Original Article

Using Mnemonics in Teaching-Learning: A Profile of Experiences of the Bangladeshi Anatomy Teachers

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Abstract

Background: *Teaching-learning of Anatomy is become challenging due to change in undergraduate medical curricula and reduction of time allotted for studying Anatomy. Moreover, students are never tried of using memory enhancing techniques like mnemonics that results better retention of recalled anatomical knowledge. But teachers' experiences regarding different aspects of mnemonics are still sketchy.* ***Objective:*** *To analyze the experiences of the Bangladeshi Anatomy teachers' in using mnemonics on teaching-learning of Anatomy.* ***Material and Methods:*** *A questionnaire-based survey was conducted to analyze the experiences of 63 Bangladeshi Anatomy teachers regarding different aspects of anatomical mnemonics and their suitability in teaching-learning of Anatomy.* ***Results:*** *Most of the surveyed teachers had experience of using anatomical mnemonics as a student (88%). Most (82%) of them used mnemonics in Regional Anatomy and also got the highest number of choices (90%) as the subdivision of Anatomy where mnemonics are likely to be effective. Most of them relate themselves with memory enhancing techniques in Anatomy.* ***Conclusion:*** *Most of the teachers' used mnemonics as a student, mostly in Regional Anatomy where the use of mnemonics was likely to be more effective than any other subdivisions of Anatomy.*

Key words: *Mnemonics, Education, Experience, Teaching-learning.*

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Introduction

Anatomy provides a foundation for clinical training and practice. However, it has been slowly squeezed from the medical curriculum in Bangladesh and abroad in recent years.[1-3] There may be genuine points which go in favor of this reduction in time and lesser time often make students take shortcut methods to learning. Moreover, there is little consensus available which clearly defined what should be the contents or how these should be taught or how much time should be engaged to study Anatomy.[4] It is also important to realize that not every teacher of Anatomy in every institution has got the ability to teach in such a way that his/her students would develop a real understanding of the topic. Panday and Zimitat noted that there are two ways to learning: Deep and surface approaches. One of the surface approaches of learning is memorization that includes memorizing facts and information and recalled them later while answering questions.[5] Understanding has been related to a deep approach of learning, but a large number of anatomical information are needed to be learnt or remembered through memorization which is a surface approach of learning. The question of 'mnemonics' arises in this critical juncture. Mnemonics are learning strategies for encoding information with the sole purpose of making it memorable to provide efficient retention and retrieval of the information.[6-7]

Bakken and Simpson believe that mnemonic strategies, as important instructional components could be implemented by the teachers to that academic content that needs to be remembered.[8-9] However, it is difficult to assess which one may be better for what particular anatomical topics. Ideas regarding what the Bangladeshi Anatomy teachers think and feel about the utilities, disadvantages and other aspects of anatomical mnemonics are also sketchy. Although Spackman claimed that mnemonics work better due to their meaningfulness, organization, association, visualization and attention.[10]

Although a good number of mnemonics are available in Anatomy, questions like what the Bangladeshi Anatomy teachers think and how they feel about these mnemonics as well as how effective they are in memorizing anatomical information have not been adequately addressed to this day. The experiences of the Bangladeshi Anatomy teachers

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regarding different aspects of anatomical mnemonics as addressed through such research can provide an insight into the beneficial and non-beneficial effects of mnemonics in future teaching-learning of Anatomy. The results can provide the teachers with such understanding as useful in manipulating the exact potentials of mnemonics in Anatomy.

Materials and Methods

This was descriptive and cross-sectional research that involved a questionnaire-based survey through e-mail with analyses of collected experiences of the Bangladeshi Anatomy teachers regarding different aspects of anatomical mnemonics. This research was carried out in the Department of Anatomy, at Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, from March 2017 to Febuary 2018. It was conducted according to guideline of Helsinki Declaration and after getting ethical clearance from the Institutional Review Board (IRB) of BSMMU. A questionnaire was prepared with a view to getting a profile of experiences of the Bangladeshi Anatomy teachers regarding different aspects of anatomical mnemonics through an e-mail and was analyzed. A small-scale 'Pilot study' was also done to get an idea about the validity of the format and language of the survey questionnaire. For this purpose, it was sent to five respondents for getting feedback through e-mail. Among them two were Assistant Professors and three were residents of MS Anatomy, at BSMMU. Modifications of the questionnaire were done according to the feedback. However, no formal procedure of validation of the questionnaire was followed in the present research. The inclusion criteria were postgraduate degree in Anatomy from any university recognized by Bangladesh Medical and Dental Council and teaching experience in Anatomy of at least five years after completing postgraduation in Anatomy. But incapability of using a personal e-mail address for participating was considered as exclusion criterion.

