



Evaluation of Competency-Based Medical Education (CBME) curriculum implementation for Phase II Medical undergraduates: A qualitative study

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Abstract

Introduction: Implementing “Competency-Based Medical education” in Indian medical colleges has necessitated reengineering by the stakeholders at the institutes. Changes in the curriculum are usually inundated with challenges. The present study aimed to evaluate the implementation of the CBME curriculum for Phase II medical undergraduates in our institute.

Methods: This qualitative study involved faculty members from Pathology, Microbiology, and Pharmacology teaching Phase II medical undergraduates, who participated in three focus group discussions (one per department) to discuss the strategies and challenges in curriculum implementation. A gap analysis followed, with individual in-depth interviews with the departmental heads to identify solutions for the challenges. A review meeting was held with the dean, curriculum committee members, and phase II faculty members to finalize the action plan.

Results: A total of 18 faculty members, predominantly females, in different age ranges (29 to 68 years) and teaching experiences (4 to 34 years) participated in this study. The faculty members have adopted various strategies for curriculum implementation such as preparing departmental planners, framing lesson plans, using interactive teaching-learning methods and e-learning, conducting self-directed learning sessions, ensuring alignment and integration, incorporating skill modules, ensuring student logbook maintenance, using appropriate assessment methods and implementing AETCOM modules. However, they faced challenges in implementing self-directed learning sessions, using e-learning platforms and recommended faculty development programs.

Conclusion: Our study reveals that the paraclinical departments at our institute have taken appreciable steps in implementing the CBME curriculum for Phase II MBBS students, despite ongoing challenges. Addressing these challenges requires careful planning and evaluation, with faculty sensitization being crucial for smooth implementation. The key outcome of the study was establishing various subcommittees within the Curriculum Committee and Medical Education Unit to facilitate the implementation of various CBME components, supported by regular feedback mechanisms. Also, the action plan was shared with the Medical Education Unit to organize appropriate faculty development programs.

Keywords: Competency-based education; Curriculum; Education; Program evaluation; Undergraduates

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Introduction

Indian undergraduate medical curriculum has seen a paradigm shift with the introduction of “Competency-Based Medical Education”. National Medical Commission (NMC), the regulatory body for medical education in India has clearly stated the competencies expected of a globally competent Indian Medical Graduate (IMG) as follows: Clinician, Leader, Communicator, Lifelong learner, and Professional (1).

Competency-based medical education (CBME), unlike traditional curricula, eliminates the time-based framework, offers greater flexibility, facilitates an outcome-focused and student-centered learning process, and enhances accountability (2). While the CBME curriculum represents a progressive shift in medical education, various studies have documented persistent challenges in its practical implementation, with some identifying the reduction of the duration of second-year MBBS to 11 months as a significant barrier to syllabus completion (3-5). Also, Khilnani, *et al.* (4) emphasized that with the new curriculum, the students are required to take two internal assessments, each in the core subjects (Pharmacology, Pathology, and Microbiology), as well as in subjects spanning multiple phases, in addition to the model and university examination, thus posing a significant burden on the students and necessitating meticulous planning.

Shrivastava, *et al.* (6) identified the anticipated challenges with implementing the new curriculum, namely faculty reluctance, student apprehension, limited timeframe, development of assessment framework, logistic issues, strategies for training slow learners, and ensuring uniform implementation across various colleges. Kumar, *et al.* (7) have also predicted some of the overarching challenges to be addressed before CBME implementation like the need for faculty development programs, improving faculty-student ratio, and managing the time constraints in assessing students’ competency attainment at individual levels. A nationwide survey of medical faculty in India, conducted by Ramanathan R, *et al.* (8) revealed that most of them were inadequately prepared for implementing the new curriculum and highlighted faculty capacity building as a key challenge in the successful rollout of CBME.

While many studies address anticipated challenges with the CBME curriculum, there is limited research on the actual obstacles colleges face during implementation. A study by Revathy, *et al.* (9) on implementing the CBME curriculum for second-year MBBS students in the paediatrics

department documented the smooth conduct and attributed it to the appropriate planning and sensitization of students. However, the authors encountered difficulties in achieving alignment and integration across departments in their training program, which required preparedness from all departments.

The literature review shows many anticipated challenges with CBME implementation, highlighting the need for rigorous evaluation frameworks in each institution, along with mechanisms for feedback and quality improvement. It is essential to analyze the alignment between intended expectations from the regulatory body and the actual implementation. Faculty and stakeholder perspectives are critical to address practical challenges and enhance the process. Given that CBME implementation is dynamic, continual adjustments are required to align with evolving educational goals and ensure effective outcomes. Although there are innumerable research articles on the anticipated challenges and few on discipline-specific challenges, there is a significant gap in the literature regarding the phase-wise evaluation of CBME.

Thus, the present study aimed to evaluate the implementation of the CBME curriculum in Phase II for medical undergraduates at our institution by gathering faculty perceptions on the strategies adopted and the challenges encountered since its introduction in 2019. Additionally, the study contributes to forming action plans, developed in collaboration with department heads, curriculum committee members, administrators, and phase II faculties; providing an opportunity to address the existing challenges; and refining the CBME implementation strategies.

