

Designing a blueprint for Theoretical assessment of community medicine phase III Indian Medical Graduates

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ABSTRACT

Introduction: A blueprint serves as a high-quality, standardized document that encapsulates all instructional resources and the outcomes they have produced. It ensures that every aspect of the curriculum and its instructional domains is thoroughly addressed during the review process. **Objective:** To create blueprints for the undergraduate community medicine exam curriculum. **Material & Method:** The distribution of various question types (MCQ, SAQ, and LAQ) and cognitive domain levels (recall, understanding, and application) is proportionally allocated. The impact point (I) ranges from 1 to 3, and the frequency score also ranges from 1 to 3. The weightage coefficient (W) is calculated using the formula $I \times F / T$. **Result:** The total of all $I \times F$ for Paper I amounts to 44, while for Paper II, it totals 43. Blueprints for Community Medicine Paper I and Paper II are each worth 100 marks. **Conclusion:** Our study's findings indicate that the topics "Principles of Health Promotion and Education," "Occupational Health," "Epidemiology of Communicable Diseases," "Demography and Vital Statistics," and "Health Care of the Community" collectively represent more than half of the total weightage.

KEYWORDS

Blueprint; Assessment; Community Medicine; Indian Medical Graduate

INTRODUCTION

Assessment is an essential component of medical education. Indian medical schools typically employ a traditional assessment approach, relying on a limited number of structured cases, such as long or short cases, to evaluate students' clinical skills.⁽¹⁾ This method does not adequately assess the comprehensive concepts outlined in the curriculum, making it appear more theoretical and misaligned with learning objectives. Implementing blueprint assessments as a technical tool for skill evaluation presents an effective solution to mitigate the common shortcomings of traditional assessments. A blueprint is a high-quality, standardized document that summarizes all instructional resources and their outcomes,

ensuring that every aspect of the curriculum and its instructional domains is covered during the review process.⁽²⁾

Blueprinting serves to:

- Ensure that the questions in the examination align with the objectives.
- Confirm that all questions are within the syllabus.
- Design effective educational strategies.
- Evaluate the selected test items for deeper thinking.
- Provide coherent and balanced examples that illustrate the assessment's competencies, content, and tools. ⁽³⁾

Creating a blueprint is a vital step in enhancing assessment validity and ensuring positive

alignment, particularly for exams that carry significant consequences.(4) It aids curriculum designers in connecting various competencies with the course content. (5)

Objective: To create blueprints for the undergraduate community medicine exam curriculum.

MATERIAL & METHODS

Steps for Designing the Blueprint:

Outline all subject areas of the Community Medicine syllabus

The Community Medicine curriculum was divided into two parts: Paper I and Paper II. An outline was created for the community medicine component of the third MBBS phase-1 (preliminary) theory exams. Input was gathered from seven faculty members, all of whom hold academic ranks above assistant professor and have at least five years of postgraduate work and teaching experience.

Develop a theoretical assessment blueprint: by paper.

The total marks allocated to Community Medicine were 200, with each paper worth 100 marks. The proportional distribution of various question types (MCQ, SAQ, and LAQ) and cognitive domain levels (recall, understanding, and application) is detailed in Tables 2 and 3. The distribution for MCQ, SAQ, and LAQ was set at 20%, 50%, and 30%, respectively, with MCQs receiving the least weight and SAQs the most. The blueprint included levels of the cognitive domain: recall [®], understanding (U), and application (A), along with the mark distribution and the different types of assessment questions (MCQ, SAQ, and LAQ).

Procedures for preparing blueprints

1 Assess each subject area's impact and provide an "impact point" (I) to each one.

Impact point (I) ranges from 1 to 3. Impact point 1 provides less emphasis on topic and offers students "may know" subject areas. Impact point 2 indicates that topic is of moderate relevance and that the subject area is "nice to know," while impact point 3 indicates that the topic is of great importance and that students "must know" the material.

2 Line up the frequency of questions asked about each of the subject areas and assign a "Frequency Score" (F) to each one

The frequency score also ranges from 1 to 3. A frequency score of 1 indicates less questions asked, a score of 2 indicates questions asked quite regularly, and a score of 3 indicates questions asked frequently.

