



Original Research Article

EVALUATION OF REFLECTION ON USEFULNESS AND ACCEPTABILITY OF COMPETENCY- BASED MEDICAL EDUCATION AMONG MBBS STUDENTS IN INDIA

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ABSTRACT

Background: Competency-Based Medical Education (CBME), introduced by the National Medical Commission (NMC) in India, represents a paradigm shift from traditional teacher- centric models to an outcome-oriented, learner-centred approach. This framework emphasizes accountability, flexibility, and competency acquisition through formative assessments and self- directed learning. Despite growing implementation across medical institutions, empirical evaluation of student perceptions regarding its usefulness and acceptability at the national level remains limited. The objective is to evaluate the usefulness and acceptability of CBME-based medical education among MBBS students in India.

Materials and Methods: An online questionnaire-based cross-sectional study was conducted across India. A total of 386 MBBS students from various universities and states participated. Data were collected using a structured questionnaire assessing reflections on teaching-learning methods, material-based teaching-learning modalities, assessment systems, and examination practices. Descriptive analysis and correlation coefficients were computed using MS Excel.

Results: Significant positive correlations were observed between teaching-learning processes and material-based TLM ($r=0.54$), teaching-learning processes and examination questions ($r=0.58$), material-based TLM and examination questions ($r=0.50$), and assessment systems and examination questions ($r=0.59$). These findings demonstrate constructive alignment between intended learning outcomes, instructional methods, and assessment practices.

Conclusion: CBME is perceived as useful and acceptable by MBBS students across diverse geographical and institutional contexts in India. The moderate-to-strong correlations validate systemic coherence and constructive alignment in CBME implementation. These findings affirm the constructivist, reflective, and experiential foundations of competency-based curricula. However, the findings also suggest opportunities for enhancement in faculty development, resource optimization, and assessment design to further strengthen competency-based medical training in India.

Keywords: Competency-Based Medical Education; CBME; Medical students; Curriculum evaluation; NMC.

INTRODUCTION

Competency-based Medical Education (CBME) was defined by the International CBME Collaborators as

an outcomes-based approach to the design, implementation, assessment, and evaluation of medical curricula, using an organizing framework of competencies.^[1]

CBME is thought to have gained popularity as a result of the desire to reduce unacceptable heterogeneity in graduates' skills after completing medical school.^[2] Medical education in the United Kingdom began the move from a time- and process-based approach to a competency- based training system with the introduction of Tomorrow's Doctors. It is a method of educating physicians for practise that is based on graduate outcome abilities and organised around competencies drawn from an analysis of society and patient demands. It emphasises accountability, flexibility, and learner-centeredness over time-based training.^[1] Learners in CBME exhibit - clearly defined and measurable-competencies,^[3] particularly at mastery level and at their own speed, untethered from course topic and credit hour.

The introduction of Competency-Based Medical Education by the erstwhile Medical Council of India (MCI) marked a paradigm shift in undergraduate medical training, replacing a teacher-centric model with an outcome-oriented, learner-centred approach. The one-month Foundation Course, embedded at the commencement of the MBBS curriculum, was designed to facilitate a smooth transition from school-based learning to the professional ethos of medicine.

The rationale for the Foundation Course arises from the inherent disjunction between pre- university schooling and medical education. Mishra and Kar's early institutional experience at AIIMS Bhubaneswar in 2017 predated the national implementation of CBME but presciently identified the need for structured orientation. Their ten-day programme revealed that more than seventy per cent of students found the content adequate and over ninety per cent appreciated the interactive nature of sessions. The findings logically infer that active, participatory learning mitigates the anxiety of entry-level students while fostering engagement. The success of this pilot, therefore, established an empirical basis for integrating orientation, communication, and professionalism within a formal foundation curriculum.^[4]

Subsequent to this pilot phase, the theoretical scaffolding for feedback and formative assessment within CBME was elaborated by Kalra *et al.* (2020).^[5] Their paper conceptualised feedback as the cornerstone of competency acquisition, proposing the "RACE" framework— Reality check, Assessment ally, Corrective, and Evaluation aide. This model positioned feedback not as a unidirectional critique but as a dialogic instrument promoting reflective learning. Deductively, if competencies must be observed, practised, and refined, then continuous, criterion-based feedback becomes indispensable. The authors further argued that the feedback process necessitates institutional sensitisation, faculty development, and a psychologically safe environment conducive to open dialogue. Thus, from the conceptual standpoint, feedback transforms medical education from episodic evaluation to

continuous mentoring, aligning with the ethical and epistemological spirit of CBME.