Methods

Study setting: The study was carried out by the Medical Education Unit of a tertiary care teaching hospital in a rural area of Puducherry, South India. The institution offers high-quality medical education to both undergraduate and postgraduate students and is affiliated with Puducherry University.

Study design: The study design integrated elements of phenomenological qualitative research and action research (10, 11). As a phenomenological study, this research aimed to explore and understand the lived experiences, including the strategies used and the challenges faced by faculty in implementing the CBME curriculum. We used descriptive phenomenological research in explaining the description of people’s experiences.

It gathered insights through focus group discussions (FGDs) and in-depth interviews (IDIs) uncovering the participants' unique and shared experiences offering a deeper understanding of curriculum implementation complexities. Simultaneously, the study incorporated aspects of action research by engaging stakeholders in collaborative discussions to identify actionable solutions to the challenges encountered. We made an attempt to integrate both phenomenological and action research in our study, as we have used phenomenology to understand the essence of the lived experiences; also, we aimed to apply the insights of phenomenology into gap analysis and framing of action plan, thus incorporating action research. Together, these methodologies provided a comprehensive framework for evaluating the challenges of curriculum implementation while actively working towards sustainable improvements.

Study duration: The study was conducted over four months, from March to June 2024. FGDs and gap analyses were held in March and April, followed by IDIs in May and an action plan review meeting in June.

Ethical considerations: The Research Committee and Institutional Ethics Committee of our institute approved the study with the code of EC/142/2024. Written informed consent was obtained from all the participants. Confidentiality of all participants' data was ensured.

Inclusion criteria: All the faculty members were involved in teaching Pathology, Pharmacology, and Microbiology for phase II MBBS students

Exclusion criteria

- Medical Education Unit (MEU) and curriculum committee members
- Faculty members unavailable to attend the FGD at the date and time fixed for FGD session in their department (due to academic or personal commitments)

Sampling technique: We employed purposive sampling, (12) a non-probability technique used to select participants based on specific characteristics aligned with the research objectives. This method ensured the inclusion of individuals with relevant knowledge and experience. Teaching faculty members, including Heads of Departments (HODs) from Pathology, Pharmacology, and Microbiology, were selected due to their direct involvement in implementing the CBME curriculum for Phase II MBBS students. Additionally, the dean and curriculum committee members were included to finalize the developed action plan, given their oversight of curriculum implementation within the institution.

Data collection tools: Checklist for gap analysis of CBME curriculum implementation, FGD guide, and IDI guide were used for data collection. The investigators developed the gap analysis checklist, FGD guide, and IDI guide based on the modules released by the NMC on the different aspects of CBME (13). The data collection tools were shared with the curriculum committee members, and their opinion was sought. Requisite modifications were made to the data collection tools as per their suggestions, thus ensuring content validation.

Methods to ensure the credibility of the data collected: We employed several strategies to ensure the credibility of the collected data. Member checking, or participant validation, involved summarizing the key points at the end of each FGD, gap analysis, and IDI session, followed by seeking participants' confirmation. Peer debriefing was incorporated through action plan review meetings, where findings were discussed and validated by curriculum committee members, the dean, phase II faculty, and department heads. This approach allowed data contributors (phase II faculty and departmental heads) to challenge interpretations that did not reflect their views. Additionally, data triangulation was achieved by using multiple methods like FGDs, gap analysis, and IDIs, further strengthening data validity.

Procedure

The flow diagram illustrating the study procedure is shown in Figure 1.

FGDs with phase II faculties

Three focus group discussions, one for each department, were conducted among the faculty members of the three paraclinical departments (Pharmacology, Pathology, and Microbiology) to understand the strategies adopted for implementation of the CBME curriculum and the challenges faced by them. Dates and times for the FGDs were scheduled in advance with the three paraclinical departments. The structured FGDs took place in designated seminar rooms within each department to ensure convenience and familiarity for the participants. Each FGD comprised 5 to 8 faculty members (except the heads of the Departments) belonging to the respective department and was conducted for 45 to 60 minutes. The focus group discussions (FGDs) were led by investigators who were trained in qualitative research. They followed a structured process that included five stages: planning and preparation, introduction and establishment of ground rules, the discussion phase, closing, and the post-discussion phase.

