

**Original Article****PRINCIPLE-ORIENTED VERSUS INFORMATION-ORIENTED APPROACH TOWARDS NEUROANATOMY: A SELECTIVE PROFILE OF QUESTION PAPERS OF FOUR PUBLIC UNIVERSITY OF BANGLADESH**Yeasmin F¹, Alam MS², Jafrin J³, Hossain S⁴, Sultana R⁵, Shamim KM⁶**Article History:**

Received: June 2024

Accepted: July 2024

Keywords:*Principle, Information, Neuroanatomy, Question papers***Abstract:**

Most of the students considered neuroanatomy to be a difficult subject that contains a large volume of information. Therefore, many of them have the tendency to memorise the subject rather than understanding. The learning will be permanent if learning and its assessment is structured around generalisable rules or 'principle' rather than trying to memorise plenty of apparently disconnected 'information'.

Materials and methods: *The Neuroanatomy portion of the Anatomy question papers of the First Professional MBBS Examinations of four public universities were analysed. It was a cross sectional, observational study carried out in the Department of Anatomy, Bangabandhu Sheikh Mujib Medical University, Dhaka from January 2012 to December 2012.*

Results: *The analyses of written question papers revealed that a vast majority (85.40 ± 7.32%) of the question segments in the question papers of four public universities were 'Information-based segments'. The mean proportion (±SD) of 'principle-based segments' was 14.60 ± 7.32%.*

Conclusion: *The results of present study provide a baseline data on the relative proportion of 'principle-based questions' and 'information-based questions' in the Neuroanatomy portion of Anatomy question papers of four public universities in Bangladesh. The study also suggests that the issue of principle-oriented approach in the teach-learning and assessment of neuroanatomy is a valid issue to be addressed in the undergraduate curriculum planning and implementation.*

EWM CJ Vol. 12, No. 1&2, January 2024-July 2024: 88-93**Introduction**

Neuroanatomy may be defined as the anatomy of the nervous system¹. It is an integral part of the anatomy portion of the undergraduate medical curricula worldwide² and is also integrated according to need in the postgraduate curricula. Neuroanatomy is descriptive in textbooks and other learning materials on the subject contain large volumes of information

that sometimes seem to be unrelated to each other. This subject is usually taught in the latter part of the medical undergraduate course in Bangladesh. This is probably because students require some maturity to cope with the subject. However, students do not get enough time to go through the subject. The tutorials and practicals on pure Neuroanatomy (i.e. the central nervous system) are included in the third term of the

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course as the “Central nervous system and the eyeball” card before the first professional MBBS Examinations. Being too busy and too scared about the professional examination students usually cannot develop a proper understanding of the subject and often resolve to rote memorisation. Discussing about the learning of Neuroanatomy it is suggested that learning broad principle, rather than focusing on detail, will lead to higher acceptance and retention of information³.

Here ‘principle’ represents a general idea derived or inferred from specific instances or occurrences⁴. It is also defined as a rule or law concerning a natural phenomenon or behaviour of a system⁵. In a more elaborate definition, ‘principle’ is an elementary assumption, concept, doctrine, maxim, or position generally held to be fundamental or true for a body of knowledge, conduct, procedure, or system of reasoning and used as a basis for production and action⁶. In the context of the present study ‘principle’ means from which others are derived.

The term ‘information’ is described as fact, data, or instructions in any medium or from⁷.

In the context of the present study, information can be distinguished from principle by regarding information as a statement expressed in such a way that it applies to only one situation, condition, part, etc.

For example, a student examining the brain found that a section through its frontal lobe shows an outer grey matter and an inner white matter. A section through the temporal lobe also shows an outer grey matter and an inner white matter. Now these two ‘information’ on two different brain regions represent a single ‘principle’- the cerebrum is composed of an outer grey matter and inner white matter. If a student develops a general understanding of the ‘principle’ s(he) will be able to use it whenever s(he) is faced with the question of the composition of the cerebrum.

Zirbel noted that although the human brain seems to be limited to how many facts it can remember when many facts are chunked together into meaningful concepts or networks of concepts, the amount of material to remember appears to be relatively less. Associations are helpful in remembering facts, and the more meaningful the associations are, the easier it will be to recall the big picture of what is going on⁸.

There are workers who believe that new concepts cannot be adopted, they have to be fitted into existing networks and go through all the emotional filtering and evaluation processes first. And even if a newly taught concept might sound logical, it can only be employed after a new network has been established.

In an attempt to develop Principle-oriented curriculum for Neuroanatomy, it should be kept in mind what Zirbel pointed out: “A healthy curriculum does not cover some breadth. However, some of the “basic” concepts need to be covered in substantial detail. The trick is to decide on which are the most basic concepts and to design a curriculum around that⁸.

