

EFFECTIVENESS OF A BLUEPRINTING-FOCUSED WORKSHOP AMONG MEDICAL FACULTIES IN A MEDICAL COLLEGE: A QUASI-EXPERIMENTAL STUDY

Anju Prasad¹, Ashish Dash², Lorika Sahu³, Sini Venugopal⁴

Received : 03/08/2026
Received in revised form : 02/09/2026
Accepted : 14/09/2026

Keywords:

Faculty development, competency-based medical education, curriculum mapping, educational assessment.

Corresponding Author:

Dr. Anju Prasad,

Email: anjuprasad1973@gmail.com

DOI: 10.47009/jamp.2026.8.5.47

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2026; 8 (5); 297-301



¹Professor and Head, Department of Pharmacology, IMS & SUM College and Hospital, Campus-2, Phulanakhara, Bhubaneswar, Odisha, India.

²Assistant Professor, Department of Pharmacology, IMS & SUM College and Hospital, Campus-2, Phulanakhara, Bhubaneswar, Odisha, India.

³Assistant Professor, Department of Pharmacology, IMS & SUM College and Hospital, Campus-2, Phulanakhara, Bhubaneswar, Odisha, India.

⁴Professor, Department of Gynaecology, Hi-Tech Medical College & Hospital, Bhubaneswar, Odisha, India.

ABSTRACT

Background: A blueprint serves as a critical tool in systematic and objective evaluation strategies, ensuring that assessments accurately reflect curricular priorities and competency requirements. In the light of outcome-based education and competency-driven curricula, blueprinting-focused workshops provide hands-on experience in designing structured assessment plans aligned with academic objectives. A methodical assessment of how well blueprinting workshops improve faculty comprehension is highly recommended. The present study intends to determine whether structured training can improve faculty knowledge and understanding of assessment blueprinting and promote its implementation in academic practice. **Materials and Methods:** It is a quasi-experimental (pre-test-post-test) interventional study including 60 faculty members involved in undergraduate medical teaching from Phase I, Phase II, and Phase III Part I. A structured questionnaire was used to assess knowledge, skills, and perceptions. Following the pre-test, a hands-on workshop was conducted. The workshop was followed by a post-test. The primary outcome measure was the difference between pre-test and post-test scores in the knowledge, skills, and perception domains. Change in scores was indicative of the workshop's effectiveness. A paired t-test (for normally distributed data) or Wilcoxon signed-rank test (for non-normally distributed data) was used to assess the significance of differences between pre- and post-intervention scores. A p-value of <0.05 was considered statistically significant. **Results:** The mean perception and knowledge scores significantly improved across all 13 domains following the workshop (n=60, p < 0.05). Notably, the median score for understanding blueprinting concepts increased from 4 (IQR: 2) to 5 (IQR: 1). Individual improvement per item ranged from 33.3% to 60.0%, with post-intervention data demonstrating a significant positive shift; faculty members were significantly less likely to view traditional non-blueprint methods as superior (p < 0.001) or consider blueprinting an unnecessary administrative burden (p < 0.001). **Conclusion:** A structured, hands-on workshop is highly effective at improving medical faculties' knowledge and fostering positive attitudes toward assessment blueprinting. Integrating short, interactive faculty development sessions into institutional programs can rapidly enhance assessment literacy, driving the systematic and standardized exam coverage required for competency-based medical education.

INTRODUCTION

Assessment is a fundamental component of medical education. In modern competency-based medical

education (CBME), a thorough assessment evaluates knowledge in addition to ensuring coherence with well-defined learning objectives and curriculum outcomes.^[1,2] Assessment blueprinting is one of the

most crucial instruments for achieving this alignment. As opposed to the traditional assessment systems wherein examinations were constructed without a structured plan, blueprinting refers to the systematic planning of examinations by mapping learning objectives, content areas, and cognitive levels to assessment items, thereby ensuring balanced and valid evaluation of student performance.^[3] A robust blueprinting offers better transparency, validity and reliability of the examination processes by providing a structured framework linking curriculum objectives with examination content.^[4-6] With the growing emphasis on outcome-based education and competency-driven curricula, the need for faculty training in assessment methods has become increasingly evident. Many medical faculties receive limited formal training in educational principles, including test construction and blueprinting. Consequently, faculty development programs have emerged as an essential strategy to strengthen teaching and assessment practices in healthcare institutions. Blueprinting-focused workshops are particularly valuable because they provide hands-on experience in designing structured assessment plans aligned with academic objectives.^[7,8]