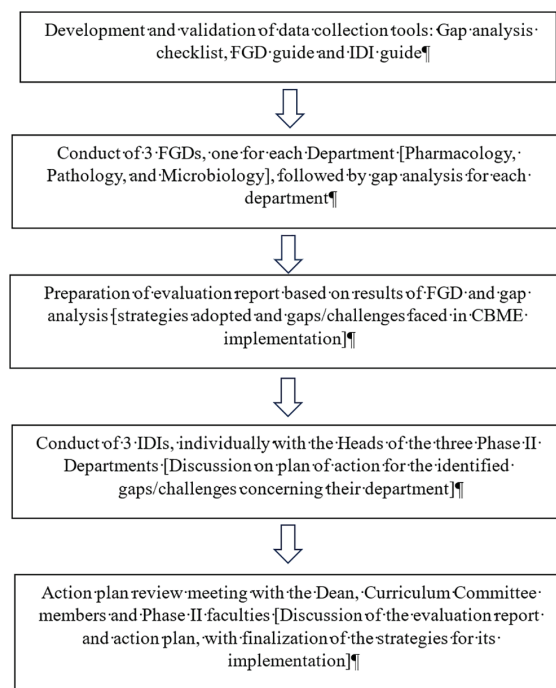


Figure 1: Flow diagram illustrating the study procedure. FGD: Focus Group discussion; IDI: In-depth interview; CBME: Competency-Based Medical Education. The study began with the development and validation of data collection tools, followed by three focused group discussions (FGDs): one for each department (Pharmacology, Pathology, and Microbiology) and involving faculty members (excluding Heads of Departments). These FGDs explored the faculty's experiences in implementing the CBME curriculum for Phase II MBBS students, mainly focusing on the strategies employed and challenges encountered. This was followed by a gap analysis for each department with the same participants. Based on the findings from the FGDs and the gap analysis, an evaluation report was prepared describing the strategies adopted and the associated challenges or gaps. These gaps and challenges were discussed with the respective departmental heads through in-depth interviews to develop action plans to improve the curriculum implementation. This was followed by an action plan review meeting with the dean, Curriculum Committee members, and Phase II faculty (including departmental Heads) to discuss the evaluation report and propose action plan, leading to the finalization of strategies for action plan implementation.

The FGDs were audio-recorded with participants' permission, and an additional investigator took detailed notes to supplement the recordings.

Gap analysis with phase II faculties

Immediately after the completion of FGD, a gap analysis was performed using the developed checklist on the various components of the CBME implementation with the same participants in the same venue.

Preparation of evaluation report:

The results of the FGD and gap analysis were triangulated to prepare the evaluation report comprising strategies adopted by the department for CBME implementation and the associated

challenges/gaps.

In-depth interviews with the heads of the three-phase II departments

The evaluation report prepared was shared with the heads of the three paraclinical departments (Pharmacology, Pathology, and Microbiology), and in-depth interviews were conducted individually in their respective rooms to discuss the possible solutions (plan of action) for the gaps identified or challenges faced in the implementation of the CBME curriculum concerning their department. The IDIs were conducted face-to-face, using a semi-structured interview guide by investigators trained in qualitative research, with each departmental head interviewed on a pre-scheduled date and time. Each IDI lasted 45 to 60 minutes and was audio-recorded with participants' consent; in addition, notes were taken by an investigator.

Action plan review meeting with the dean, curriculum committee members, and phase II faculties:

An action plan review meeting was conducted with the dean, curriculum committee members, and phase II faculties (including departmental heads). The evaluation report and the action plan were discussed and the strategies to implement the action were finalized. This led to the formation of various subcommittees for different components of CBME under the curriculum committee and Medical Education Unit. The Medical Education Unit was also recommended to plan frequent, timely, and appropriate FDPs for the capacity building of the faculty.

Analysis of the data: We conducted manual content analysis for the FGDs and IDIs, all performed in English. We incorporated the following steps of manual content analysis into our research: transcribing the data, deciding the 'unit of analysis' as sentences, coding all text data, and organizing it into categories (Figure 2).

The audio-recorded data were transcribed and compared with notes taken during the discussions/interviews, leading to the preparation of the final transcript. This transcript was reviewed multiple times to ensure familiarity with the data and for accurate interpretation of the conveyed meanings. Sentences served as the unit of analysis. Each sentence was assigned a code, and similar codes were consolidated to form categories. Statements derived from the gap analysis were compiled manually by the authors and finalized after reaching a consensus.

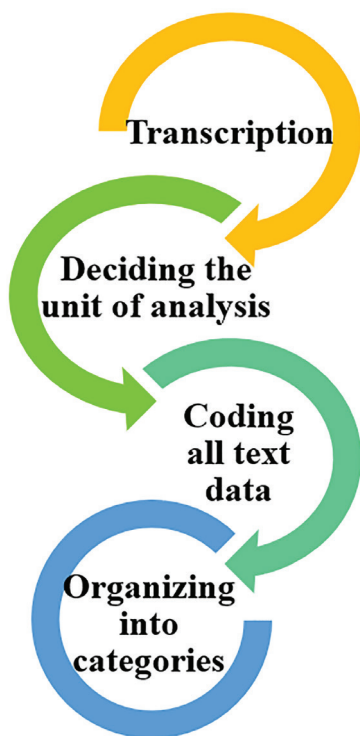


Figure 2: Steps of manual content analysis of qualitative data analysis. The audio-recorded data were transcribed and cross-verified with notes from the focus group discussions and in-depth interviews to produce the final transcript. The transcript was reviewed multiple times to ensure a thorough understanding of the content. This was followed by deciding the unit of analysis as ‘sentences’. Text segments capturing key ideas or similar patterns were coded, and similar codes were organized into ten broad categories.

To improve the internal validity of the study, a faculty member trained in qualitative research, who was not involved in the study, reviewed the results. Strategies used for CBME implementation were gathered from the FGDs, while challenges and gaps in CBME implementation were identified through data triangulation from both FGDs and gap analysis. The action plan for addressing the identified challenges/gaps was developed based on the insights from the IDIs with departmental heads.