No literature is available on any ‘principle-oriented’ approach toward the teaching-learning and assessment of Neuroanatomy in medical undergraduate courses in the country. In 2013 a study was done on feedback from teachers and postgraduate students on the anatomy component of the MD Gastroenterology discipline of BSSMU regarding principle-based questions and information-based questions. It has been observed that 85% of respondents felt about the lack of a problem-based approach in the whole course, and about 56% of respondents in the course created more recall level knowledge⁹.

Considering the above context, it is not difficult to understand that addressing neuroanatomical ‘principles’ in relation to the teaching-learning and assessment in undergraduate Neuroanatomy is an important relevant issue in the planning and implementation of Anatomy curriculum in a meaningful effective manner in people’s healthcare. To achieve that, through analyses of existing assessment systems in Neuroanatomy.

Material and Methods

The present study was a cross-sectional, observational, and mostly descriptive study with few analytical components. It is carried out in the Department of Anatomy, Bangabandhu Sheikh Mujib Medical University, Dhaka from January 2012 to December 2012. For the analyses of the written question papers, the Neuroanatomy portion of all the available question papers of the First Professional MBBS Examinations (under the latest curriculum) of four public universities of Bangladesh (Chittagong, Dhaka, Rajshahi, and Shahjalal) held from January 2009 to January 2013 (5 latest years) were selected. Two First Professional MBBS exams were held per year. Thus, a total of 36 question papers (9 from each university) were analysed, only the Short Answer Questions (SAQs) were considered, not the MCQs.

The operational definitions used in analyses of question papers in the present study are demonstrated in Figure 1. Each portion of the question paper is subdivided into the following components.

- i. Question
The term 'question' was used for the numbered questions asked in question papers. Thus, there were 14 questions in the SAQ portion of each question paper.
- ii. Part
This term was used to denote the separate sentences in each of the short answer questions (SAQ) of each question paper.
- iii. Segment
This term indicated each component of a 'part' of a SAQ that called for a different answer. Thus, in some cases, a 'segment' represented a whole sentence (and thus, a whole part) or fraction of a sentence.
- iv. Principle-based segment
This term was used in analysing the university question papers. It meant a 'segment' of a 'question' answering which invariably requires the use of a principle.
- v. Information-based segment
This term was used in analysing the university question papers. A 'segment' of a 'question', answering which is based in neuroanatomical information only, and does not require the use of a 'principle'.

Original appearance of a SAQ in the question paper:

Diagrammatic representation of the above question and its components.

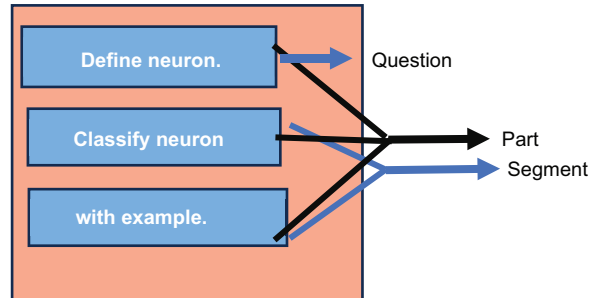


Figure 1: Diagrammatic representation of different terms used in analysing the question paper. The question has been taken from January 2012 First Professional MBBS Examination of Shahjalal University of Science and Technology, Sylhet

Methods used for analyses of question papers

There were fourteen (14) questions in the Short Answer Questions (SAQ) portion and twenty (20) questions in the Multiple-Choice Questions (MCQ) portion of each question paper. In this study, only the Short Answer Questions (SAQ) dealing with Neuroanatomy were analysed.

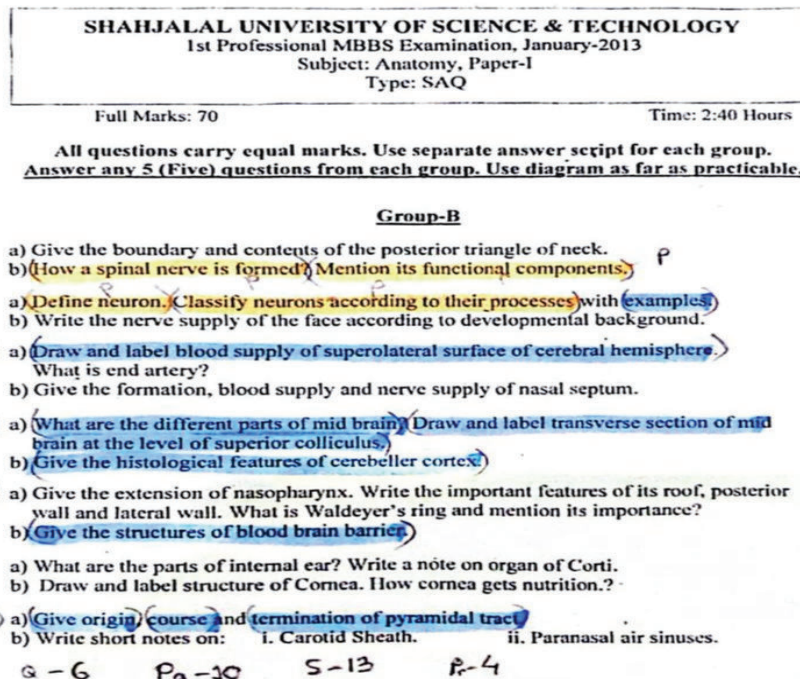


Figure 2: A sample of how each 'segment' of question on Neuroanatomy was marked by a colored highlights being identified either as a 'Principle-based segment' (orange) or an 'Information-based segment' (blue)

Thus, a whole of 116 questions was analysed. Each question had one or more parts. Thus, a total of 201 parts were analysed. Thus, a total of 292 segments were analysed.