Empirical validation of these theoretical propositions emerged from the institution-based cross- sectional study by Gore *et al.* (2021),^[6] which examined feedback from 134 first-year MBBS students who had completed the Foundation Course under CBME at Vydehi Institute of Medical Sciences, Bengaluru. The results demonstrated over ninety per cent satisfaction across all six modules—orientation, skill development, community field visits, professional ethics, extracurricular activities, and language or computer skills. The logical deduction from these findings is that the structured design and experiential orientation of the course effectively addressed student adaptation and professional acclimatisation. The study also highlighted operational challenges, notably ensuring full attendance, suggesting that logistical refinement rather than curricular overhaul is required for optimisation.

Integrating the insights from these studies reveals a coherent progression from formative experimentation to systematic implementation. The early observations of Mishra and Kar confirmed the pedagogical necessity of a transitional course,^[4] Kalra *et al.* provided the philosophical and operational framework for integrating feedback within CBME,^[5] and Gore *et al.* demonstrated its empirical acceptability among students.^[6] Together, they substantiate a deductive chain: if CBME aspires to produce competent, ethical, and communicative physicians, and if such competence is achieved through iterative feedback and contextual learning, then the Foundation Course serves as the logical and pedagogical entry point into this continuum.

From a broader educational perspective, these findings affirm that the Foundation Course is not merely an orientation exercise but a formative crucible for professional identity formation. It cultivates self-awareness, ethical sensibility, and interpersonal competence—attributes often neglected in traditional curricula. Furthermore, the near-universal satisfaction reported underscores the receptivity of Indian medical students to a learner-centred, reflective pedagogy. The primary inference, therefore, is that the Foundation Course operationalises the principles of CBME by embedding feedback, reflection, and contextual relevance at the very inception of the medical journey.

Despite consistency in the associated literature, considerable disagreements over the rationale, definition, components, advantages and downsides, and implications of CBME continue.^[7,8]

With an expanding number of medical schools using CBME, it is becoming increasingly vital to identify effective CBME practises and share best practises, which necessitates curriculum review. Medical education must be improved and updated in response to scientific, technical, and social advancements, making curriculum evaluation necessary. Curriculum evaluation is defined as the act of identifying,

acquiring, and disseminating meaningful information for evaluating decision alternatives.^[9,10]

According to various accreditation councils around the world (Accreditation Council for Graduate Medical Education, Liaison Committee for Graduate Medical Education, Association for Evaluation and Accreditation of Medical Education Programmes, World Federation for Medical Education), comprehensive, multifaceted, model-based, data-driven curriculum evaluation studies are a fundamental responsibility of medical schools.

The evaluation of CBME assists university/national/international decision-makers in determining what type of curriculum to develop in order to execute CBME more effectively. The evaluation of the CBME curriculum may not only provide insight into the success of a CBME in the assessed context, but it may also contribute to the expanding field of knowledge that may help change the existing regulatory environment in other national/international settings.

Curriculum-based Medical Education is a noble paradigm shift from age-old unidirectional lecture-based teaching in medical education. This system is not only bi-directional, but also there remains active participation of learners in the way of SDL and regular clearance of the competencies through year-long ongoing formative assessments. So, this goal-directed education system is meant for effective, purposeful learning to meet the need of healthcare at large. This study is designed to assess the reflection of learners about the utility of this mode and their acceptance to.

MATERIALS AND METHODS

To evaluate the usefulness and acceptability of CBME-based medical education among MBBS students in India

Type of study: Online questionnaire-based cross-sectional study
Place of study: Across India through online mode

Study subjects: MBBS students studying in various universities and states across India. Inclusion criteria: Any MBBS students willing to fill up the circulated google form
Exclusion criteria: Those who are not willing to take part in this study.

Sample size: 386

Sample size calculation: A questionnaire based observational study will be conducted online among the MBBS students in different medical colleges and institutions in India. Sample size of the study is calculated using below mentioned formula.