“Consolidation criteria for reporting qualitative research (COREQ)” guidelines were used to report the findings. The demographic details of the participants were summarized using descriptive statistics.

Results

Table 1 shows the demographic characteristics of the study participants.

A total of 18 faculty members took part in the research (FGDs-cum-IDIs), with eight from the Department of Pathology and five from each of the Departments of Microbiology and Pharmacology. The participants’ ages ranged from 29 to 68 years, with a median age of 36.5 years. There was a preponderance of female participants (72.2%). The teaching experience of the faculties varied between 4 and 34 years, with a median value of 8 years. Most of the participants were assistant professors (44.4%).

Table 2 describes the strategies adopted by the departments in implementing the CBME curriculum, as identified by the focus group discussions. It was found that all three departments shared similar strategies, which were classified into ten distinct categories. Preparation of the departmental planners, framing of lesson plans, usage of interactive teaching–learning methods, incorporation of e-learning, self-directed learning, alignment and integration, skills training, documentation in the logbook, incorporation of appropriate assessments and AETCOM modules were the major categories identified from the qualitative analysis.

Table 3 describes the challenges faced by the departments and the appropriate action plan devised for the challenges. The challenges identified through FGDs and the gaps identified through gap analysis were mapped with appropriate categories. The desired action plan, developed from the IDIs and finalized during the action plan review meeting, was also mentioned and mapped with appropriate categories. Organization of faculty development programs,

Table 1: Demographic characteristics of the study participants (n=18)

No	Demographic characteristics	Frequency (percentage)
1	Age of the participants in years [median (minimum, maximum)]	36.5 (29.68)
2	Gender	
	Male	5 (27.8)
	Female	13 (72.2)
3	Teaching experience in years [median (minimum, maximum)]	8 (4.34)
4	Designation	
	Senior Resident	1 (5.6)
	Assistant Professor	8 (44.4)
	Associate Professor	3 (16.7)
	Professor	3 (16.7)
	Professor and Head	3 (16.7)

Table 2: Strategies adopted by the departments in implementing the CBME curriculum

No	Categories identified	Strategies adopted	Direct quotes from participants
1	Preparation of the Departmental planner	<ul style="list-style-type: none"> • Curriculum Committee, College Council and departmental meetings for sensitization of the faculty. • Preparation of yearly schedule (both theory and practical) by all the three departments well at the beginning of the academic year (batch specific) in accordance with the NMC guidelines. • Segregation of topics to be covered under interactive lectures, integration, and self-directed learning at the beginning of the academic year. • Regular preparation of the monthly schedule (both theory and practical) at least a week before the upcoming month (based on yearly schedule). • Incorporation of competency number, teaching-learning method and details of internal assessments in the yearly and monthly schedule. 	<ul style="list-style-type: none"> • "Our HOD updates us on the instructions given during College council meeting and curriculum committee meeting regarding preparation of departmental academic schedule." • "We prepare academic calendar at the beginning of the academic year during the departmental meeting and also decide the different small group teaching methods such as buzz sessions, think-pair and share activities, chart-based learning, image-based learning, fish bowl technique which can be followed." • "The time schedules for yearly timetable are prepared based on the NMC norms for duration of lectures, small group teaching and SDL." • "We prepare a detailed monthly schedule, both for theory and practical, at least a week in advance, based on yearly schedule." • "The prepared schedule includes date, time, topic, competency number, teaching-learning method and internal assessment details."
2	Framing of Lesson Plans	<ul style="list-style-type: none"> • For the interactive lectures, integration classes, and AETCOM sessions, lesson plans are prepared by the faculty(ies) and approved by the concerned Head(s) of the Department(s) well in advance for effective planning. 	<ul style="list-style-type: none"> • "We prepare lesson plan for all classes like interactive lecture and integration classes, and get it approved from our HOD well in advance." • "Development of lesson plans for AETCOM sessions facilitate its smooth conduct."
3	Usage of interactive teaching-learning methods	<ul style="list-style-type: none"> • Utilisation of interactive teaching-learning methods like buzz sessions, think-pair and share activities, chart-based learning, image-based learning, fish bowl technique, flipped classroom approach, case-based learning and game-based learning (bug tales*) in lectures and small group teaching sessions. • Effective utilization of Computer Assisted Learning (CAL) by the Pharmacology Department. 	<ul style="list-style-type: none"> • "I have used think-pair and share activity, buzz sessions and case scenarios in my lecture classes." • "We tried flipped classroom technique for students and we received good feedback." • "During practical classes, students are divided into small groups with each group having a facilitator." • "We use CAL to teach drug actions in simulated animal models."
4	Incorporation of E-Learning	<ul style="list-style-type: none"> • E-Learning effectively implemented by all the three departments using the institutional "Learning Management System" (LMS) and other platforms to enhance the learning experience of the students. • Voice-over/ video lectures and other resources routinely shared in the LMS for the continuous learning by the students. • Multiple choice question bank periodically updated and quizzes posted in LMS periodically (part of formative assessments). 	<ul style="list-style-type: none"> • "In our college LMS, we post Voice-over/ video lectures and other resources routinely and multiple-choice question bank are periodically updated by all of us in our department." • "We consistently create and share voice-over presentations, for continuous learning by students." • "I periodically update the multiple-choice question bank and post quizzes on the LMS as part of formative assessments."
5	Self – Directed Learning (SDL)	<ul style="list-style-type: none"> • To some extent planning done by the departments to carry out self-directed learning by <ol style="list-style-type: none"> (a) Segregation of topics for SDL, (b) Effective usage of LMS for SDL, (c) Usage of case scenario-based/problem-based approach for SDL. 	<ul style="list-style-type: none"> • "For conducting SDL, we plan certain topics at the beginning of academic year and mention it in our yearly schedule." • "We post in the LMS, various case scenarios for which students find and post their answers as a part of self- directed learning."
6	Alignment and Integration	<ul style="list-style-type: none"> • Alignment and Integration extensively planned at the beginning of the academic year through institutional meetings and departmental meetings. • Google sheets were used in the preparation of the schedule for better planning and overview of alignment. • The departments involved in integration were informed in advance with prior appointment of the faculties. • In one department, integrated topic learning was assessed using student seminars. • The departments conducted a pretest and post-test at the beginning and end of integrated lectures and collected student feedback on the sessions. 	<ul style="list-style-type: none"> • "We prepare a yearly schedule for our department and integrate it into Google sheets shared by MEU which has slots for the three phase 2 departments." • "Me, being integration coordinator of my department, inform the heads of integrating departments well in advance and the concerned HODs appoint the faculties beforehand." • "We assess students' learning in integration class by giving student seminars on that topic." • "We conduct pretest, post-test and feedback for assessing the usefulness of the integrated sessions."