3 Estimate the Weighting of Every Subject area (W)

To determine the weighting of each subject area, the following steps were taken:

- Calculate $I \times F$, which is the Impact of the topic multiplied by the Frequency of questions asked from each topic.
- Compute the total sum of all $I \times F$, which will be referred to as "T."
- The Weightage coefficient (W) is then calculated as $I \times F / T$.
- Finally, multiply the Weightage coefficient (W) by the total number of average questions, which is 31 for Paper-I and 32 for Paper-II. This will yield the proportionate weightage for each subject area. Adjust the weightage for each subject area accordingly.

Table 1 Distribution of theory marks in community medicine PAPER A and PAPER B

Theory Paper A		Theory Paper B	
Concept of health and disease	10	Demography and Vital Statistics	10
Relationship of social and behavioural sciences to health and disease	5	Reproductive, maternal and child health	20
Environmental health problems	10	Occupational Health	5
Principle of health promotion and education	5	Geriatrics Services	5
Nutrition	20	Disaster management	5
Basic statistics and its application	5	Hospital waste management	5
Epidemiology	20	Health planning and management	5
Epidemiology of communicable and non-communicable diseases	20	Mental health	5
AETCOM	5	Health care of community	20
		International health	3
		Essential medicine	3
		Recent advance in community medicine	14
Total	100	Total	100

Table 2 Distribution of Question Types (MCQ, SAQ, LAQ) Across Cognitive Domains in Theory Paper II: Percentage and Marks Allocation

THEORY PAPER II	%	MARKS		MCQ			SAQ			LAQ			TOTAL
MCQ	20%	20	DOMAIN	R	U	A	R	U	A	R	U	A	
SAQ	50%	50	%	25	40	35	6	24	54	33	33	33	100
LAQ	30%	30	MARKS	5	8	7	3	12	27	10	10	10	
			TOTAL	20			50			30			

Table 3 Distribution of Question Types (MCQ, SAQ, LAQ) Across Cognitive Domains in Theory Paper I: Percentage and Marks Allocation

THEORY PAPER I	%	MARKS		MCQ			SAQ			LAQ			TOTAL
MCQ	20%	20	DOMAIN	R	U	A	R	U	A	R	U	A	
SAQ	50%	50	%	10	50	40	8	42	50	33.3	33.3	33.3	100
LAQ	30%	30	MARKS	2	10	8	4	21	25	10	10	10	
			TOTAL	20			50			30			

Table 4. Blueprint for summative assessment community medicine paper-I phase 3

SN	Topic	Impact of Topic (I)	Frequency of asking Question (F)	I× F	Weightage W = I× F/T	W× 31	Final marks
1	Concept of health and disease	3	2	6	0.13	4.03	14
2	Relationship of social and behavioural sciences to health and disease	2	1	2	0.04	1.24	6
3	Epidemiology	3	2	6	0.13	4.03	14
4	Nutrition	2	2	4	0.09	2.79	10
5	Basic statistics and its application	2	1	2	0.04	1.24	6
6	Epidemiology of communicable	3	3	9	0.20	6.2	17
7	Epidemiology of non-communicable diseases	2	1	2	0.04	1.24	6
8	Environmental health problems	2	2	4	0.09	2.79	10
9	Principle of health promotion and education	3	3	9	0.20	6.2	17
Total				T=44			100

Table 5. Blueprint for summative assessment community medicine paper-II phase 3

SN	Topic	Impact of Topic (I)	Frequency of asking Question (F)	I× F	Weightage W = I× F/T	W× 32	Final marks
1	Demography and Vital Statistics	2	3	6	0.13	4.16	14
2	Reproductive maternal and child health	3	3	9	0.20	6.4	16
3	Geriatrics Services	1	1	1	0.02	0.64	4
4	Mental health	1	1	1	0.02	0.64	4
5	Hospital waste management	1	1	1	0.02	0.64	4
6	Health planning and management	2	2	4	0.09	2.88	10
7	Health care of the community	3	2	6	0.13	4.16	14
8	Occupational Health	3	3	9	0.20	6.4	16

9	International health	1	1	1	0.02	0.64	4
10	Disaster management	2	2	4	0.09	2.88	10
11	Essential medicine and recent advances and AETCOM	1	1	1	0.02	0.64	4
Total				T=43			100

RESULTS

Final paper I and paper II blueprints were developed. The total of all I × F for Paper I amounts to 44, while for Paper II, it is 43. Therefore, the blueprints for both papers, which together are worth 100 marks, have been established.