In the light of recent curriculum reforms in undergraduate medical education, faculties are encouraged to adopt more systematic and objective evaluation strategies. Blueprinting serves as a critical tool in this process, ensuring that assessments accurately reflect curricular priorities and competency requirements. A methodical assessment of how well blueprinting workshops improve faculty comprehension is needed. Evaluating such interventions can help determine whether workshops effectively enhance faculty knowledge, confidence, and practical ability to design blueprint-based examinations. The present study is an attempt to evaluate the effectiveness of a blueprinting workshop among medical faculties in a medical college, that intends to determine whether structured training can improve faculty knowledge and understanding of assessment blueprinting and promote its implementation in academic practice.

MATERIALS AND METHODS

The study was designed as a quasi-experimental (pre-test-post-test) interventional study conducted at IMS & SUM Hospital Campus-2, Phulanakhara with the aim to evaluate the effectiveness of a blueprinting-focused workshop among medical faculty members. Faculty members involved in undergraduate medical teaching from Phase I, Phase II, and Phase III Part I were screened. All teaching faculty members who were actively involved in undergraduate teaching and willing to participate were included in the study. Faculty members who did not provide consent or were unable to attend the complete workshop session were excluded from the study. Approval was

obtained from the Institutional Ethics Committee of IMS & SUM Hospital Campus-2, Phulanakhara with reference number IEC/IMS.SH/SOA/2025/1015. The study was conducted in strict accordance with the ethical principles outlined in the Declaration of Helsinki (amended 2013) and the National Ethical Guidelines for Biomedical and Health Research Involving Human Participants laid down by the Indian Council of Medical Research (ICMR).

Written informed consent was obtained from the participants prior to enrollment. A total of 60 faculty members completed the workshop. Participants' confidentiality was maintained and their data was anonymised. A structured questionnaire was used to assess knowledge, skills, and perceptions regarding blueprinting of question papers. The questionnaire was developed based on standard medical education principles and validated by subject experts for content validity. The knowledge-based questions were objective type, skill-based questions were application-oriented and perception-based questions required Likert scale responses. Baseline data were collected using a pre-test questionnaire. The responses were recorded and analyzed to assess the initial level of understanding of blueprinting concepts. Following the pre-test, participants were exposed to a structured, hands-on workshop organized by the Department of Pharmacology of the institution. It included interactive sessions on the principles of blueprinting, various assessment methodologies, relevance of alignment between learning objectives and assessment alongside practical training sessions where they developed blueprints for question papers under guided supervision. Following the workshop, a post-test questionnaire similar in structure to the pre-test was administered to all participants. The primary outcome measure was the difference between pre-test and post-test scores in the knowledge, skills, and perception domains. Change in scores was indicative of the workshop's effectiveness.

Data were entered into Microsoft Excel and analyzed using appropriate statistical software. Descriptive statistics such as mean, standard deviation, frequencies, and percentages were used to summarize the data. Inferential statistics were applied to compare pre-test and post-test scores. A paired t-test (for normally distributed data) or Wilcoxon signed-rank test (for non-normally distributed data) was used to assess the significance of differences between pre- and post-intervention scores. A p-value of <0.05 was considered statistically significant.