For analysing each portion (SAQ), each segment was marked for its identity by different symbols. The methods of marking the 'segment's is shown in Figure 2. Table 1 and table 2 show examples of 'Principle-based segments' and 'Information-based segments' respectively from the question papers of four public universities of Bangladesh.

Q: 'Questions' on Neuroanatomy topic(s); Pa: 'Parts' of a 'Question'; S: 'Segment' of a 'Part'; Pr: 'Principle-based segment'; I: 'Information-based segment';

Results:

It may be recalled that the Neuroanatomy portion of the written Anatomy question papers of the last 5 years (2009 to 2013) of four public universities of Bangladesh (Dhaka, Chittagong, Rajshahi and Shahjalal universities) were analysed in this study. Total 9 question papers of each university were analysed. The following is the description of the findings.

The proportion of 'Principle-based segments' of question varied between 6.25 and 22.62 among the universities, the mean proportion being around 15% (in Table 3). the greatest frequency of 'Principle-based segments' was found in the question papers of Dhaka University.

Table-I
Examples of 'Principle-based segments' of questions from the question papers of four public universities of Bangladesh

University	Examination	Example
Chittagong	January (2010)	What is an upper motor neuron?
	July 2011	Mention the origin of upper motor neuron
Dhaka	January 2010	Explain Anatomically/Histologically: how/why - CSF drains into venous sinuses
	July 2009	Explain Anatomically: how/why -the upper part of the face escapes the upper motor type of facial nerve palsy.
Rajshahi	July 2012	What are gray rami communicantes?
	July 2011	What is spinal segment?
Shahjalal	January 2013	How is spinal nerve formed?
	January 2011	Write the composition of gray matter.

*The language of the questions has been kept as it was in the question papers, even though some grammatical mistakes were noted.

Table-II
Examples of 'Information-based segments' of questions from the question papers of four public universities of Bangladesh

University	Examination	Example
Chittagong	January 2013	Explain the embryological basis of the development of spinal bifida.
	January 2012	Write a short note on the circle of Willis.
Dhaka	January 2012	Name the supporting cells of the central nervous system.
	July 2011	Give the functions of the thalamus.
Rajshahi	January 2013	How brain stem is formed?
	January 2009	Give the boundary of the frontal lobe of brain.
Shahjalal	January 2013	Give the histological features of cerebellar cortex.
	January 2011	Draw and label transverse section of spinal cord at the level of 5 th thoracic vertebra.

Table-III

Proportions of 'Principle-based segments' and 'Information-based segments' of question in the Neuroanatomy portions of the written Anatomy question papers of the last 5 years of four public universities of Bangladesh

Sl no.	Basis of question-segment	University-wise proportion (%)				Mean proportion \pm SD (%)
		CU (n=72)	DU(n=76)	RU(n=64)	SU(n=137)	
1.	Principle-based segments	6.25	18.42	22.62	11.11	14.60 \pm 7.32
2.	Information-based segments	93.75	81.58	77.38	88.89	85.40 \pm 7.32

CU: Chittagong University

DU: Dhaka University

RU: Rajshahi University

SU: Shahjalal University

n represents the total number of question- 'segments' in the Neuroanatomy portion of all the question papers of the universities analysed.

Discussion:

Research like the present study provides evidence-based footing to any move towards modulating teaching approach or even modifying curricula in order to ensure better student learning. It is believed that active conceptually oriented involvement of students is key to their learning¹⁰.

In the study, the relative proportions of the 'Principle-based segments' and 'Information-based segments' of question among the short answer questions (SAQ) in the Neuroanatomy portion of the Anatomy question papers of the First Professional MBBS Examination of four public universities of Bangladesh in the last 5 years were analysed.

The proportion of 'Principle-based segments' of questions varied between 6 to 25% (approx.) among the universities yielding a mean of about 15%. In order to encourage students in developing a proper understanding of Neuroanatomy through a principle-oriented approach as reasonable, 'Principle-based questions' need to be increased in the First Professional MBBS Examinations. Adequate exposure of teachers to Principle-oriented approach towards assessment should also be considered.

Conclusion:

Based on the above information and understanding it may be suggested that thinkers, curriculum planners and above all teachers of Bangladesh should be proactive in dealing with the issue of optimum use of

'principles' in teaching-learning and assessment in Neuroanatomy.

Conflict of Interest: None to disclose.

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