

Original article:

Analytical study of written examination papers of undergraduate anatomy: Focus on it's content validity.

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ABSTRACT

Background: The 'Question Paper' in the form of written examination forms the most important instrument of assessment. Content validity refers to the extent that a test actually measures the intended content area. Adequate coverage of the course content is necessary for the validity of assessment. The content of First professional M.B.B.S written examination of Anatomy was given in syllabus but the weightage of different subdivision of Anatomy is not mentioned. Present study was done to observe the content validity of different subdivisions of Anatomy in written examinations. It was the question paper analysis based study.

Results: It is evident from the questions paper analysis that different subdivisions of Anatomy are usually not given proper weightage in the Anatomy written examinations. There are some subdivisions of Anatomy that are usually covered less than required. These include genetics, general Anatomy, histology and neuroanatomy. Some subdivisions of Anatomy remained uncovered in some question papers. For example, questions from Genetics were found in the question papers of only one session out of twenty sessions examined.

Conclusion: Methods like test blueprinting and table of specifications should be used during test construction process for proper validation of our assessment system. By harmonizing course objectives with assessment content, educators can ensure a unified curriculum.

Key words: Anatomy, Undergraduate medical education

INTRODUCTION

One of the most important parts of the teacher's job is to find out how much students have learned. This process is called assessment and it can be carried out by setting examinations or watching students at work. (1) Assessment is a very important component of medical education and therefore, the assessment system is an integral part of the curriculum of a course. It must never be forgotten how powerfully an assessment affects students, particularly if it is one on which their future may depend. This influence may be positive

or negative and even harmful. For many students, passing the examination at the end of the course is their primary motivation. Should this examination not be valid, and thus not truly reflect the content and objectives of the course, then the potential for serious distortions in learning and for making errors of judgment about students is evident. (2)

There are three broad types of assessment instruments that are used in assessing undergraduate medical students in Anatomy: written, oral and practical examinations. The 'Question Paper' in the form of written examination forms the most important instrument of assessment.

Though it is used along with instruments such as practicals/clinicals and orals, it continues to occupy a prominent place in the evaluation system. (3)

The main attributes of an assessment instrument are: - Validity (the appropriateness of the given tool for achieving the required purpose), Reliability (the degree of consistency with which a tool measures what it is supposed to measure), Objectivity (the extent to which two or more independent examiners agree on a correct answer), Feasibility (the extent to which it is practicable under the given circumstances). (3) Validity is the sine qua non of assessment, as without evidence of validity, assessments in medical education have little or no intrinsic meaning. (4) Content validity refers to the extent to which a test actually measures the intended content area. Adequate coverage of the course content is necessary for the validity of assessment. **Validity:** The validity of a test is the degree to which a test measures what it is supposed to measure. (5) There are five categories of validity: content, concurrent validity, predictive validity, construct validity, face validity. (6) Content validity is the first priority of any assessment. It is a measure of the degree to which the assessment contains a representative sample of the material taught in the course. A numerical value cannot be assigned to it and it must be judged according to the objectives of the assessment (2) and should cover important skills and abilities. (1) Contents of written examinations are clearly mentioned in 2006-07 syllabus but weightage of

different subdivisions of Anatomy is not mentioned. (7) The present study was done to observe the content validity of different subdivisions of Anatomy in written examinations.

METHODS

It was the question paper analysis based study. For the analyses of the written question papers, all the Question papers of the First Professional Examinations (M.B.B.S) of the University of Rajasthan from 2003 (January) to 2006 (January) and of Rajasthan University of Health Sciences "Established as medical division of university of Rajasthan" from July 2006 to July 2012 were examined. Thus, question papers of ten years were examined. There were two exams per year, therefore questions papers of 20 exams were analysed. There were two question papers for each exam (Paper-I and Paper-II). So, total forty question papers were analysed. There were two sections per paper and four questions per section. So, 320 questions were analysed. There were subdivisions per question. So, total 818 subdivisions were analysed. Subdivisions comprised of one or more 'segments' resulting in a total of 967 segments were analysed. The 967 segments of questions in total question papers of 20 exams were analysed for variable frequencies of different aspects of the anatomy syllabus covered and expressed as percentage of a total number of segments of the questions. Methodology was adopted as according to Sultana R et al. 2009. (8)

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RESULTS

Table-1: Frequencies of coverage of different aspects of Anatomy in 20 Anatomy sessions of examinations of the First Professional M.B.B.S.

