)

7. What were the problems you faced while planning Electives?
8. What were the problems you faced while implementing the Electives?

Section 4: Resource and infrastructure issues (open-ended)

9. What were the funds-related problems you faced?
10. What were the logistics-related problems you faced?

Optional Add-On: suggestions & improvements (open-ended)

Your suggestions to improve the electives module implementation-