DISCUSSION

In the actual implementation of the CBME program by the NMC, the blueprinting of the medical curriculum can be very useful.

Here are some studies which show a positive association of blueprint designing and its implementation. Kumar P (6) concludes that the designing of a blueprint of community medicine was challenging, but it will help standardising the assessment method of the subject, which will address the hurdles. Similarly, Gujarathi et al (7) state that the blueprint makes the evaluation transparent, accessible, and easy to understand. It is also observed by Kundoor et al (1) Blueprint means "detailed action plan." In brief, it acts as a link between assessment and learning objectives. Blueprint enables the faculty to set the question paper in such a way that it covers most of the important concepts and tests the students' in-depth knowledge. In another study done by Aneja et al (8) who also strongly supported that Blueprinting of theory question papers to ensure adequate and suitable allocation of marks to each subjection, framing the questions with appropriate verbs as suggested by Bloom to test hierarchical levels of cognitive domain, inclusion of all types of questions from MCQs to structured LAQs and finally assessing the AETCOM and ECE are some of the key fundamentals to attain a high quality and valid summative assessment theory question papers.

The goal of the current study was to create an assessment design for the Final Proff Part-1 MBBS community medicine curriculum following the new competency-based curriculum established by the NMC. Each community medicine theory assessment paper had 100 marks each. For which students need to acquire a minimum of 40 % marks in each paper (paper I and II) separately. It ensures that the students acquire a minimum of basic knowledge of each core competency. It also implies that the

students can now, not leave a particular region or subsection of the subject in choice.

In our study, the chapter entitled "Epidemiology of communicable diseases," "Principles of health promotion and education," "Reproductive, maternal and child health," "occupational health" and "Principles of Epidemiology" are given top total weightage. In contrast, in a Gujarathi et al (7) study, the chapter entitled "Epidemiology", "MCH" and "Health care delivery" received top total weightage. Landge et al (9) has given top weightage to "Epidemiology" "Epidemiology of communicable diseases and noncommunicable" and "Reproductive, maternal and child health". In another study done by Mathur et al (10) "Epidemiology of communicable Diseases," "Principles of Epidemiology" and "Preventive Medicine in Obstetrics, Paediatrics & Geriatrics" had top weightage.

While in our study given to "Mental health" "Essential medicine" "International health" "Geriatrics" "Hospital management" were some least weightage topics. Study done by Gujarathi et al (7) shows "Geriatrics" "Hospital waste management" "Mental health" and "Disaster management" are on least prioritized topics. The least weightage topics according to Landge et al (9) were "Environmental health" "Geriatrics" "Hospital waste management" "Mental health" and "Essential medicine". Mathur et al (10) study observed that "Relationship of social and behavioral to health and disease" "Essential medicine" and "International health" were low weightage topics

CONCLUSION

According to the results of our study, the subjects of "Principle of health promotion and education" "Occupational health," "Epidemiology of communicable diseases" "Demography and Vital Statistics" and "Health care of community" accounted for more than half of the total weight. The Community Medicine department's faculty conducted peer review of the prepared blueprint, and all of them gave it favourable remarks. This outline should be updated every two to three years to account for the addition of new subject areas and used as a guide for internal theoretical exams. In

addition to assigning weights to various competencies and themes, the use of blueprints in curriculum implementation and assessment improves time management and classroom planning. Faculty members who are better familiar with the blueprint will set papers more effectively and guarantee that all domains and subject areas are taken into account.

CONFLICT OF INTEREST

There are no conflicts of interest.

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DECLARATION OF GENERATIVE AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

The authors haven't used any generative AI/AI assisted technologies in the writing process.

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