

# Descriptive analysis of MBBS Microbiology Question Papers of RGUHS, Bengaluru.

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## Abstract

**Introduction:** Over the years medical education has evolved in the system of education, teaching and evaluation. It is the evaluation system that has the most insightful impact on learning.

**Aims :** To assess the effectiveness of undergraduate medical question papers of summative evaluation for content validity, level of cognition and the type of domain.

**Methods:** Retrospective analysis of II MBBS question papers (n=20) of RGUHS, Bangalore from the year 2009- 2013 was done. Questions were analysed individually for the type of question, marks allotted for each, and type of skill analysed from each question. The data was classified using a modification of Bloom's hierarchy of cognitive learning (level I, II, III).

**Results:** The percentage distribution of marks was not positively related to the number of hours allotted for each chapter. Analysis of question papers for cognitive domains showed 8% of the questions tested factual recall (Bloom level I), 10% tested data interpretation (Bloom level II) and 15% questions tested critical evaluation (Bloom level III) and 67% question didn't belong to any of the cognitive domain

**Conclusion:** Theory Examination and evaluation though a source of apprehension for the undergraduate medical students, it is essential to stimulate their cognitive skills by teaching and enhance the evaluation of mental and reasoning skills.

**Key words:** Summative evaluation, Microbiology, MBBS, cognitive

## Introduction

The quality of medical education is complex and challenging due to various reasons, and can be analogous to medical care<sup>1,2</sup>. Even though conventional techniques for assessing the knowledge and clinical competence of undergraduate medical students are widely acknowledged as being unsatisfactory<sup>3,4</sup>, an attempt is made to assess the microbiology question paper from Rajiv Gandhi University of Health Sciences in accordance with the university guidelines related to syllabus, number of hours allotted and number of marks distributed. Such studies are limited or rare and we hope that studies like this will help the authorities at the university level to promote similar studies to overcome the ambiguity in evaluation of the educational objectives.

## Methodology :

A retrospective descriptive analysis of microbiology theory question papers (2006- 2012) of the second year MBBS students Rajiv Gandhi University of Health Sciences, Bangalore, Karnataka was done. The University conducts exams twice a year and written examination, has two question papers: papers I and II.

The assessment tools commonly employed in the theory paper are as follows; long essay, short essays and the short answer type of questions amounting for 100 marks each paper. The pattern is as follows

1. Long essay 2 questions, each carrying 10 marks – 20 marks
2. Short essay 10 questions, each carrying 5 marks – 50 marks
3. Short answer, 10 questions, each carrying 3 marks – 30 marks.

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Questions included in Paper I are on topics related to General Bacteriology, Immunology, Systemic bacteriology, and Paper II contains questions on Virology, Parasitology, Mycology and applied microbiology

The question papers set by RGUHS (RS2) from the year 2006 to 2012 were collected. Each question was evaluated to measure the type of domain and the level of cognition being tested. Essay questions, short essays and short answers were categorized according to the cognitive level measured by each question. The data was classified using a modification of Bloom's hierarchy of cognitive learning<sup>1</sup>. Three levels were defined and classified, level I covered knowledge and recall of information<sup>5,6</sup>, level II covered comprehension and application, understanding and the ability to interpret data, level III tested problem solving (fig 1), the use of knowledge and understanding in new circumstances<sup>6</sup>.

The methodology to analyse the content validity and evaluate the cognitive domain was as follows

#### **For content validity**

The coverage of different sub-divisions of Microbiology in written examination was entered on an excel sheet and its comparison with the teaching hours (as per the RGUHS syllabus) devoted to teaching each topic and marks was evaluated<sup>4</sup>.

#### **For evaluation of cognitive domain and marks distribution in the question paper**

Question papers of the second MBBS Microbiology theory examination of RGUHS from 2009 to 2013 were examined. A total of 20 question papers were analysed. Each paper had 22 questions; hence the 20 question papers had 440 variable parts. The verbs used for framing questions behavioural objectives<sup>5</sup> are as mentioned in table 1.

**Statistical analysis:** The data was compiled in Microsoft excel, presented as tables and graphs and analysed in terms of proportion and percentages.

#### **Results:**

The RGUHS syllabus truly measures what is intended to measure in terms of content validity. Table 2 illustrates a distribution of marks for each of the system in the RGUHS curriculum. There was a positive correlation between the hours allotted for didactic lectures to the distribution of marks. Fig 2 shows the mean distribution of marks of various systems across the years from 2006 to 2012. A mean difference from -3.9 to +3.5 was observed from each system.

Figure 3 shows a close correlation in their assessment of the questions according to the modified Bloom's

taxonomy categorization. Analysis of question papers for cognitive domains showed 8% of the questions tested factual recall (Bloom level I), 10% tested data interpretation (Bloom level II) and 15% questions tested critical evaluation (Bloom level III) and 67% question didn't belong to any of the cognitive domain

#### **Discussion**

Education is a process which brings about desirable changes in the behaviour of learner. This could be by acquisition of knowledge, performance of skills or development of attitudes. Over the years Indian medical colleges, medical council bodies and universities have made all possible efforts to provide the educational spiral i.e. well set educational objectives, teaching learning activities and accurate, reliable, and timely evaluation.