No	Categories identified	Strategies adopted	Direct quotes from participants
7	Skills training	<ul style="list-style-type: none"> • DOAP (Demonstration- Observation – Assistance – Performance) sessions and OSPE modules accordingly planned in teaching-learning, and assessment by the respective departments. • Mannequin-based training in skills lab for teaching psychomotor skills (eg. routes of drug administration). • Communication skill training using role-plays and video critiques. 	<ul style="list-style-type: none"> • “For assessing procedural skills of students, we use OSPE stations.” • “In skill lab, mannequins are used for teaching drug administration skills to students using DOAP sessions.” • “We teach doctor-patient communication skills by making the students to do role plays and we give feedback.”
8	Documentation in Log book	<ul style="list-style-type: none"> • Appropriate entry of the activities recommended in the log book by all three departments as per the guidelines of the regulatory body. 	<ul style="list-style-type: none"> • “We ensure that students document all the recommended activities like SDL, practical sessions, integrated classes, remedial classes, seminar presentations and AETCOM sessions in their logbook.” • “Students are asked to fill the various sections in the logbook and get it signed from their allotted faculty”.
9	Assessment	<ul style="list-style-type: none"> • Periodic implementation of blueprint for question paper setting, and preparation of answer key for standardizing the assessments. • Case scenario-based structured long-answer and short-answer questions were used in the assessments. • Conducting remedial examinations for slow learners, offering them an opportunity to enhance their academic performance. • Distribution of answer sheets to the students within 10 days of the assessment with appropriate feedback. • Grievance addressal (re-evaluation, retotalling) of assessments produced increased satisfaction among the learners. • Use of checklists/rubrics for assessment of certain OSPE stations. • Certification of the identified certifiable skills in students’ logbook. 	<ul style="list-style-type: none"> • “We prepare blueprint based on which we do question paper setting and also prepare answer key for ensuring standardized assessments.” • “Addressing grievances, such as re-evaluation and retotalling of assessments resulted in increased satisfaction among the learners.” • “Within 10 days of the test, we distribute the answer sheets to students and clarify their doubts and give feedback.” • “We conduct remedial examinations for slow learners, providing them with an opportunity to improve their academic performance.” • “Assessment of drug administration skills of students is done using OSPE stations and we assess their performance using checklist.” • “We assess the certifiable competencies in our department and document it in students’ logbook.”
10	AETCOM	<ul style="list-style-type: none"> • Allotment of the AETCOM modules to the three departments. • Early incorporation of timeslots for AETCOM in the timetable smoothened its implementation. • Role plays, video critiques, poster creation, tag-along sessions with the hospital personnel, debate, and small group discussions with students’ presentations and facilitation by faculties, were effectively carried out during AETCOM sessions. • Encouragement of reflective writing by the students with incorporation in the logbook. • Pretest, post-test, and feedback obtained from students for the AETCOM sessions. 	<ul style="list-style-type: none"> • “Since separate time slots have been provided in timetable for AETCOM sessions, it is easy for us plan ahead for the sessions.” • “During AETCOM sessions, we successfully implemented role plays and small group discussions, which included student presentations and faculty facilitation.” • “In our department, we successfully planned and conducted the allotted AETCOM competency. We incorporated tag-along sessions for students with the hospital personnel after initial sensitization, and it was followed by in-depth discussion of students’ findings by facilitators.” • “We ask students to write reflective writings at the end of the AETCOM session in their logbooks.”