Serial No.	Part of Syllabus	SEGMENTS PRESENT (Total Segments=967)	Overall Percentage of Segments
1.	General Anatomy	9	0.93%
2.	Gross Anatomy	690	71.36%
a.	Upper extremity	142	14.68%
b.	Lower extremity	112	11.58%
c.	Thorax	65	6.72%
d.	Abdomen	167	17.27%
e.	Head And Neck	204	21.1%
3.	Neuroanatomy	89	9.2%
4.	Histology	70	7.24%
5.	Embryology	108	11.17%
6.	Genetics	1	0.10%

A total of forty question papers (20 sessions) of first professional examination of anatomy containing 967 segments were analysed. Table-1 shows frequencies of coverage of different aspects of Anatomy in 20 (twenty) Anatomy sessions of First Professional Examinations.

It was observed from the questions paper analysis that different subdivisions of Anatomy are usually not given proper weightage in the Anatomy written examinations. There are some aspects which are usually covered less than required. These include genetics, general anatomy, histology and neuroanatomy. Some aspects of anatomy remained

uncovered in some question papers. For example, questions from Genetics were found in the question papers of only one session out of twenty sessions examined. General anatomy had negligible coverage (0.93%). [Table-1,2]

Histology coverage (7.24%) was approximately one-tenth the size of regional anatomy (71.36%) as well as neuroanatomy (9.2%) was around one-eighth of the coverage of regional anatomy. Regional anatomy of most parts (upper & lower extremity, abdomen, head & neck) had more coverage than the whole of histology, embryology and neuroanatomy. [Table-1]

Table -2: Frequency of coverage of different aspects of Anatomy in the questions papers of individual examinations.

Different Aspects of Anatomy	*03	*03	04	04	05	05	06	06	07	07	08	08	09	09	10	10	11	11	12	12
	*Jan	*Sep	Feb	Aug	Jan	Jul	Jan	Jul	Jan	Jul	Jan	Jul	Jan	Jun	Feb	Jul	Feb	Jul	Feb	Jul
1.General Anatomy	1	1	2	0	0	0	1	0	0	0	1	0	0	1	0	2	0	1	0	0
2.Gross anatomy																				
a-Upper Extremity	6	10	9	4	11	5	7	5	3	6	8	6	7	6	6	4	3	10	3	7
b-Lower Extremity	6	5	5	4	10	3	7	3	3	4	7	5	11	5	9	6	3	6	3	3
c-Thorax	3	4	4	5	5	2	5	6	3	1	9	2	2	2	3	2	3	2	1	1
d-Abdomen	13	13	17	10	5	5	11	4	8	10	8	6	9	3	8	3	8	10	8	8
e-Head & Neck	9	7	13	5	4	6	11	7	5	10	10	10	11	9	12	11	6	7	7	6

Conti.....

3.Neuro anatomy	<u>2</u>	3	4	3	3	3	4	7	7	<u>2</u>	3	4	6	4	5	4	6	4	<u>8</u>	5	
4.Histology	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	4	4	<u>7</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	4	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	4	<u>3</u>	4	4	
5.Embryology	5	5	4	5	8	<u>12</u>	7	5	4	6	3	3	4	4	5	6	4	8	<u>2</u>	6	
6.Genetics	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>

*Here 03 Jan and 03 Sep means 2003 January and 2003 September. Others follow the same principles. Highest frequencies were shown in bold and underlined. Lowest frequencies were shown in italics and underlined.

Table-2 shows the frequency of coverage of different aspects of anatomy in the question papers of individual examinations. Wide ranges of variations were seen in most of the subdivisions of anatomy. Highest frequencies were shown in bold and underlined. The lowest frequencies were shown in italics and underlined.

