

Content Validity of Written Examinations in Undergraduate Anatomy

Rubina Sultana¹, Khondker Manzare Shamim², Lutfun Nahar³, Ferdous Hasan⁴

Abstract

Objective: In 'Curriculum' 2002 short answer questions are newly introduced. The content of 1st professional written examination was given but the weightage of different subdivision of Anatomy is not mentioned. So, present study was done to see the content validity of different subdivisions of Anatomy in written examinations.

Study design: Descriptive type of study

Place and period of study: The study was carried out from January 2003 to July 2004 in the Department of Anatomy, Bangabandhu Skeikh Mujib Medical University, Dhaka.

Methods: It was based on a quantitative method; 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 weight in the Anatomy written examinations. There are some subdivisions of Anatomy which are usually covered less than required. These include Genetics, Histology, General Anatomy, General Developmental Anatomy, Clinical Anatomy, etc.

Conclusion: for further improvement of assessment system of Anatomy, content validity is needed to be established.

Key words: Content validity, Anatomy, undergraduate, written examinations

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. There are three broad types of assessment instruments that are used in assessing undergraduate medical students in Anatomy: written, oral and practical examinations. In written examination, there are two divisions- paper I and paper II. Contents of this two papers are clearly mention in 2002 curriculum⁶, though they are absent in 1988 curriculum⁵. In the 2002 curriculum, only SAQs have been recommended along with multiple-choice questions (MCQs) but weightage of different subdivisions of Anatomy is not mentioned. For further improvement of assessment system of Anatomy, the weightage of different subdivision of Anatomy is needed to be established.

The present study was done to see the coverage of different subdivisions of Anatomy in written examinations.

Methods:

Method of question paper analysis-based study
Selection and organization of questions for analysis

For the analyses of the written question papers, all the question papers of the First Professional Examinations of the universities of Dhaka from January 1998 to September 2002 were examined. Thus, question papers of five years were examined.

There were three (3) exams per year. So, the question papers of fifteen (15) exams were analysed. There were two (2) question paper for (Paper-I and Paper-II) per exam. So, thirty (30) question papers were analysed. There were four (4) 'questions' (1,2,3,4) per paper. So, 120 questions were analysed. There were four (4) 'subdivisions' (a, b, c, d) per question. So, 480 subdivisions were analysed. Each subdivision had one or more 'parts'. Thus, a total of 744 parts were analyses. Each part, again comprised of one or more 'segments'. Thus, a total of 1044 segments were analysed. Some of the terms used in the study need to be clarified for proper understanding of the methodology and results. Each complete set of questions presented

1. Assistant Professor, Dept of Anatomy, Sylhet Women's Medical College, Sylhet
2. Professor and Chairman, Department of Anatomy, BSMMU, Dhaka
3. Faculty Member, College of Medicine, King Fahad Medical City, Riyadh, Email drnahar @ holmail. com
4. Assistant Professor, Dept of Community Medicine, Sylhet Women's Medical College, Sylhet

Correspondence: Dr. Rubina Sultana

before the examination of any given paper was considered as a question paper. The terms 'question', 'subdivision', 'part' and, 'segment' are explained in Figure 2.1.

Variable studied

The 1044 segments of questions in each question paper were analysed for the following variable frequencies of different aspects covered: (expressed as percentage of total number of segments of the questions)

Important operational definitions

Validity: The validity of a test is the degree to which a test measures what it is supposed to measure¹³.

Validity is five types

1. content validity
2. concurrent validity
3. predictive validity
4. construct validity
5. face validity⁹

Content validity: it is an important consideration in examinations in education, where we want to correctly judge the knowledge and skill of the learner; and desire to have a good coverage of contents in the test⁸.

Results:

Results of the question paper analysis-based study
Thirty (30) papers of fifteen (15) First Professional

Exams containing 1044 'segments' of questions were analysed (as detailed in the Methods chapter). The following are the results.

Coverage of different aspects of Anatomy

Table-I shows the frequencies of the coverage of different aspects of Anatomy in the thirty (30) question papers of the First Professional Examinations. The distribution of frequencies some interesting characteristics that include negligible coverage of Genetics. The coverage of Systemic Developmental Anatomy was around one-fourth of the coverage of Regional Anatomy, while that of Systemic Histology (less than 3%) was around one-fourteenth of the coverage of Regional Anatomy. Regional Anatomy of head and neck alone had a coverage of more than the whole Histology (General and Systemic). On the other hand, the nervous systems (including nerve supply to the organs, muscles, and skin) got about 23% coverage.

Table-II the Master table showing the frequency of coverage of different aspects of Anatomy in the question papers of individual examinations. Here highest frequencies are shown in **bold** and lowest frequencies are shown in *italics* and underline. In this table wide range of different is observed in most of the subdivision of Anatomy.