Sixty three (63) teachers responded by completing the questionnaire and returning the filled-outs questionnaire via e-mail. The questionnaire contained two sections (A and B) and covered the issues related to mnemonics. Three forms of item (question) were constructed for the questionnaire: Multiple Choice Questions (MCQs) asking for single choice from multiple options, MCQs asking for multiple choices from multiple options. The questionnaire was organized for e-mail correspondence using the 'Google Forms'. 'Google Forms - along with Docs sheets and slides is part of Google online apps suite of tools' that can be used to 'make, edit and respond to forms'. Each participant filled out the questionnaire and sent it back to the researcher via e-mail.

SECTION B : Issues on mnemonics		
B1	**Were you familiar with the term "mnemonics" before reading this questionnaire?**	
	☐ a)	Yes
	☐ b)	No
B2	**In which of the following way(s) can you relate yourself with the memory-enhancing techniques (mnemonics) in Anatomy?** *(You may tick multiple options)*	
	☐ a)	I have heard about the memory enhancing techniques.
	☐ b)	I have used the techniques as an undergraduate medical student.
	☐ c)	I have used the techniques as postgraduate Anatomy students/residents.
	☐ d)	I have used the techniques as a teacher.
	☐ e)	I have taught the techniques to students/residents.

An example of two questions from the survey questionnaire is shown above.

The data gathered through the questionnaire-based survey were analyzed qualitatively, and then quantitated. Thus, percentage frequencies of different experiences of the Bangladeshi Anatomy teachers were calculated and statistical diagrams were produced using MS Excel as applicable for presentation.

Results

Familiarity of the Bangladeshi Anatomy teachers with term mnemonics

The estimated frequencies of the familiarity of the Bangladeshi Anatomy teachers regarding the term 'mnemonics' is shown in Figure 1. Majority of them were familiar with the term 'mnemonics' before reading the questionnaire of the present research.

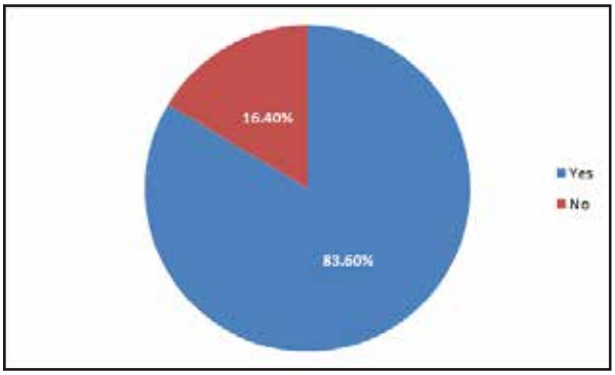

Fig 1: Frequency of familiarity of the Bangladeshi Anatomy teachers with the term 'mnemonics' before reading the questionnaire of the present survey.

Particulars of the Bangladeshi Anatomy teachers participating in the survey

(Table-l) shows the details of the particulars of the responding Bangladeshi Anatomy teachers regarding their postgraduate qualifications, present designation, type of institution presently teaching in, type of students/residents taught and length of experience in teaching.

Table I: Particulars of the Bangladeshi Anatomy teachers participating in the survey.

Particular	Frequency (n= 63)
Postgraduate qualification † (>1 options allowed)	
MPhil	61 (96.8%)
MS	2 (3.2%)
MD	0 (0%)
MMEd	6 (9.5%)
PhD	1 (1.6%)
Present designation	
Professor (or equivalent)	33 (52.4%)
Associate Professor (or equivalent)	27 (42.9%)
Assistant Professor (or equivalent)	3 (4.8%)
Type of institution presently teaching in	
Medical university	2 (3.17%)
Government medical college	11 (17.5%)
Armed forces medical college	6 (9.6%)
Non-government medical college	44 (69.8%)
Government dental college	0 (0%)
Non-government dental college	0 (0%)
Type of students/residents taught † (>1 options allowed)	
Undergraduate medical students	62 (98.4%)
Postgraduate students/residents of Anatom	16 (25.4%)
Postgraduate clinical students/residents	12(19%)
Undergraduate nursing students	10 (15.9%)