Sample size = $z^2 \times p \times (1-p) / M^2$

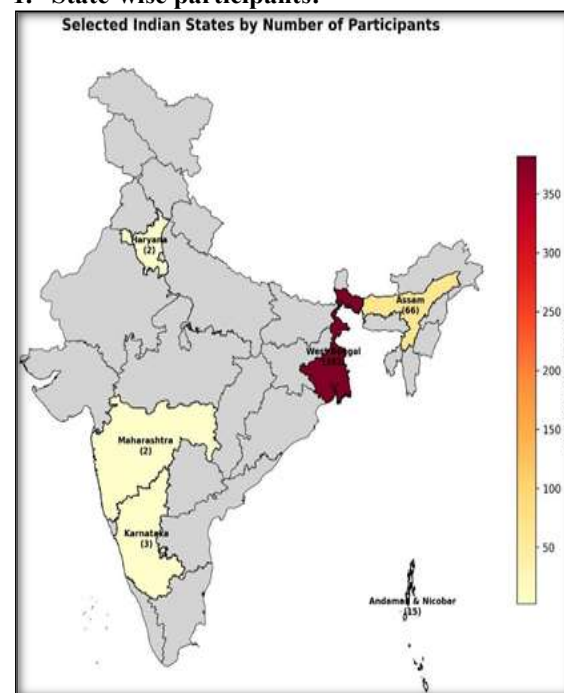
At 95% confidence interval, z value is 1.96, considering margin error(M) as 5% and prevalence of MBBS students in India with positive response towards CBME is 50% to get the maximum number of samples. The calculated sample size is 386 for this study.

Statistical methods: Descriptive analysis of collected data by using MS Excel.

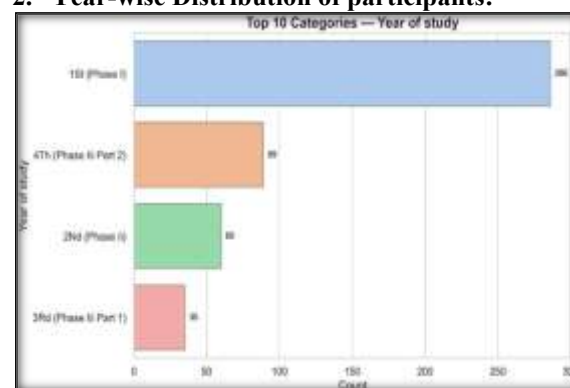
RESULTS

Responses of total n participants across India against each point in the questionnaire were entered into a master spreadsheet of MS Excel. Data were analysis descriptively. The display of the frequency distribution of various parameters are presented below:

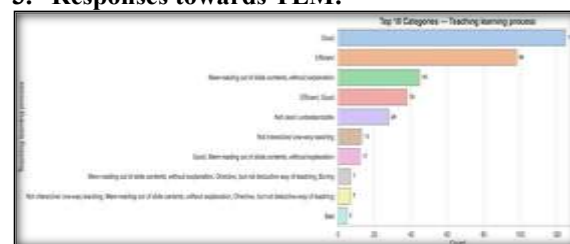
1. State-wise participants:



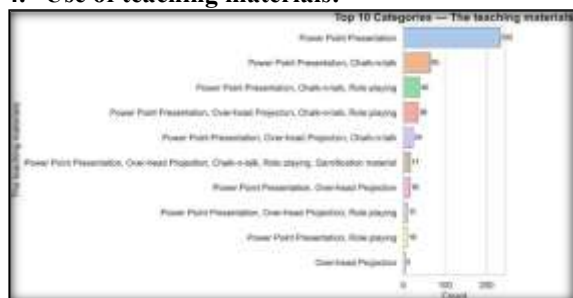
2. Year-wise Distribution of participants:



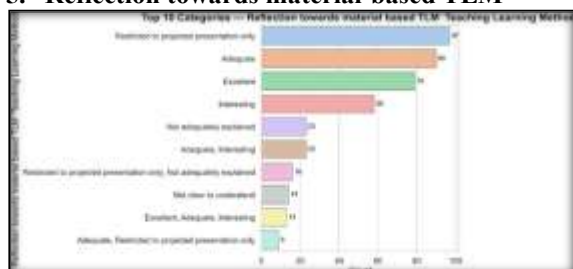
3. Responses towards TLM:



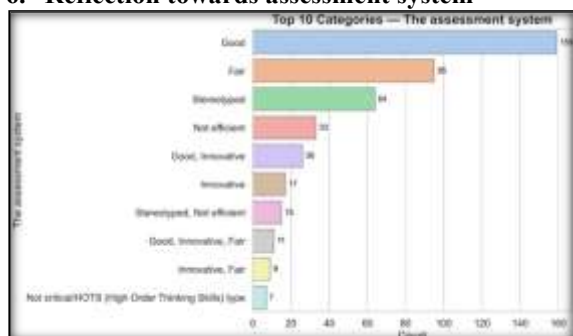
4. Use of teaching materials:



5. Reflection towards material-based TLM



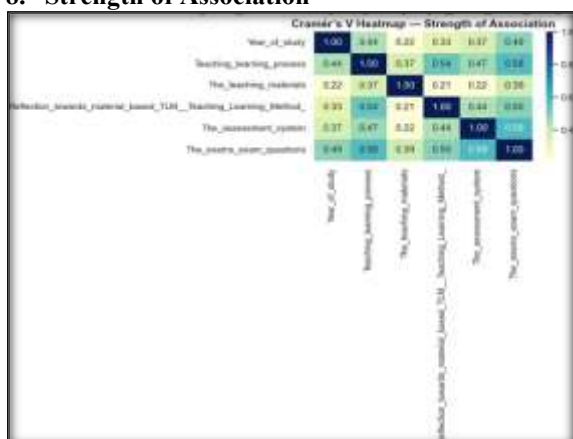
6. Reflection towards assessment system



7. Reflections towards exam or exam questions



8. Strength of Association



Significant associations were found between the teaching learning process and the reflection towards material-based TLM (0.54), and the exam/exam questions (0.58) also; between reflection towards material-based TLM and the exam/exam questions (0.50); between the assessment system and the exam/exam questions (0.59).

DISCUSSION

This cross-sectional study, encompassing 386 MBBS students across multiple states in India, aimed to evaluate the usefulness and acceptability of Competency-Based Medical Education (CBME) as implemented under the National Medical Commission (NMC) framework. The findings reveal significant insights into students' perceptions of teaching-learning methods, material-based pedagogical tools, assessment systems, and examination practices—all of which constitute the operational architecture of CBME.

Acceptance and Engagement with CBME: A Nationwide Perspective

The pan-India participation in this study reflects the widespread implementation of CBME across diverse geographical and institutional contexts. The heterogeneity of respondents—spanning different states, academic years, and institutional types—strengthens the generalizability of our findings. This geographical and temporal diversity is crucial, as it captures the lived experiences of students at various stages of competency acquisition, from the Foundation Course through clinical rotations.

The year-wise distribution of participants offers a longitudinal lens through which the maturation of CBME perception can be examined. Students in earlier academic years may evaluate CBME primarily through the lens of foundational modules and early clinical exposure, whereas senior students' reflections are likely informed by integrated clinical competencies and workplace-based assessments. This developmental trajectory aligns with Miller's Pyramid of Clinical Competence, wherein progression from "knows" to "does" requires scaffolded learning experiences that CBME explicitly provides through its competency-based framework.^[11]

Interconnectedness of Pedagogical Components: Interpreting the Correlations

The strength of associations identified in this study reveals the systemic coherence of CBME implementation. The moderate to strong positive correlations between teaching-learning processes and material-based TLM ($r = 0.54$), teaching-learning processes and examination questions ($r = 0.58$), material-based TLM and examination questions ($r = 0.50$), and assessment systems and examination questions ($r = 0.59$) demonstrate constructive alignment—a concept articulated by Biggs (1996) as the consonance between intended learning outcomes, teaching methods, and assessment tasks.^[12]

From an epistemological standpoint, these correlations validate the principle of backward design, which posits that curricular coherence emerges when assessment drives instruction, and instruction is mediated through appropriate pedagogical tools.^[13] In CBME, competencies define the destination; teaching-learning methods constitute the journey; and assessments verify arrival. The significant correlations observed suggest that students perceive this alignment, recognizing that what is taught through diverse TLM modalities is indeed what is assessed, and that assessment systems authentically reflect the competencies emphasized during instruction.