RESULTS

Sixty faculty members from Phase I, Phase II, and Phase III Part I of the undergraduate medical program completed the workshop and both pre-test and post-test questionnaires, resulting in a 100 percent completion rate among eligible participants. The demographic profile was representative of teaching

faculty at a mid-sized Indian medical college. Women comprised 61.7 percent of the sample (Figure 1), and 55.0 percent of participants held the rank of assistant professor (Figure 2). The largest departmental groups were pathology (20.0 percent), community medicine (18.3 percent), and

biochemistry (18.3 percent), with smaller proportions from microbiology, pharmacology, physiology, and five clinical specialties (Table 1). One participant did not specify position or department; these missing data were included in the analysis as they did not affect the paired pre-post comparisons

Table 1: Demographic characteristics of participating medical faculty members (n = 60)

Characteristic	n	%
Gender		
Male	23	38.3
Female	37	61.7
Position / Designation		
Assistant Professor (AP)	33	55
Professor (P)	9	15
Head of Department (HOD)	5	8.3
Senior Resident (SR)	5	8.3
Associate Professor (Asso P)	5	8.3
Tutor	2	3.3
Not specified	1	1.7
Department		
Pathology	12	20
Community Medicine (CM)	11	18.3
Biochemistry	11	18.3
Microbiology	8	13.3
Pharmacology	5	8.3
Physiology	5	8.3
Medicine	2	3.3
Other (Dermatology, ENT, Anatomy, Pediatrics, Ophthalmology)	5	8.3
Not specified	1	1.7

Other: Dermatology, ENT, Anatomy, Pediatrics, Ophthalmology (1 each).

The primary outcome was change in faculty perceptions and knowledge across 13 domains measured on five-point Likert scales. Table 2 presents the median (interquartile range) scores before and after the workshop, the percentage of participants who improved on each item, and the corresponding Wilcoxon signed-rank test statistics. Statistically significant improvements occurred in every domain (all $p < 0.05$). The largest median shifts were observed for understanding of blueprinting concepts (pre 4, IQR 2 to post 5, IQR 1) and for the belief that blueprinting ensures systematic coverage of the syllabus and appropriate representation of cognitive levels. On the three reverse-scored items,

median scores declined as expected, indicating that participants became less inclined to view the traditional non-blueprint method as superior or to regard blueprinting as an unnecessary administrative burden. The proportion of individual participants who improved ranged from 33.3 percent (need for structured approach; previously used blueprinting) to 60.0 percent (perceived fair balance of question types and difficulty levels). Post-workshop distributions displayed pronounced ceiling effects, with several items reaching a median of 5 and an IQR of 0 or 1, suggesting that the training moved a substantial subset of faculty toward the highest possible endorsement of blueprinting principles.

Table 2: Pre- and post-workshop perception and knowledge scores on assessment blueprinting (n = 60)

Item (Likert scale 1–5)	Pre-test Median (IQR)	Post-test Median (IQR)	Improved n (%)	Z	p-value
Understanding of blueprinting concept	4 (2)	5 (1)	35 (58.3%) ↑	−5.108	<0.001
Need for structured approach to assessment	5 (1)	5 (0)	20 (33.3%) ↑	−3.285	<0.001
Previously used blueprinting in question paper setting	3 (1)	3 (2)	20 (33.3%) ↑	−5.55*	0.047
Current method (without blueprint) is more effective†	2 (1)	2 (1)	28 (46.7%) ↓	−3.892	<0.001
Current method provides fair balance of Q types & difficulty†	3 (2)	2 (2)	36 (60.0%) ↓	−4.778	<0.001
Blueprinting assesses student performance more accurately	4 (1)	5 (1)	30 (50.0%) ↑	−5.38*	0.002
Blueprint covers the entire syllabus	4 (2)	5 (1)	32 (53.3%) ↑	−4.742	<0.001
Blueprint covers different cognitive levels	4 (1)	5 (0)	24 (40.0%) ↑	−3.861	<0.001
Systematic coverage of syllabus in examinations	4 (1)	5 (0)	28 (46.7%) ↑	−4.070	<0.001
Maintaining appropriate level of	4 (2)	5 (1)	27 (45.0%) ↑	−3.835	<0.001

difficulty in exams					
Aligning assessments with learning objectives	4 (1)	5 (0)	28 (46.7%) ↑	-4.001	<0.001
Blueprinting is an unnecessary addition†	2 (1)	1 (1)	29 (48.3%) ↓	-4.092	<0.001
Recommend blueprinting as a standard practice	4 (2)	5 (1)	32 (53.3%) ↑	-3.226	0.001

Table 2: Pre- and post-workshop perception and knowledge scores on assessment blueprinting (n = 60)

IQR = interquartile range ($Q3 - Q1$). All p-values from two-sided Wilcoxon signed-rank test. ↑ = improvement (higher post-test score); ↓ = improvement on reverse-scored items (lower post-test score).