Table-I

Frequencies of coverage of different aspects of Anatomy in 30 (thirty) Anatomy question papers of the First Professional Examinations of the University of Dhaka (1998-2002)

Aspect covered in the segment * of question	% frequency of coverage	
	Mean % of segments covered per session [†]	Overall % of segments (out of 1044 segments [‡])
(a) General and Systemic Anatomy	6.93 %	6.51%
(b) Regional Anatomy (Gross)		
Abdomen	11.93 %	12.07%
Thorax	6.93 %	7.00%
Superior extremity	6.67 %	6.61%
Inferior extremity	8.60 %	8.61%
Head and neck including eyeball	10.40 %	10.54%
(c) Nervous system including nerve supply to the organs, muscles and skin	22.80 %	22.79%
(d) General Developmental Anatomy	7.67 %	6.51%
(e) Systemic Developmental Anatomy	9.07 %	8.91%
(f) Genetics	0.33 %	0.38%
(g) Cell Biology and General Histology	5.80 %	5.94%
(h) Systemic Histology	2.67 %	4.12%

*As shown in Figure 2.1, each question paper had four questions. Each question had four subdivisions. Each subdivision had one or more parts. Each part had one or more segments. [†]Each session (e.g., Jan 1998.) had two questions: Paper-I and Paper-II. [‡]Total no. of segments of questions analysed : 1044

Table-II

Master table showing the frequency of coverage of different aspects of Anatomy in the question papers of individual examinations

Aspect	Number of segments used to cover an aspect in an examination(Jan/May/Sep)															
	*Jan 98-1	Jan 98-2	May 98-1	*May 98-2	Sep 98-1	Sep 98-2	Jan 99-1	Jan 99-2	May 99-1	May 99-2	Sep 99-1	Sep 99-2	Jan 2000-1	Jan 2000-2	May 2000-1	May 2000-2
General and systemic anatomy	<u>0</u>	0	2	0	4	0	8	0	2	2	7	0	5	0	4	0
Regional anatomy-(gross)	0	14	0	12	0	16	0	5	0	7	0	5	0	6	0	7
Abdomen																
Thorax	0	4	0	4	0	4	0	<u>2</u>	0	4	0	12	1	4	0	5
Superior extremity	0	<u>0</u>	0	3	0	6	0	3	0	3	0	0	0	5	0	5
Inferior extremity	0	6	0	7	0	0	0	7	0	5	0	10	0	5	0	<u>4</u>
Head &neck including eyeball	12	0	11	4	10	3	7	3	4	0	9	0	<u>3</u>	0	4	0
Nervous system including nerve supply to the organs, muscles and skin	19	2	11	4	7	<u>0</u>	6	4	17	6	7	9	17	8	14	6
General Developmental Anatomy	<u>1</u>	0	7	0	3	6	4	0	3	0	2	0	3	0	6	0
Systemic Developmental Anatomy	1	3	3	6	2	<u>0</u>	1	7	6	5	4	5	3	6	1	7
Genetics	0	0	0	0	0	0	0	0	0	0	0	0	<u>0</u>	0	1	0
Cell Biology & General Histology	4	0	1	0	4	2	<u>1</u>	0	2	0	5	0	1	0	10	0
Systemic Histology	0	4	1	2	0	<u>0</u>	2	2	1	1	1	2	2	2	1	1
Aspect	Sep 2000-2	Jan 2001-1	Jan 2001-2	May 2001-1	May 2001-2	Sep 2001-1	Sep 2001-2	Jan 2002-1	Jan 2002-2	May 2002-1	May 2002-2	Sep 2002-1	Sep 2002-2	Total		
General and systemic anatomy	0	7	0	5	0	3	0	7	0	4	0	6	0	68		
Regional anatomy-(gross)	4	2	6	0	8	0	<u>3</u>	0	12	0	9	0	10	126		
Abdomen																
Thorax	6	0	<u>2</u>	0	4	0	5	0	8	0	6	0	<u>2</u>	73		
Superior extremity	5	0	5	0	7	0	5	0	13	0	4	0	5	69		
Inferior extremity	<u>4</u>	0	7	0	<u>4</u>	0	5	0	5	0	9	0	12	90		
Head &neck including eyeball	0	5	0	13	0	3	0	7	0	5	0	7	0	110		
Nervous system including nerve supply to the organs, muscles and skin	3	4	5	13	5	9	6	3	11	18	1	10	2	238		
General Developmental Anatomy	0	8	0	2	0	6	0	4	0	3	0	4	0	68		
Systemic Developmental Anatomy	4	2	3	1	1	1	3	3	1	3	2	3	2	93		
Genetics	0	0	0	1	0	0	0	0	0	0	0	2	0	4		
Cell Biology & General Histology	0	2	0	5	0	4	0	7	0	7	0	4	0	62		
Systemic Histology	1	2	1	1	2	2	2	1	1	0	3	0	3	43		
														1044		

*Jan 1998-1 and May 1998-2 stand for the examination of January 1998 Paper-1 and May 1998 Paper-2 respectively. Others follow the same principles.