The correlation between teaching-learning processes and material-based TLM ($r = 0.54$) indicates that students who find the pedagogical approaches effective also appreciate the learning materials provided. This resonates with Mayer's Cognitive Theory of Multimedia Learning, which emphasizes that learning is optimized when instructional design considers cognitive load and employs multimedia principles.^[14] In the context of CBME, where small-group teaching, case-based learning, simulation, and self-directed learning (SDL) predominate, the quality and relevance of learning materials become pivotal. The moderate strength of this correlation suggests room for enhancement—perhaps through more contextualized, competency-mapped resources or through greater integration of digital learning platforms.

The strongest correlation observed was between the assessment system and examination questions ($r = 0.59$). This finding is particularly significant within the CBME paradigm, which privileges formative assessment and continuous feedback over summative high-stakes examinations. The correlation suggests that students perceive coherence between ongoing assessments (workplace-based assessments, OSCEs, logbook entries) and terminal examinations. However, the moderate strength also hints at a potential disconnect—possibly reflecting the tension between traditional examination formats (MCQs, theory papers) and competency-based assessment modalities. As Schuwirth and van der Vleuten (2011) argue, assessment in competency-based education must be programmatic, integrating multiple methods across time to form a comprehensive judgment of competence.^[15] The present finding underscores the necessity for continuous faculty development in designing assessment blueprints that authentically test competencies rather than mere knowledge recall.

Philosophical Underpinnings: Constructivism, Reflective Practice, and Experiential Learning

The theoretical foundation of CBME rests upon constructivist epistemology, particularly as articulated by Piaget and Vygotsky. Constructivism posits that knowledge is actively constructed by learners through interaction with their environment, rather than passively received from instructors.^[16] CBME operationalizes this through active learning strategies—problem-based learning, small-group

discussions, hands-on skill sessions—that require students to engage cognitively, manipulate concepts, and apply knowledge to clinical scenarios. The students' positive reflection toward TLM suggests that they recognize and value this shift from passive reception to active construction of knowledge.

Furthermore, CBME embeds Schön's concept of reflective practice as a mechanism for competency development. Reflection-in-action and reflection-on-action enable learners to critically evaluate their performance, identify gaps, and iterate toward mastery. The Foundation Course, as highlighted in the introduction, explicitly incorporates reflective exercises, professional identity formation activities, and feedback sessions. The acceptability of CBME observed in this study may partly stem from students' appreciation of structured opportunities for reflection—a marked departure from the procedural, non-reflective pedagogy of traditional curricula.^[17] Kolb's Experiential Learning Theory provides another lens through which to interpret these findings. Kolb's cycle—concrete experience, reflective observation, abstract conceptualization, and active experimentation—mirrors the CBME workflow: clinical exposure, debriefing and feedback, conceptual integration, and subsequent practice.^[18] The positive correlations between teaching methods and assessments suggest that students experience this cycle as coherent and purposeful, reinforcing learning through iterative engagement.

Alignment with CBME Principles under NMC Guidelines

The National Medical Commission's adoption of CBME represents a deliberate move toward producing "Indian Medical Graduates" who are competent, compassionate, and contextually responsive.^[19] The Graduate Medical Education Regulations mandate that students demonstrate competencies across knowledge, skills, attitudes, values, and communication—encapsulated in the AETCOM (Attitudes, Ethics, and Communication) module and integrated horizontal and vertical teaching.

The present study's findings affirm that students perceive CBME as addressing these multidimensional competencies. The correlation between TLM and assessment suggests recognition that ethics, communication, and professionalism are not peripheral add-ons but are woven into the pedagogical and evaluative fabric. This is consistent with the CanMEDS framework,^[20] which identifies seven physician roles—medical expert, communicator, collaborator, leader, health advocate, scholar, and professional. CBME in India, inspired by international models yet adapted to local contexts, seeks to cultivate these roles through targeted competencies.

Moreover, the emphasis on formative assessment and feedback—as operationalized through the RACE framework—addresses a critical gap in traditional medical education, where feedback was sporadic and

often judgmental rather than developmental.^[5] The significant association between assessment systems and examination questions ($r = 0.59$) suggests that students perceive formative assessments as preparatory for summative evaluations, thereby reducing anxiety and promoting mastery-oriented learning.

