Descriptive analysis of II - MBBS university question papers of microbiology subject

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Abstract

Introduction: Assessment is a very important component of medical education and written examination is widely used tool of assessment. The instrument used in the written examination is the "Question Paper" (QP). The QP often lacks the validity, reliability, relevance and objectivity.[1,2] The present study is undertaken to assess the characteristics in construction of University question papers.

Aim and Objectives: To analyze the theory question papers of Microbiology subject of Saurashtra University, with respect to; question form, learning objectives, relevance to core syllabus, relevance to teaching hours, and language and grammatical errors.

Materials and Methods: Total 28 question papers of Saurashtra University of Microbiology subject (Mar-05 to Mar-15) were analyzed. The questions were analyzed with respect to types of question form and categorized in long answer type, short note type and short answer type. All questions were analyzed with respect to learning objectives and were classified in to three cognitive domains of learning knowledge, understanding and synthesis. All questions were analyzed to determine the focus of questions with respect to the syllabus and classified into must know, desirable to know and nice to know areas. Questions were analyzed to determine the weather questions cover the area of syllabus with regards to teaching hours dedicated. Questions were analyzed to identify the clarity and ambiguity in language, spelling and grammatical errors and scientific and taxonomic errors.

Results: There were two paper styles noted. Question papers have long answer; short note and short answer questions. 95% questions were framed to test basic knowledge level of cognitive domain, and 5% question were framed to test the understanding level, while none of the questions were framed to test the synthesis level of cognitive domain. The majority of question were framed from must know area (97%) of syllabus, while less number of questions were from desirable to know (2%) and nice to know (1%) area. 30% of teaching hours were dedicated to bacteriology section and carried 22% weightage in examination. 6% of teaching hours were dedicated to mycology section which carried 11% weightage in examination. A balance was observed for General microbiology, Immunology and Virology sections with regards to teaching hours and weightage in examination. On an average of 11.1 errors per paper was noted. Spelling errors were common (8.8) followed by taxonomic errors (2.2) and grammatical errors (0.1).

Conclusions: Major numbers of questions were subjective type than objective type. Majority of questions were framed to test basic knowledge level of cognitive domain. The majority of question were framed from must know area of syllabus which may have poor discriminatory ability between low and high achievers. A balance was observed for General microbiology, Immunology and Virology sections for dedicated teaching hours and its weightage in examination while Bacteriology has less and Parasitology and Mycology has more weightage in comparison to teaching hours. Many different types of errors were noted in question papers which include spelling errors, taxonomic errors and grammatical errors. A standard "Blue Print" is essential to bring the uniform standard in theory examination.

Keywords: Question paper analysis, Blue-printing.

Introduction

Assessment is a very important component of medical education and therefore, the assessment system is an integral part of the curriculum of a course. Written examination is widely used tool of evaluation both in formative and summative assessment. The instrument used in the written examination is the "Question Paper" (QP). The QP often lacks the validity, reliability, relevance and objectivity. The quality of QP can be improved by adequate preparation.[1,2]

Ideally the design of QP includes the certain essential points. 1. Question form: The different form of questions and the number of each type should be considered while setting the QP. 2. Learning objectives: The paper should cover range of learning objectives. Weightage should be given to different learning objectives and to different topics or areas of subject. Educational objectives should be divided into must to know, desirable to know and nice to know categories and same weightage should be adapted in the question paper. 3. Question paper format: Guidelines regarding the use of options, nature of sections and difficulty level of the paper are also required to be delineated. It is advisable to write in clear and simple terms.[1,2]

The present study is undertaken to assess the characteristics in construction of University question papers with respect to question form, learning objectives, relevance to core syllabus, teaching hours and language and grammatical errors.

Aims and Objectives

Aim

Study of University question paper to determine the lacunae in construction of question papers, and to determine the balance between teaching hours and its weightage in examination.

Objectives

To analyze the Theory QP of Microbiology subject of Saurashtra University, with respect to;

1. Question form: Long answer / Short note / Short answer type
2. Learning objectives: Knowledge / Understanding / Synthesis

3. Relevance to core syllabus: Must know / Desirable to know / Nice to know
4. Relevance to teaching hours:
5. Language and grammatical errors.

Materials and Methods

Last 10 years Saurashtra University (SU) QP of Microbiology subject were collected and analyzed as per the stated objectives. Total 28 question papers from March 2005 to January 2015 were analyzed.