Ten distinct categories emerged from the qualitative analysis. The direct quotes from the participants are from the focus group discussions. NMC: National Medical Commission; AETCOM: Attitude, Ethics and Communication; OSPE: Objective Structured Practical Examination; *Bugtales is a student activity based on interactive notice board concept. Students will be displayed with a question on a notice board which is like a microorganism riddling the student to find ‘Who am I?’. Students can answer the question by scanning the QR code provided below the question. The answers will be received in the Google form linked to the QR code. Students getting the answer right will be given academic credit batches.

provision of regular updates on the guidelines from regulatory bodies, sensitization to the interactive teaching-learning methods and self-directed learning, and improving the conduct of integration classes were some of the proposed action plans.

Discussion

We aimed at process evaluation of the implementation of the CBME curriculum for phase II MBBS students in our institute, and the study results provided insights into various strategies adopted and the challenges

Table 3: Challenges faced by the departments and the appropriate action plan devised for the challenges

S. No	Categories	Challenges/ gaps	Action plan	Direct quotes from participants
1	Preparation of the departmental planner	Batch-to-batch separate guidelines given by the regulatory body	<ul style="list-style-type: none"> • Creating awareness among faculties on the recent updates in the NMC documents with institutional meetings and Departmental meetings. • Planning well ahead of the academic year by using the recent version of the NMC document can overcome the issue. 	<p>“Since we get batch-to-batch separate guidelines from the regulatory body, it creates confusion in the planning for each academic year.” (FGD)</p> <p>“I think creating awareness among faculties on the recent updates in the NMC documents through institutional and departmental meetings will solve this issue.” (IDI)</p>
		Though small group teaching was effectively carried out by the departments, reinforcement of the topics covered in lectures were given attention in small group teaching	Segregation of topics exclusively for SGT may be planned well ahead during the preparation of the yearly planner.	<p>“We reinforce the topics covered in lectures during the small group teaching sessions.” (FGD)</p> <p>“When we prepare the yearly planner, we can allot certain topics exclusively for SGT.” (IDI)</p>
2	Framing of lesson plan	Incorporation of feedback from students and a simple assessment to understand the learning by the students	Sensitization of the faculty in the departmental meetings.	<p>“I feel sensitization of the faculty in departmental meetings to incorporate feedback and assessment as a part of lesson plan framing will improve this practice.” (IDI)</p>
		Increasing the frequency of usage of the innovative TL methods	<ul style="list-style-type: none"> • Faculty should be motivated to adopt new TL methods. • Early planning should focus on identifying these innovative TL methods and incorporating them into the yearly timetable to align with various competencies. 	<p>“I always motivate my faculty to try new teaching learning methods.”(IDI)</p> <p>“This can be implemented by early planning, focusing on identifying and incorporating innovative teaching methods in the yearly timetable, in alignment with the competencies.” (IDI)</p>
3	Usage of interactive teaching learning (TL) methods	Regular collection of students’ feedback by all the departments for the newer TL methods implemented	Faculty sensitization for routine collection and consideration of student feedback.	<p>“We can sensitize faculty on the importance of collecting and analysing student feedback routinely to refine teaching strategies and address learners’ needs effectively.” (IDI)</p>
		Awareness of the faculty on new interactive TL methods	Medical Education unit (MEU) recommended to organized FDPs on “Interactive Teaching Learning Methods”.	<p>“I recommend the Medical Education unit to organize FDPs on “Interactive Teaching Learning Methods” for all the faculties in the college at regular intervals.”(IDI)</p>
4	Incorporation of E-Learning	LMS to be made more user friendly	ICT team to be informed about the same, with purchase of the space for enhancing the speed of the LMS.	<p>“It is difficult to upload the video lectures in the LMS, since it takes long time to upload.”(FGD)</p> <p>“I feel we can solve this by informing the ICT team and enhancing the speed of LMS by purchasing more space.” (IDI)</p>
5	Self – Directed Learning (SDL)	Lack of clarity on the methodology to be followed in SDL	Medical Education unit (MEU) recommended to organized FDPs on “Self-Directed Learning”.	<p>“There is no clarity on the methodology to be followed in conducting these SDL sessions and we need more sensitization on implementing SDL.” (FGD)</p> <p>“MEU should organize FDPs on self-directed learning.” (IDI)</p>
6	Alignment and Integration	Less usage of integrated assessments	Effective utilization of the formative assessment methods with integrated assessment to overcome the fragmented learning by the students.	<p>During formative assessments, we can effectively use them to do integrated assessment to overcome fragmented learning by the students.”(IDI)</p>