Comparison with Previous Literature

The findings of this study resonate with prior research on CBME acceptability in India. Gore *et al.* (2021) reported over 90% satisfaction with the Foundation Course among first-year MBBS students at Vydehi Institute, Bengaluru.^[6] Similarly, Mishra and Kar (2017) found high levels of appreciation for interactive, participatory orientation sessions at AIIMS Bhubaneswar.^[4] The present study extends these findings by demonstrating that positive perceptions persist across academic years and geographical regions, suggesting that the initial enthusiasm for CBME is not merely a novelty effect but reflects substantive pedagogical value.

However, it is essential to acknowledge the critiques of CBME articulated in the international literature. Leung (2002) and Frank *et al.* (2010),^[7,8] caution against the reductionism inherent in competency frameworks, warning that fragmentation of medical practice into discrete competencies may undermine holistic clinical reasoning and professional identity. This critique is particularly pertinent in the Indian context, where large class sizes, resource constraints, and faculty unfamiliarity with CBME may exacerbate implementation challenges. The moderate strength of the correlations observed in this study may reflect these tensions—indicating general alignment but also highlighting areas requiring refinement.

Implications for Medical Education in India

First, the significant correlations validate the systemic design of CBME but also reveal opportunities for strengthening alignment. Faculty development programs must emphasize backward design, ensuring that assessments authentically measure competencies and that TLM strategies facilitate competency acquisition. The NMC's mandate for continuous medical education and faculty training in medical education technologies must be rigorously implemented.

Second, the study underscores the importance of learning materials that are contextually relevant, competency-mapped, and pedagogically sound. Medical institutions should invest in developing or curating high-quality resources—case banks, simulation modules, e-learning platforms—that support diverse learning styles and facilitate SDL. The correlation between material-based TLM and examination performance suggests that well-designed resources can bridge the gap between teaching and assessment.

Third, the findings affirm the value of formative assessment and feedback in shaping students' perceptions of CBME. Institutions must cultivate a feedback culture characterized by psychological

safety, timeliness, specificity, and actionability. The RACE framework offers a practical model, but its effectiveness depends on faculty buy-in and institutional support.

Fourth, the pan-India nature of this study highlights the need for contextual adaptation. While the NMC provides a national framework, regional variations in infrastructure, faculty expertise, and student demographics necessitate locally tailored implementations. Periodic curriculum evaluation, as advocated by accreditation bodies (WFME, 2015 & ACGME, 2020), is essential to ensure that CBME remains responsive to evolving healthcare needs and educational contexts.^[21]

Limitations of the Study

Several limitations warrant consideration. First, the cross-sectional design captures perceptions at a single time point, precluding causal inferences or assessment of temporal changes in attitudes. Longitudinal studies tracking cohorts from entry to graduation would provide richer insights into the developmental impact of CBME.

Second, while the sample size of 386 is statistically adequate, the reliance on self-reported perceptions introduces potential response bias. Students' reflections may be influenced by social desirability, institutional culture, or recent experiences, which may not accurately represent their sustained engagement with CBME.

Third, the study does not disaggregate findings by institutional type (government vs. private), geographical region, or academic performance levels. Such stratification would reveal differential experiences and inform targeted interventions.

Fourth, the discussion lacks qualitative data that could illuminate the "why" behind the quantitative patterns. Mixed-methods research incorporating focus group discussions or in-depth interviews would enrich understanding of students' lived experiences within CBME.

Future Directions

Future research should adopt longitudinal designs to track students' evolving perceptions and competency development over the course of their medical education. Comparative studies examining CBME implementation across institutions with varying resources and contexts would identify best practices and scalable models.

Additionally, investigations into faculty perspectives, challenges, and training needs are essential, as successful CBME implementation hinges on educators' capacity to operationalize competency-based teaching and assessment. Finally, outcome studies correlating CBME exposure with clinical performance, patient outcomes, and career trajectories would provide definitive evidence of its impact on producing competent, compassionate physicians.

Concluding the Discussion

To sum up the discussion, this study provides empirical evidence that CBME, as implemented under NMC guidelines, is perceived as useful and

acceptable by MBBS students across India. The significant correlations among teaching-learning processes, material-based TLM, assessment systems, and examination questions demonstrate constructive alignment and validate the systemic coherence of CBME. Philosophically, these findings affirm the constructivist, reflective, and experiential foundations of CBME, aligning with international frameworks while addressing India-specific healthcare and educational contexts. However, the moderate strength of correlations suggests scope for enhancement, particularly in faculty development, resource optimization, and assessment design. As India's medical education system continues to evolve, sustained commitment to curriculum evaluation, contextual adaptation, and evidence-based refinement will determine whether CBME fulfils its promise of producing competent, empathetic, and contextually responsive physicians for the 21st century.