* For these particulars, as more than one option were offered, the total percentage frequency was more than 100%.
n: Number of Bangladeshi Anatomy teachers participating in the survey

Familiarity of the Bangladeshi Anatomy teachers with terms related to mnemonics

The experiences regarding familiarity with different mnemonic 'techniques', may be not by names, but by example only or may be not by using, but by knowing only. It revealed that most of the Bangladeshi Anatomy teachers were familiar with the term 'Acronym' but they were most familiar with the 'Acrostic' 'techniques'.(Table-ll)

Table II: Estimated frequencies* of the familiarity of the Bangladeshi Anatomy teachers regarding mnemonic techniques.

Term related to mnemonic	Frequency of familiarity with different mnemonic techniques* (n= 61)	Frequency of mnemonic The technique most familiar with (n= 62)
'Acronym'	49 (80.3%)	20(32.3%)
'Acrostic'	46 (75.4%)	30 (48.4%)
'Rhyme'	34 (55.7%)	9 (14.5%)
'Storytelling'	16 (26.2%)	3 (4.8%)

* As more than one options were offered, the total percentage frequency was more than 100%.

n: Number of Bangladeshi Anatomy teachers responding to the questions.

How the Bangladeshi Anatomy teachers can relate themselves with mnemonics.

All the responding Bangladeshi Anatomy teachers related themselves in different ways with the memory-enhancing techniques (mnemonics). About 90% of them used the 'techniques' as an undergraduate medical student. More than half of these teachers used the 'techniques' as a teacher. The table also shows the other ways of relations with their estimated frequencies.(Table-lll)

Table III: Estimated frequencies* of the Bangladeshi Anatomy teachers' ways of relating themselves to anatomical mnemonics.

Way of relating	Frequency (n=63)
Heard about the memory enhancing techniques	33 (52.4%)
Used the techniques as an undergraduate medic student	56 (88.9%)
Used the techniques as postgraduate Anatomy students/residents	27 (42.9%)
Used the techniques as a teacher	36 (51.1%)
Taught the techniques to students/residents	18 (28.6%)

* As more than one options were offered, the total percentage frequency was more than 100

n: Number of Bangladeshi Anatomy teachers responding to the question.

Subdivision of Anatomy where the teachers used mnemonics or thought to be effective

The estimated frequencies of the Bangladeshi Anatomy teachers remembering using mnemonics in different subdivisions of Anatomy and their experiences regarding the effectiveness of mnemonics in different subdivisions are shown. About 95% could remember using mnemonics in Regional Anatomy. More than 40% used mnemonics in Neuroanatomy. No teacher told about using mnemonics in Genetics. Only two of them could not remember using mnemonics as a student or a teacher.(Table-lV)

Table IV: Estimated frequencies of subdivisions of Anatomy in which the Bangladeshi Anatomy teachers used mnemonics and for which they thought that mnemonics would be most effective

Subdivision of Anatomy	Frequency* (n= 63)	
	Remembered using mnemonics as a student or a teacher	Thought that use of mnemonics would be most effective for
General anatomy	20 (31.7%)	17 (27%)
Regional anatomy	59 (93.7%)	57 (90.5%)
Embryology	14 (22.2%)	13 (20.6%)
Genetics	0 (0%)	2 (3.2%)
Cell Biology and Histology	8 (12.7%)	3 (4.8%)
Neuroanatomy	26 (41.3%)	26 (41.3%)
None	2 (3.2%)	-
Undecided	-	5 (7.9%)

* As more than one options were offered, the total percentage frequency was more than 100.

n: Number of Bangladeshi Anatomy teachers responding to the question

Number of mnemonics used by Bangladeshi Anatomy teachers in their life

Although more than one-fourth of the surveyed teachers could not remember the number, more than a third mentioned that they had used six to ten (6 to 10) mnemonics as a student/resident or as a teacher.