S. No	Categories	Challenges/ gaps	Action plan	Direct quotes from participants
		Redundancy of topics in integration faced by some departments	Sharing of lesson plan with objectives well ahead with oversight from the "Alignment and Integration" subcommittee of MEU.	"Sometimes during integration classes, there is overlap of content by the faculties which needs to be avoided to ensure effective utilization of these classes." (FGD) "We can resolve this by sharing the entire lesson plan along with the session objectives with the integrating departments well ahead." (IDI) "To prevent this, we need oversight from the Alignment and integration subcommittee of MEU."(IDI)
7	Skills training	Periodic evaluation and improvement of the developed skill modules for ensuring their relevance and effectiveness	<ul style="list-style-type: none"> • Faculty to attend FDPs organized by the MEU on skills training. • Analysis and consideration of the students' feedback regarding the implemented skills modules. 	"I encourage all my faculties to attend FDPs on skills training. MEU can organize such FDPs." (IDI) "This can be done by periodically analyzing and considering the feedback from students on all the newly implemented skills modules." (IDI)
8	Documentation in Log book	Delay in distribution of logbooks to students	<ul style="list-style-type: none"> • Recommendation of early distribution of logbooks to students. • Departmental meetings to emphasize on periodic recording and documentation in logbook. 	"I recommend the distribution of logbooks to students much earlier."(IDI) " During the departmental meetings, we can sensitize the faculties on the importance of periodic recording and documentation in logbooks by the students." (IDI)
9	Assessment	Less sensitization to the assessment of the affective domain	Faculty to attend FDPs organized by the MEU on the assessment of the affective domain.	"I find it difficult to do assessment for the affective domain since we are not much sensitized to it." (FGD) "MEU should organize FDP specifically pertaining to the assessment of affective domain for our faculty." (IDI)
10	AETCOM	Less sensitization on assessment of reflective writing	Faculty to attend FDPs organized by the MEU on the assessment of reflective writing.	"We encourage students to write reflective writings during AETCOM sessions, but it is difficult for us to evaluate them in an objective manner and need more training on it." (FDP) "More FDPs can be conducted by the MEU on how to assess the students' reflective writings to train the faculties." (IDI)

Challenges/gaps were identified through triangulation of data from focus group discussions and gap analysis. The action plan was devised from the in-depth interviews and finalized in the action plan review meeting. The direct quotes from the participants are either from the focus group discussions or in-depth interviews. FDP: Faculty Development Programs; LMS: Learning Management System; ICT: Information and Communications Technology; MEU: Medical Education Unit; SGT: small group teaching.

encountered, based on the perceptions of the faculty. The focus group discussions and gap analysis were conducted among a mixed group of faculties with varied teaching experiences, thus ensuring diversity of opinions and perspectives and aiding in a holistic understanding of the planning and execution of the revised curriculum in each department.

The preparation of departmental planners and the design of lesson plans emerged as categories in our analysis. The departments demonstrated extensive planning at the beginning of the academic year by faculty sensitization through institutional and departmental meetings, preparation of annual teaching schedules, and segregation of topics for various teaching methods

to ensure smooth curriculum implementation. Also, the departments prepared a monthly schedule (based on the yearly schedules) at least a week before the upcoming month to allow for greater flexibility to accommodate real-time challenges and adaptability to evolving academic needs. However, the process was not free of challenges due to mild differences in the calendar for different batches to override the turbulence caused by the COVID-19 pandemic. As an initiative to smoothen the implementation of the CBME curriculum, Srivastava TK, *et al.* (14) recommend the constitution of a departmental curriculum committee, in addition to the college curriculum committee, which could conduct fortnightly meetings to assist in timetable

preparation, develop learning and assessment methods, ensure alignment and integration, and gather students' feedback while providing student support. In alignment with our study, where a departmental planner with detailed lesson plans was crucial for successful CBME implementation, Revathy, *et al.* (9) similarly emphasized comprehensive department module planning, including curriculum design, timetable preparation, teaching session structuring, assessment planning, and feedback mechanisms, along with stakeholder sensitization during the pre-implementation phase. This proactive approach facilitated a smoother transition and more effective curriculum implementation. Also, Pal, *et al.* (15) discussed the comprehensive framework of a lesson plan and its crucial role. They recommended the inclusion of feedback from the students and at least a single assessment at the end of the lesson plan for a better understanding of the students' learnings by the facilitator. Our study indicated that the three departments regularly developed lesson plans for their classes. However, as a quality improvement initiative, they were advised to gather students' feedback and document an assessment to understand the students' learning, as finalized in the action plan review meeting.

In our study, we observed that while there was no segregation of topics specifically for small-group teaching, the departments implemented various interactive teaching and learning methods to enhance the effectiveness of lectures and small-group sessions. The use of interactive approaches emerged as a distinct category in our findings. Many studies have shown the effectiveness of small group teaching over didactic lectures (16, 17). Roshni, *et al.* (16) identified small group teaching as an effective instructional tool. A review by Challa, *et al.* (18) recommended the use of modern innovative teaching-learning methods like "case-based learning, evidence-based medicine, problem-based learning, simulation-based learning, e-learning, peer-assisted learning, observational learning, flipped classroom and team-based learning" in the medical curricula for ensuring effective learning. However, implementing an interactive and innovative technique requires extensive planning, preparation, and structuring (19).

The incorporation of E-Learning was another category identified in our analysis. The COVID-19 pandemic has significantly enhanced e-learning in medical education. Our faculties routinely blend e-learning in the teaching-learning and assessment process through institutional Modular Object-Oriented Dynamic Learning Environment

(MOODLE) based LMS. They recommended a user-friendly space and an improved interphase in our LMS. A review by Delungahawatta, *et al.* (20), identified a significant increase in e-learning in medical education, after the COVID Pandemic. Goyal, *et al.* (21) in their study have highlighted the possibility of self-paced independent learning offered by MOODLE in the teaching-learning process.