CONCLUSION

This pan-India cross-sectional study, encompassing 386 MBBS students across diverse geographical and institutional contexts, provides empirical evidence that Competency-Based Medical Education (CBME), as implemented under the National Medical Commission (NMC) framework, is perceived as both useful and acceptable by undergraduate medical students. The study successfully achieved its objective of evaluating student reflections on the utility and acceptability of this transformative pedagogical paradigm.

The findings reveal significant positive correlations among teaching-learning processes, material-based teaching-learning methods (TLM), assessment systems, and examination questions, with correlation coefficients ranging from 0.50 to 0.59. These moderate to strong associations demonstrates constructive alignment—the consonance between intended learning outcomes, instructional methods, and assessment practices—which is fundamental to the CBME philosophy. Students recognize that what they learn through diverse pedagogical modalities is authentically reflected in assessments, validating the systemic coherence of CBME implementation in India.

From a philosophical standpoint, the acceptability of CBME affirms the constructivist, reflective, and experiential foundations upon which this curriculum is built. The shift from passive knowledge reception to active knowledge construction, from sporadic evaluation to continuous formative feedback, and from content-based learning to competency-based mastery represents a paradigm shift that students perceive as meaningful and relevant. The alignment with educational theories articulated by Vygotsky, Schön, and Kolb—combined with the practical operationalization through frameworks like CanMEDS, AETCOM, and RACE—demonstrates

that CBME is not merely a regulatory mandate but a pedagogically sound and philosophically grounded approach to medical education.

The study extends previous institutional-level investigations by demonstrating that positive perceptions of CBME persist across academic years, states, and institutional types, suggesting that the initial enthusiasm is not a novelty effect but reflects substantive educational value. The nationwide acceptance validates the NMC's vision of producing "Indian Medical Graduates" who are competent, compassionate, contextually responsive, and equipped with the knowledge, skills, attitudes, values, and communication abilities required for 21st-century healthcare.

However, the moderate strength of the observed correlations also reveals opportunities for enhancement. Faculty development remains paramount, as the success of CBME hinges on educators' capacity to design competency-mapped learning experiences, provide timely and actionable feedback, and conduct programmatic assessments that authentically measure competence rather than mere recall. Institutions must invest in high-quality learning resources, cultivate psychologically safe feedback cultures, and adapt the national framework to local contexts while maintaining fidelity to core principles.

The study acknowledges several limitations, including its cross-sectional design, reliance on self-reported perceptions, and absence of qualitative insights or institutional stratification. Future research should adopt longitudinal and mixed-methods approaches to track competency development, explore lived experiences, and identify context-specific best practices. Outcome studies correlating CBME exposure with clinical performance and patient care quality will provide definitive evidence of its long-term impact.

In conclusion, this study marks a significant contribution to the growing body of evidence supporting CBME implementation in India. It demonstrates that students, as primary stakeholders, perceive CBME as a valuable and acceptable framework for their professional development. The theoretical soundness, empirical validation, and practical implications of these findings collectively affirm that CBME represents not merely a curricular innovation but a fundamental transformation in how India prepares its future physicians.

As medical education continues to evolve in response to societal needs, technological advancements, and healthcare challenges, the commitment to competency-based, learner-centred, and outcome-oriented education remains essential. The success of CBME will ultimately be determined not by regulatory compliance but by its capacity to produce physicians who are clinically competent, ethically grounded, empathetically engaged, and committed to lifelong learning and service. This study provides grounds for cautious optimism that CBME, when implemented with fidelity, faculty commitment, and

institutional support, can fulfil this promise and shape a generation of medical professionals equipped to meet the complex healthcare needs of India and beyond.

The journey from traditional medical education to competency-based learning is neither simple nor complete, but the reflections of students captured in this study suggest that the foundation has been laid, the direction is sound, and the future is promising. Sustained evaluation, contextual adaptation, and evidence-based refinement will ensure that CBME evolves from an educational reform into an enduring legacy of excellence in Indian medical education.

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