1. **Question form**: The questions were analyzed with respect to types of question form. Questions were classified in to various categories based on marks weightage and length of answer required. Three types of questions were observed long answer type, short note type and short answer type.

2. **Learning objectives**: The questions were analyzed with respect to learning objectives. Questions were classified according to Bloom's taxonomy in to three cognitive domains of learning knowledge, understanding and synthesis.[1,2]

3. **Relevance to core syllabus**: Questions were analyzed to determine the focus of questions with respect to the core and non-core syllabus into three standard division as per MCI guidelines into must know, desirable to know and nice to know areas.[3,4]

4. **Relevance to teaching hours:** Questions were analyzed to determine the weather questions cover the area of syllabus with regards to teaching hours dedicated.[3]

5. **The language and grammatical errors**: Questions were analyzed to identify the clarity and ambiguity in language, spelling and grammatical errors and scientific and taxonomic errors.

Question papers were analyzed with the tools and methods mentioned above. The data were analyzed and strength and weakness in the design of question paper was determined.

Observations and Results

Total 28 SU question papers were analyzed. There were two paper styles; March-2005 to July-2013 had old type question paper which consisted of short note and short answer questions. January-2013 to January-2015 had new type question paper having long answer; short note and short answer questions. January-2013 and July-2013 examination had an overlapping system and both question paper style were followed.

Overall, 74% questions were of short note form (4 marks), 21% questions were of short answer form (2 marks) and 5% questions were of long answer form (10 marks). (Table 1)

Table 1: Distribution of questions as per 'Question form'

Questions	Short Answer	Short Note	Long Answer	Total
Percentage (%)	21 %	74 %	5 %	100 %

Analysis according to learning objectives revealed that out of all questions 95% questions were framed to test basic knowledge level of cognitive domain, and 5% question were framed to test the understanding level, while none of the questions were framed to test the synthesis level of cognitive domain. The questions which tested the understanding stage of cognitive domain were long answer type and part of new question paper style which started from March 2013. (Table 2)

Table 2: Distribution of questions as per 'Learning objectives'

Questions	Percentage (%)
Knowledge	95 %
Understanding	5 %
Synthesis	0 %
Total	100 %

Analysis of questions with respect to the portion of syllabus shown that the majority of question were framed from must know area (97%) of syllabus, while less number of questions were from desirable to know (2%) and nice to know (1%) area of syllabus. (Table 3)

Table 3: Distribution of questions with respect to Relevance to core syllabus

Questions	Percentage (%)
Must know	97 %
Desirable to know	2 %
Nice to know	1 %
Total	100 %

Analysis of questions according to six sections of Microbiology subject and its teaching hours shown that 30% of teaching hours were dedicated to bacteriology section and carried 22% weightage in examination. 6% of teaching hours were dedicated to mycology section which carried 11% weightage in examination. All sections given weightage in examination and its teaching hours are represented in table and chart. (Table 4)

Table 4: Weightage in examination with Relevance to teaching hours

	Weightage (%)	Teaching hours (%)
Gen. Microbiology	17 %	14 %
Immunology	13 %	17 %
Bacteriology	22 %	30 %
Parasitology	21 %	16 %
Virology	16 %	17 %
Mycology	11 %	6 %
Total	100 %	100 %

Analysis of question paper for identifying the errors has shown an average of 11.1 errors per paper. Spelling errors were common (8.8) followed by taxonomic errors (2.2) and grammatical errors (0.1). (Table 5)

Table 5: Language and grammatical errors

Errors	Average / QP
Language	0.0
Grammar	0.1
Spelling	8.8
Taxonomic	2.2
Total	11.1

Summary of Results

Total 28 SU question papers were analyzed. There were two paper styles noted old and new style. Question papers have long answer; short note and short answer questions.

95% questions were framed to test basic knowledge level of cognitive domain, and 5% question were framed to test the understanding level, while none of the questions were framed to test the synthesis level of cognitive domain.

The majority of question were framed from must know area (97%) of syllabus, while less number of questions were from desirable to know (2%) and nice to know (1%) area of syllabus.

30% of teaching hours were dedicated to bacteriology section and carried 22% weightage in examination. 6% of teaching hours were dedicated to mycology section which carried 11% weightage in examination. A balance was observed for General microbiology, Immunology and Virology sections with respect to teaching hours and weightage in examination.