Self-directed learning sessions were introduced to the students in phase II, with the segregation of topics at the beginning of the academic year. However, faculty demanded sensitization sessions from the MEU due to a lack of guidelines from the regulatory body. Similar results were shown by Siraja, *et al.* (22) The authors highlighted the importance of fostering SDL skills in medical faculty for better training of the students. Charokar, *et al.* (23) emphasized the importance of high student readiness and enhanced faculty development in SDL for its better implementation.

Redundancy of topics in integration and lack of integrated assessment were some of the challenges faced by our faculties as mentioned in the evaluation process. Similar results were reported by Revathy, *et al.* (9) The authors considered the collaboration with departments for alignment and integration as a major challenge in the use of CBME. Appropriate inter-disciplinary coordination and development of a conducive learning environment with the availability of sensitized faculty were recommended by Patel, *et al.* (24) for an effective integration in medical education.

Our study revealed that the paraclinical departments developed skill modules and successfully integrated DOAP (Demonstrate, Observe, Assist, Perform) sessions into their practical classes, with comprehensive documentation maintained in the students' logbooks. DOAP is a small-group instructional approach wherein the teacher provides demonstrations, observes students, assists the teacher, and subsequently performs tasks under supervision and independently. Similarly, a study by Madavan K. (25) demonstrated that DOAP sessions were well-received by medical students and effectively enhanced their knowledge, skills, and attitudes. Omer A. (26) identified several challenges in implementing students' logbook maintenance, including a lack of students' appreciation for its usefulness, biased grading by faculty, and poor or inconsistent faculty feedback. Similarly, our study identified the delayed distribution of logbooks as a significant challenge, which could be mitigated through departmental

meetings emphasizing the importance of timely entries and proper documentation.

Our study showed that Bloom's taxonomy-based blueprints and periodic student feedback were incorporated into the assessment process. However, the faculty members requested dedicated training sessions specifically for assessing the affective domain. Ramanathan, *et al.* (8) identified capacity building of the faculty as a major challenge with the use of CBME. A cross-sectional study by Zhang, *et al.* (27) have indicated that the evaluation of the affective domain among medical students is still in its early stages, emphasizing the need to develop a comprehensive evaluation system that involves students and teachers as important stakeholders.

Our study revealed that AETCOM modules were consistently implemented for students, while the faculty members expressed the need for training sessions on assessing the reflective writing component of these modules. Similar results were shown by Ross, *et al.* (28) in their systematic review. They highlighted the use of reflective writing in summative assessments; however, they emphasized a significant need for the faculty members to develop literacy skills for effectively assessing reflective writing.

Strengths and Limitations

While many studies have focused on faculty perceptions of curricular changes and conducted analyses by discipline, we aimed to provide a comprehensive, phase-wise evaluation of the implemented curriculum, along with a targeted action plan for enhancing its implementation.

Our study had several limitations. Our sample size was affected by the non-availability of certain faculty due to their personal or other academic commitments. While we evaluated the curriculum from the perspective of faculty and administrators, incorporating student perceptions would have enhanced the value of the study. Additionally, we did not gather perspectives from the clinical departments on the clinical aspects of the curriculum and solely focused on curriculum implementation in para-clinical departments, which were the exam-going departments for phase II students. Finally, we conducted a process evaluation, but the outcome evaluation would be more meaningful, which could be done after the first CBME batch completes the MBBS course and graduates.

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Conclusion

Our study indicates that the paraclinical departments at our institute have taken appreciable steps in implementing the CBME curriculum for phase II MBBS students, though challenges persist. The evaluation process emphasized the need to strengthening the e-learning platform and enhancing faculty training in innovative teaching-learning methods, self-directed learning, skills training, and the assessment of the affective domain, including the evaluation of students' reflective writing. Additionally, it highlighted the importance of faculty sensitization to improve lesson plans by incorporating student feedback and assessments, as well as regularly considering student feedback to further refine the implemented innovative teaching-learning methods and skills modules. Moreover, longitudinal studies on outcome evaluation of the CBME are recommended for a more comprehensive understanding of the curricular changes.

Suggestions for future studies

A holistic evaluation of a student cohort completing the entire CBME curriculum and graduating would provide valuable insights into the attainment of graduate attributes, offering a clearer understanding of the curriculum effectiveness. Such outcome evaluations can inform necessary revisions and refinements to enhance the curriculum further. Equally critical is the integration of process evaluation throughout the various phases of CBME implementation, enabling periodic reassessment and improvement of strategies. Additionally, involving all stakeholders in the evaluation process would significantly strengthen its rigor and ensure a comprehensive approach to curriculum evaluation.

Authors' Contribution

KS conception or design of the work, data interpretation, drafting the work and final approval of version to be published. AN conception or design of the work, data acquisition, analysis and interpretation, revising it critically for important intellectual content and final approval of version to be published. RM conception or

design of the work, data acquisition, analysis and interpretation, revising it critically for important intellectual content and final approval of version to be published. MV conception or design of the work, data interpretation, revising it critically for important intellectual content and final approval of version to be published. All authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Conflict of Interest

The authors declare no conflicts of interest.

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