Highest frequencies are shown in **bold** and lowest frequencies are shown in **bold**, *italics* and underline.

Discussions:

It is evident from the questions paper analysis that different subdivisions of Anatomy are usually not given proper weight in the examinations. There are some subdivisions of Anatomy which are usually covered less than required, in the written exams. These include Genetics, Histology, General Anatomy, General Developmental Anatomy, Clinical Anatomy, etc. (from Table-I of the Results portion). In the old curriculum there were no clear-cut contents for Paper-I and Paper-II, but in the orientation manual for the new curriculum¹², the contents of both papers have been defined. But, there are as yet no official guidelines regarding the weightage to be given to different subdivisions of Anatomy. So, teachers select questions from subdivisions of Anatomy according to their own judgment. Begum stated that adequate coverage of the course content is necessary for the validity of assessment³. David also stated that 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 course⁷.

In the present study, it was observed that there is some difficulty in the setting of questions due to the absence of weightage for different subdivisions. Some subdivisions of Anatomy remained uncovered in some question papers. For example, questions from Genetics were found in the question papers of only four sessions out of fifteen sessions examined. There were some sessions where there was complete absence of questions from Clinical Anatomy and from some particular areas of Regional Anatomy (as shown in Table 2).

Adkoli stated that weightage to the content areas is a delicate issue on which even the experts often differ in opinion. He also noticed, at that time, the weightage of various topics depended mainly on the examiners own judgment². This was mostly the Indian scenario that broadly matched the Bangladesh situation.

Crowl also stated that "In determining the content of an instructional unit, ask yourself not only what topics you have covered but also what proportion of the total content each topic represents. What

proportion of class time and textbook was devoted to each topic? .. when constructing your unit achievement test, make the proportion of the total number of tests items dealing with each topic correspond to the proportion of the total content dealing with that topic. The resulting test will have content validity because the test items represent an accurate sample of the material covered"⁴.

Content validity is the one of the major types of validity. McAleer stated that "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. However, poor sampling validity will be apparent if all the questions focus on the lower limbs⁹.

McAleer 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

This type of 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."⁹.

Content validity is based on expert judgement and the assessor should compare what is taught with what is measured by the examination. If you are testing for achievement you must ensure content validity⁹.

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 material taught in the course¹⁰ and should cover important skills and abilities¹.

Content validity is the most important type of validity for measuring the academic achievement. Test blueprinting and table of specification are efficient methods to coordinate the test-construction process and may be the most important step in test development¹¹.

From above discussion it is obvious that 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 of Anatomy, content validity is needed to be established.

References

1. Abbatt FR. Teaching for better learning: a guide for teachers of primary health care staff. Geneva: World Health Organization; 1980.
2. Adkoli BV. Attributes of a good question paper. In: Sood R, chief editor. Assessment in medical education trends and tools. New Delhi: K.L. Wig Center for Medical Education and Technology; 1995. p. 73-6.
3. Begum AA. A study of the assessment system of the M Phil (Medical Science) Anatomy course in Bangladesh [Thesis]. Dhaka. Bangabandhu Sheikh Mujib Medical University; 2001.
4. Crowl TK, Kaminsky S, Podell DM. Educational Psychology: windows on teaching. Dabouque: Brown & Benchmark; 1997.
5. Curriculum for under graduate medical education in Bangladesh, 1988.
6. Curriculum for under graduate medical education in Bangladesh, 2002.
7. Davis MH. Constructed response questions. In: Dent JA, Harden RM, editors. A practical guide for medical teachers. Edinburgh: Churchill Livingstone; 2001. p.326-35.
8. Khanam ST. Research methodology basic concepts. 2nd ed. Dhaka: 1998.
9. McAleer S. Choosing assessment instruments. In: Dent JA, Harden RM, editors. A practical guide for medical teachers. Edinburgh: Churchill Livingstone; 2001. p.303-13.
10. Newble D, Cannon R. A handbook for teachers in universities and colleges, a guide to improving teaching methods. 3rd ed. London: Kogan Page Limited; 1995.
11. Patrick D. Bridge, Joseph Musial, Robert Frank, Thomas Roe and Shlomo Sawilowsky. Measurement practices: methods for developing content-valid student examinations. Med Teach 2003; 25(4): 414-421.
12. Shefayetullah KM, Khalil M. Manual for orientation of new MBBS curriculum and assessment-subject: Anatomy. Dhaka: 2003.
13. Shumway JH, Harden RM. Amce guide no. 25: the assessment of learning outcomes for the competent and reflective physician. Med Teach 2003; 25(6): 569-84.