On an average of 11.1 errors per paper was noted. Spelling errors were common (8.8) followed by taxonomic errors (2.2) and grammatical errors (0.1).

Discussion

The analysis of question form has shown 74% questions were of short note form, 21% questions were of short answer form and 5% questions were of long answer form. The long answer questions are essential to determine the understanding of subject and to test comprehensive ability of student in writing. More weightage to long answer questions has inherent weakness that it cannot test the broad area of syllabus. Short answer question on other hand can cover larger part of syllabus but cannot test "creativity" aspect of long question. An ideal balance of short answer and long answer question must be created. Certain universities has published standard "Blue Print" of whole curriculum and more weightage has been given to objective type of questions.[1-3]

Analysis of learning objective of questions has shown that 95% questions were framed to test basic knowledge level and 5% question were framed to test the understanding level, while none of the questions were framed to test the synthesis level of cognitive domain. Framing of questions which can tests higher levels of cognitive domain is time consuming and difficult task for paper setter. The question paper should have ideal balance of different questions so that higher domain of learning objectives can be tested. There are no standard guidelines regarding the setup of question papers based on learning objectives.[1,2]

The majority of question were framed from must know area (97%) of syllabus, while less number of questions were from desirable to know (2%) and nice to know (1%) area of syllabus. It is advisable to frame a question paper having balance of must know, desirable to know and nice to part of syllabus. Expert have suggested the standard weightage in examination from various division of syllabus (70% must know + 20% desirable to know + 10% nice to know). This would lead to well discrimination of low achievers and high achievers.[1,2]

Analysis of questions according to six sections and its teaching hours has shown good balance between teaching hours and its due weightage in examination for General microbiology, Immunology and Virology sections. Bacteriology has less weightage while Mycology and Parasitology has more weightage in examination in comparison to teaching hours. There should be a balance between dedicated teaching hours and weightage in examination.

Various authors have studied the pattern of theory examination and have discussed the issue of content, distribution of teaching hours, and question forms. Various lacunae and wide variability have been reported. Many authors have suggested the implementation of standard Blue Print for assessment.[5-8]

A standard 'Blue Print' clarifying the teaching hours, core and non-core syllabus, pattern of examination, types of question and learning objectives would ensure solution to above mentioned issues and would implement uniform standard of examination across the country.[3]

The question papers have shown an average of 11.1 errors per paper. Spelling errors were common (8.8) followed by taxonomic errors (2.2) and grammatical errors (0.1). This requires an attention of authority. Some mechanism to check the errors must be in place without compromising the confidentiality issue of theory examination.

The study identifies the facts that certain lacunae exist in framing of theory question paper. The lacunae includes more emphasis on long answer question forms, testing of learning objective of basic cognitive levels, more stress on core syllabus and less coverage of desirable and nice to know part of syllabus. It shows minor difference between teaching hours versus weightage in examination. Many errors have been observed including the spelling mistakes in framing question paper.

Conclusions

Overall question papers have three forms of questions long answer; short note and short answer type. More emphasis is given to subjective question in comparison to objective question. Majority of questions were framed to test basic knowledge level of cognitive domain, and less number of question were framed to test the understanding level, while none tested the synthesis level of cognitive domain. The majority of question were framed from must know area of syllabus, less weightage was given to desirable to know and nice to know area of syllabus. A balance was observed for

General microbiology, Immunology and Virology sections for dedicated teaching hours and its weightage in examination. Bacteriology has less and Parasitology and Mycology has more weightage in comparison to teaching hours. Many different types of errors were noted in question papers which include spelling errors, taxonomic errors and grammatical errors.

Limitations

The study has been carried out in one university of Gujarat and question papers of last 10 years were selected for analysis.

No standard "Blue Print" of theory examination was available with the parent university or any other Universities of Gujarat state.

Implications

The lacunae need to be rectified by at various levels. An individual needs to improve the skills to uplift the standard of examination. Medical council of India should frame a standard "Blue Print" for whole curriculum which must include micro details of syllabus, teaching learning experience and assessment. The "Standard Blueprint" must be followed nationwide to bring uniformity in medical education.

Emphasis must be given to train teachers (assessors) in accordance to standard "Blue Print".

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