Discussion

In the e-mail based survey the participating Anatomy teachers were expected to complete the questionnaire in one sitting without much distraction. The survey questionnaire contained MCQs including single best/correct answer questions as well as multiple correct answer questions. As it was descriptive and cross-sectional so no scoring was done. Variations in the types of question were kept to identify greater number of choices regarding the experiences of the Bangladeshi Anatomy teachers. For several questions of the questionnaire, options were provided to the respondents for selecting from several given reasons behind any specific standpoint (e.g., Yes or No) of a respondent rather than merely declaring the standpoint itself.

Regarding familiarity with the term 'mnemonics' in the present research, more than 80% of the teachers had heard this term before reading the questionnaire. A variety of mnemonic systems has been developed for aiding recall since the time of the ancient Greeks when it was impossible to provide any external retrieval cues.[11] The teachers were also asked about the way(s) how they can relate themselves with mnemonics in Anatomy. More than 85% of them used the techniques as undergraduate medical students and more than 50% of them heard about the mnemonics or used the techniques as a teacher. About 40% of them used the techniques as post graduate Anatomy students/residents and few taught students/residents the techniques themselves. These results show that the use of mnemonics is in general common in Bangladeshi medical institutions, but the ways of involvement varies. It may be due to the fact that one of the characteristics of the human mind is to forget something that they have learned and as a consequence, to aid recall, memory aids or mnemonics have been developed.[12]

When asked on the subdivision of Anatomy on which s(he) has used mnemonics as a student or as a teacher, more than 93% of the teachers were found to use mnemonics in Regional Anatomy. More than 40% of them used mnemonics in Neuroanatomy. Mnemonics are used by undergraduates to remember a large number of details in Gross Anatomy course, for example-names of the cranial nerves, tarsal bones, carpal bones and leg flexors.8 According to the experience of more than 90% of the surveyed teachers regarding two subdivisions of Anatomy where the use of mnemonics is likely to be most effective, Regional Anatomy was the most frequent choice and next frequent (41%) as one of the two most effective, was Neuroanatomy. It may be assumed that Regional Anatomy is vast and intensely related. So the use of mnemonics would be most effective. The teachers were also asked about which mnemonic techniques they heard of or were most familiar with. More than 80% of them heard about 'Acronym'. Several apps use different 'Acronyms' in social media. Acronym is composed of the first letters of a series of words (items) that needs to be remembered. Thus, each letter acts as a cue to an item that needs to be remembered.[13] Bakken and Simpson have pointed out that to use 'Acronym' effectively, students have to know the information first, otherwise it will not help to recall information.[9]

The term 'Acrostic' was heard of by more than 75% and 'Rhyme' by about 55%. Only 26% of them heard about 'Storytelling'. A popular mnemonic technique, 'Rhyme', has similar sound at the end of each chosen line.[14] A 'Rhyme' is believed to accentuate the sound between words.[13] It has encoded information by associating each item in a list with the elements of a story.[6] Regarding the most familiar mnemonic techniques-about 48% named 'Acrostic'. In 'Acrostic', the first letter of each word stands for the first letter in a list of words that are needed to be remembered to create a sentence or phrase rather than making a word. 'Acrostic' is less limiting because when the words don't make an easy-to-remember 'Acronym', using 'Acrostics' may be preferable. All of these techniques are particularly useful for rote memory but do not aid comprehension.

It has been claimed that mnemonic devices are the well established tools of teaching-learning that leads to increased retention of knowledge.[15] The cumulated results regarding the number of mnemonics used by the individual teachers participating in the present research showed that more than half of them remembered using more than five mnemonics in their student/resident life and teaching life. Akhter et. al conducted a research to determine the effectiveness of two different mnemonic techniques ('Rhyme' & 'Storytelling') in memoriz

ing anatomical information as well as to compare their effectiveness with the control group through analyses of the performances of the Bangladeshi medical undergraduates in 'memory tests' and judging by the statistical analyses of performances of the undergraduates, they concluded that 'Rhyme' was significantly more effective in memorizing anatomical information than 'Storytelling' and control group. But regarding 'Storytelling', the performance did not differ significantly from that of the control.[16]

Conclusion

It was revealed that most of the Anatomy teachers surveyed had experience of using anatomical mnemonics in their student lives as well as teaching life. Most of them were used mnemonics effectively in Regional anatomy. The teachers' experiences of using mnemonics show that it can be used as a teaching tool in Anatomy on the basis of its actual potentials. Future research should achieve better insights into different aspects of mnemonics in teaching-learning of Anatomy.

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