† Reverse-scored items: lower scores after the workshop indicate a positive shift in perception (i.e., participants were less likely to endorse that the current non-blueprint method is superior or that blueprinting is unnecessary).

Designation of Participants

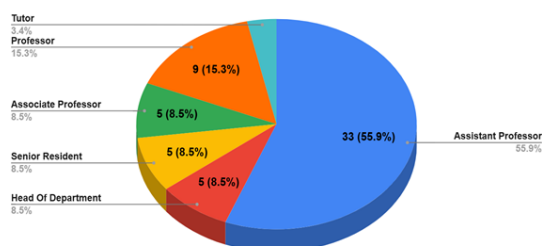


Figure 1: Pie chart showing distribution of designation of participants (n = 60)

Distribution of Gender

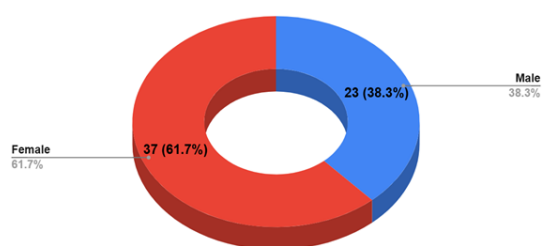


Figure 2: Pie chart showing the distribution of gender (n = 60)

DISCUSSION

This quasi-experimental study demonstrates that a single, well-structured, hands-on blueprinting workshop can produce rapid and statistically significant gains in medical faculty members' understanding of assessment planning and their willingness to adopt structured blueprinting in routine practice. The breadth of improvement across all 13 measured domains, the magnitude of the median shifts, and the proportion of participants (one-third to three-fifths) recording personal improvement on each item collectively indicate that the intervention addressed both cognitive and attitudinal barriers that often hinder the adoption of modern assessment methods in Indian medical colleges.

These findings are consistent with and extend the limited literature on faculty development in blueprinting. Patil et al. reported that a departmental sensitization workshop in pathology increased faculty appreciation of validity, reliability, and appropriate question weightage, with over 80 percent

of participants expressing satisfaction with the process.^[9] The present study achieved comparable gains in perceived understanding and even larger shifts in the conviction that blueprinting improves syllabus and cognitive-level coverage, likely due to the combination of didactic content and immediate practical application, as every participant constructed an actual blueprint for a question paper under guided supervision. Abdellatif and colleagues have argued that blueprinting is among the most effective tools for mitigating the two principal threats to test validity: construct under-representation and construct-irrelevant variance.^[3,10] The observed reduction in endorsement of the current non-blueprint method as “more effective” provides direct perceptual evidence that faculty recognized these validity advantages after training. More recently, Bhattacharyya et al. demonstrated that structured faculty development can reduce examiner variability in undergraduate theory assessments.^[11] The present results suggest that blueprinting training achieves a similar benefit by aligning faculty mental models of fair and comprehensive examination practices.

Several methodological strengths enhance the credibility of these conclusions. The paired pre-post design eliminated between-subject variability, and the 100 percent completion rate minimized selection bias. The use of non-parametric statistics appropriate for ordinal Likert data avoided distributional assumptions that are rarely met with five-point scales. Including faculty from 13 departments across preclinical, paraclinical, and clinical phases increases the applicability of the findings to a typical Indian medical college. Additionally, reporting both median (IQR) values and the percentage of participants who improved on each item provides a transparent account of central tendency and individual-level change, an approach that remains uncommon in medical education intervention studies.

Several important limitations should be acknowledged. First, the study was conducted at a single institution, and faculty culture, assessment practices, and administrative support for educational innovation may differ elsewhere, limiting external validity. Second, the absence of a concurrent control group means that maturation, testing effects, or social desirability bias cannot be entirely excluded, although the magnitude and consistency of change across 13 independent items make these alternative explanations less likely. Third, outcomes were

limited to self-reported perceptions; the actual quality of blueprints produced or downstream effects on student examination performance were not assessed. Fourth, follow-up was immediate, so the durability of observed attitude shifts is unknown. Finally, the modest sample size, while sufficient for primary paired analyses, precluded adequately powered subgroup comparisons that might have identified which faculty members benefit most from such training.