Blooms taxonomy divides the educational objectives in three domains: Cognitive, Affective and Psychomotor<sup>1</sup>. Cognitive domains can be evaluated at different levels including knowledge, comprehension, application, analysis, synthesis and evaluation. Modified Bloom's taxonomy<sup>1,5</sup> identifies three levels of cognitive domain. In medical education, the major emphasis is on developing and evaluating the level III or problem solving skills, as most of the physician's time is spent in analyzing patient's problems<sup>6</sup>.

Each learning objective belongs to a specific domain of learning and will need to be measured and assessed to determine if they have been successfully learnt. For the valid assessment of medical student's knowledge, skills and attitude, the core elements of the curriculum requires different forms of assessment. Assessment can be formative (guiding future learning, promoting suggestion, and shaping values) or summative (whether the learner knows, understand or can do a predetermined thing, and qualification for advancement to higher levels of responsibility)<sup>2,6</sup>.

Assessment has a powerful influence on the learning. Scientific studies confirm that it is the evaluation system rather than the educational objectives, curriculum that has a profound impact on what the students ultimately learn. Hence, for successful learning of predetermined objectives the assessment must be designed to capture the learning of the necessary learning objectives. As per the Miller's pyramid<sup>7</sup> knowledge and competence are best assessed through written examination. Written examination is still the widely used test tool of evaluation both in summative and formative evaluation, which cannot be replaced entirely by any other method.

In Indian medical education, the most common method for the assessment of knowledge is the written method. Validity is that it should truly measure what it is intended

to measure; there are several types of validity, Content validity, Criterion validity, Construct validity and predictive validity<sup>4</sup>. Validity of content should always be carried out regardless of the type of assessment tool used. At a minimum this should include content validity and construct validity. Content validity correctly judges the knowledge the skill of the learner and desire to have a good coverage of contents in the test<sup>5</sup>.

In the present study, microbiology question paper evaluated from Rajiv Gandhi University of Health Sciences is in accordance with the university guidelines

related to syllabus, number of hours allotted and number of marks distributed, in spite of insignificant mean variation in the marks from different sections. However analysis of question papers for cognitive domains as per modified Bloom's criteria, 67% question didn't belong to any of the cognitive domain for the last five years question paper. This puts the evaluator and the student in the confusion mode. In written exam you don't have the keys for questions, which may lead to bias in the valuation. Hence university guidelines should be promptly followed while setting the question paper.

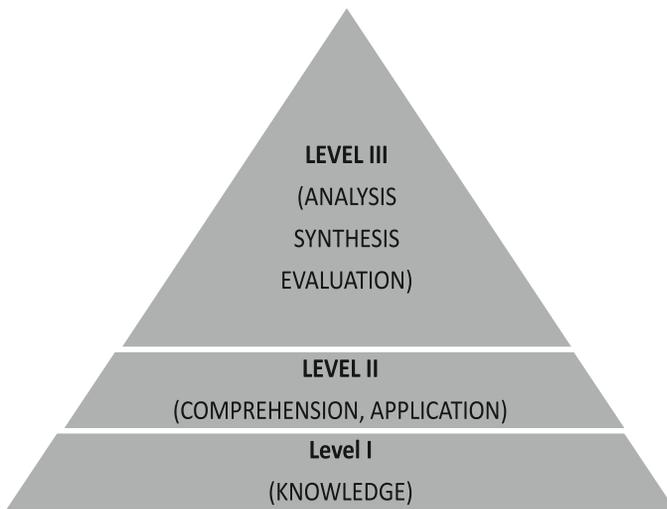
**Table 1: Verbs For Use In Writing Behavioral Objectives**

KNOWLEDGE	COMPREHENSION	APPLICATION	ANALYSIS	SYNTHESIS	EVALUATION
define	Discuss	compute	distinguish	diagnose	evaluate
list	Describe	demonstrate	analyze	propose	compare
recall	Explain	illustrate	differentiate	design	assess
name	Identify	operate	compare	manage	justify
recognize	Translate	perform	contrast	hypothesize	judge
state	Restate	interpret	categorize	summarize	appraise
repeat	Recognize	apply	appraise	compose	rate
record	Express	employ	calculate	plan	revise
label	Locate	use	test	formulate	score
diagnose	Report	practice	criticize	arrange	select
tell	Schedule	diagram	assemble	choose	
transform	Sketch	inspect	collect	estimate	
convert	Prepare	question	construct	measure	
distinguish	Modify	relate	create	argue	
estimate	Predict	solve	organize	decide	
extrapolate	Examine	prepare	criticize		
manage	Classify	modify			
deduce	Invent				
outline	Generate				