DISCUSSION

In the syllabus (2006-07), the contents of both papers have been defined. There are as of yet no official guidelines regarding the weightage to be given to different subdivisions of anatomy. Teachers select questions from subdivisions of anatomy according to their own judgment. It is evident from the questions paper analysis that different subdivisions of anatomy are usually not given proper weightage in the anatomy written examinations. There are some subdivisions of anatomy that are usually covered less than required. These include genetics, general anatomy, histology and neuroanatomy. Adequate coverage of the course content is necessary for the validity of assessment. The examination should be designed to assess the individual candidate’s ability to meet the course objectives or curriculum outcomes and should cover the main content of the course. (9)

In the present study, it was observed that some subdivisions of anatomy remained uncovered in some question papers. For example, questions from genetics were found in the question papers of only one session out of twenty sessions examined. There were also found negligible coverage of general anatomy (0.93%). Weightage to the content areas

is a delicate issue on which even the experts often differ in opinion. Weightage of various topics depended mainly on the examiners own judgment. (3)

If the learning objectives have been derived properly, then all the learning objectives will be important. The assessment should directly test whether the learning objectives have been achieved. If this is done, then the assessment will test the important skills and abilities and the assessment is said to be valid. (1)

The 'Design' also implies that the examining agency is expected to spell out the weightage for various content areas or topics. This is a delicate issue on which even the experts often differ in opinion. At present the distribution of weightage to various topics is left to the paper setter who uses his or her own judgment in making allocation. (3)

What should be the basis of allocating weightage to various topics? While the number of learning concepts involved in a topic forms one dimension, the importance of each topic in realizing the objectives set in the course forms another dimension to derive at the actual weightage. Another point to be noted while deciding the weightage is whether a particular ability or a content area can be better tested by other methods of evaluation such as oral, practical etc. A learning outcome that cannot be tested by a written test may be given importance in oral or practical wherever it is better suited. (3) A look at the teaching programme, lecture and tutorial topics, and

discussions with teaching staff guide us to identify and categorise the key features of the course. (2)

The content validity refers to the extent to which a test or examination actually measures the intended content area. For an examination to have content validity it must have item validity and sampling validity. These terms are best explained in the following example. If a test is designed to measure knowledge of the human anatomy then good item validity is present, if all the questions deal with facts pertaining to the human body. Poor sampling validity will be apparent if all the questions focus on the lower limbs. (6)

McAleer (6) also stated the way to established content validity -

- Define the subject matter being assessed
- Identify the cognitive / behavioral / attitudinal process involved
- Establish the outcomes expected
- Draw up a specifications grid
- Specifications grid should:
 - Identify the content areas
 - Specify learning outcomes
 - Determine the number of items for each content area and learning objective
 - Ensure that the number of items in each cell is in proportion to the time spent in teaching and learning.

According to the standards of American Educational Research Association (10): Some sources of validity evidence for proposed score interpretations are:

- Examination blueprint
- Representativeness of test blue print to achievement domain
- Test specifications
- Match of item content to test specifications
- Representativeness of items to domain

- Logical/empirical relationship of content tested to achievement domain
- Quality of test questions
- Item writer qualifications

For the written assessment, documentation of validity evidence related to the content tested is the most essential. The test blueprint is sufficiently detailed to describe subcategories and sub classifications of content and specifies precisely the proportion of test questions in each category and the cognitive level of those questions. The blueprint documentation shows a direct linkage of the questions on the test to the instructional objectives. (4)

Blueprinting refers to the process where test content is carefully planned against the learning objectives. The examination blueprint specifies the objectives that are to be tested in the given examination as well as their relative weight on the examination. A proper blueprint is the first crucial step in developing a valid examination and must not be overlooked. A proper blueprint will ensure fair representation of all the important curricular objectives in the examination. The scope and structure of the blueprint will depend on the nature of the examination. For example, for a final examination, in a centrally administered integrated curriculum the test blueprint would take into account the entire core learning objectives and physician tasks. (11)

Test blueprinting and table of specification are efficient methods to coordinate the test-construction process and may be the most important step in test development. (12) Increasing the sample of objectives and content areas included in any given test will improve the validity of test and for further improvement of assessment system; content validity is needed to be established. (8)

Assessment in medical education is a multi-faceted and dynamic process. While outwardly

complex, the focus should be centered on basic principles that allow accurate, efficient and meaningful determinations of mastery of the subject. Content validity is representative of learning objectives in the assessment. It should be justified by giving proper weightage to all subdivisions of anatomy.

CONCLUSION

1. For achieving academic excellence in anatomy, the assessment system needs to

be improvised. Methods like test blueprinting and table of specifications should be used during test construction process for proper validation of our assessment system.

2. By harmonizing course objectives with assessment content, educators can ensure a unified curriculum. This is necessary in present scenario to augment learning and create efficient medical professionals.

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