Despite these constraints, the practical implications are evident. Although the National Medical Commission of India mandates competency-based curricula and outcome-aligned assessment, many faculty members lack formal training in test construction. A focused, half-day to one-day workshop that integrates theory with hands-on blueprint construction appears to be an efficient strategy for addressing this gap. Incorporating such workshops into mandatory faculty development programs and linking completion to institutional requirements for blueprint submission before high-stakes examinations could accelerate culture change and improve the standard of undergraduate assessment. Cost-effectiveness analyses and longitudinal studies tracking objective blueprint quality and student learning outcomes would further support widespread adoption.

CONCLUSION

In conclusion, a structured blueprinting workshop resulted in rapid, broad, and statistically significant improvements in faculty knowledge and attitudes toward modern assessment practices. When scaled and sustained, such interventions have the potential to enhance the validity and fairness of medical licensing examinations and to support the broader objectives of competency-based medical education in

India and similar low- and middle-income country contexts.

REFERENCES

1. Gupta SK, Srivastava T. Assessment in Undergraduate Competency-Based Medical Education: A Systematic Review. *Cureus*. 2024;16(4):1-18. doi:10.7759/cureus.58073
2. Alharbi NS. Evaluating competency-based medical education: a systematized review of current practices. *BMC Med Educ*. 2024;24(1):612. doi:10.1186/s12909-024-05609-6.
3. Abdellatif H, Ebrahim A, Khamis T. Exam blueprinting as a tool to overcome principal validity threats: A scoping review. *Educ Médica*. 2024;25(3):100906. doi:10.1016/j.edumed.2024.100906
4. Landge J, Patel N, Lunagariya R. Preparing Blueprint for Theory Assessment of 3rd Part-I Students in Community Medicine. *Int J Med Res Heal Sci*. 2022;11(12):1-7.
5. Kumar P, Chaudhary N, Kokane AM, Zaman F, Kamble B, Yadav K. Designing a summative assessment blueprint in community medicine: an expert consensus approach at All India Institute of Medical Sciences. *BMC Med Educ*. 2024;24(1):1539. doi:10.1186/s12909-024-06365-3
6. Kaushik D, Sharma MK, Sawaraj S, Malik K, Sachdeva R. "CRAFTING EXCELLENCE": BLUEPRINTING OF PAPER SETTING OF FINAL YEAR MBBS STUDENTS FOR GENERAL MEDICINE IN COMPETENCY BASED. *Int J Acad Med Pharm*. 2025;7(4):520-524. doi:10.47009/jamp.2025.7.4.98
7. Ahmed AI, Batt AM. Exploring faculty development initiatives in medical education in resource-limited settings: perspectives and challenges. *BMC Med Educ*. 2025;25(1):1501. doi:10.1186/s12909-025-07848-7
8. Kohan M, Changiz T, Yamani N. A systematic review of faculty development programs based on the Harden teacher's role framework model. *BMC Med Educ*. 2023;23(1):910. doi:10.1186/s12909-023-04863-4
9. Patil SY, Gosavi M, Bannur HB, Ratnakar A. Blueprinting in assessment: A tool to increase the validity of undergraduate written examinations in pathology. *Int J Appl Basic Med Res*. 2015;5((Suppl 1)):S76-9. doi:10.4103/2229-516X.162286
10. Al-shahrani AM. Effect of blueprinting methods on test difficulty, discrimination, and reliability indices: cross-sectional study in an integrated learning program. *Adv Med Educ Pr*. 2019;10(Jan):23-30. doi:10.2147/AMEP.S190827
11. Bhattacharyya S, Rawekar A, Sau A, Goswami DP, Samashaptak S. Impact of a Structured Faculty Development Program on Reducing Examiner Variability in Undergraduate Medical Theory Assessments: A Quasi-Experimental Study. *Cureus*. 2026;18(3):e105946. doi:10.7759/cureus.105946.