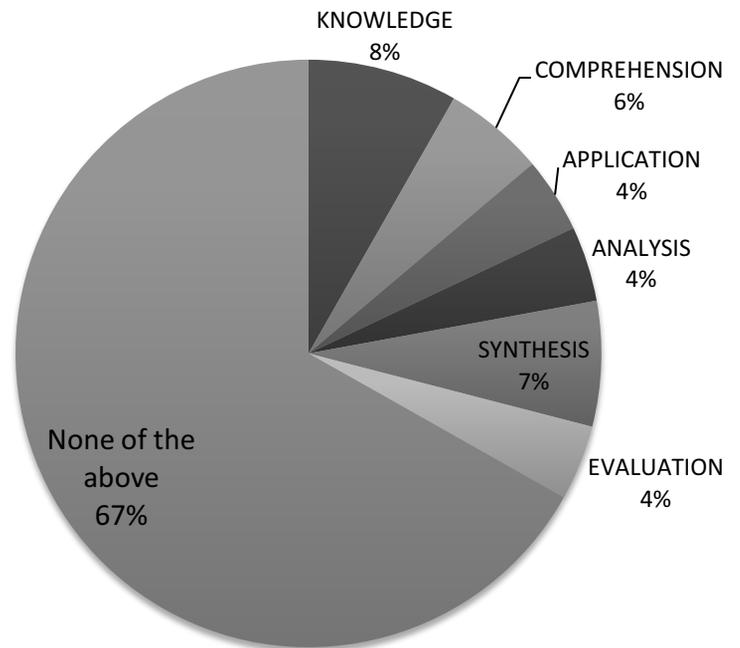
**Table 2: Distribution of teaching hours and marks as per RGUHS curriculum**

Sl No	System	Hours	Marks
1	General Bacteriology	10	10
2	Immunology	20	20
3	Systematic Bacteriology	35	35
4	Virology	20	20
5	Parasitology	25	25
6	Mycology	5	5
7	Applied Microbiology	5	5
	Total	120	200

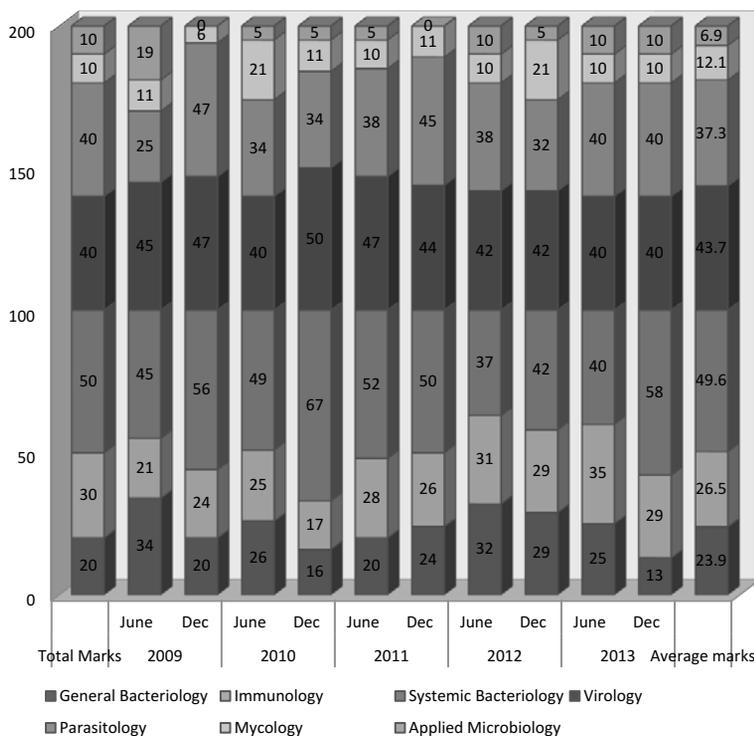
**Figure 1 : Modified Bloom's hierarchy of cognitive learning**



**Figure 2: Percentage distribution of cognitive skills assessed**



**Figure 3: Distribution of marks assessed in various branches across the years**



**References:**

1. Bloom B, Englehart M, Furst E, Hill W, Krathwohl D: Taxonomy of educational objectives: The classification of educational goals. Handbook I: Cognitive domain. New York, Toronto: Longmans, Green; 1956
2. Schuwirth LW, van der Vleuten CP. Different written assessment methods: what can be said about their strengths and weaknesses? *Med Educ* 2004;38:974-9.
3. Ananthkrishan N, Sethuraman, KR, Santosh K. Medical education-Principles & Practice. 2<sup>nd</sup> edition. Pondicherry; Alumni Association of National Teacher Training Centre, 2000: 117.
4. Rubina S, Khondker MS, Lutfun N, Ferdous H. Content validity of written examinations in undergraduate Anatomy. *Bangladesh J Anat.* Jan 2009;7:1:14-8.
5. Palmer EJ, Devitt PG. Assessment of higher order cognitive skills in undergraduate education: modified essay or multiple questions? *Research paper. BMC Med Edu.* 2007;28;7:49.
6. Buckwalter JA, Schumacher R, Albright JP, Cooper RR. Use of an educational taxonomy for evaluation of cognitive performance. *J Med Educ.* 1981 Feb;56(2):115-21.
7. Miller GE. Educational strategies for the health professions. In: *Development of educational programmes for the health professionals.* WHO Public Health, 1973, 52pp. practical examination in physiology at Melaka Manipal Medical College, India. *Adv Physiol Educ.* 2009; 33(1):21-3.

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