

Impact of use of illustration in the presentation of Neuroanatomy through the analyses of the illustration in the Neuroanatomy text books commonly used by the medical postgraduates of Bangladesh

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Abstract

Context: *Illustration can say many things than detail texts. Texts with illustrations are extremely helpful in aiding the understanding of Anatomy. It was observed that even in postgraduate level in maximum times students in Bangladesh have more tendency to memorize the text without correlating with illustrations. Text of complicated Neuroanatomy cannot be thought without illustration. So illustration is very much important in Neuroanatomy. Even recently Neuroanatomy books are improved with the illustrations to make them easier for the reader. Illustrations also help to identify the intended structures and important pathways of structural-functional correlation and mechanism of development of diseases. The contribution of adding more illustrations also makes Neuroanatomy books more clinically oriented. So the present study was undertaken with a view for better Neuroanatomy teaching-learning and assessment according to their utility of illustrations as teaching- learning and assessment tools in Bangladesh and by analyzing frequencies of different categories of illustrations in the Neuroanatomy text books.*

Objectives: *To determine the frequencies of different 'categories' of illustration according to their utility as teaching / learning/ assessment tools.*

Study design: *A descriptive, study involving quantitative analyses.*

Place and period of the study: *Department of Anatomy, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, between July 2008 to June 2009.*

Materials and methods: *Three "categories" of illustration based on their utilities as teaching/learning/ assessment tool were identified. The frequency of each "category" was determined.*

Results: *About 79% of all the illustration could be categorized either as 'practically the best tool' or as 'a complementary to another tool' for using in teaching/learning/assessment.*

Conclusions: *From the result of the present study suggestions could be formulated on improving the methods of teaching and assessment in Neuroanatomy in Bangladesh by incorporating the different categories of illustrations.*

Key words: Illustrations, Contemporary Neuroanatomy Text Books

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Introduction

Illustrations are commonly placed in textbooks to explain the text and to provide information beyond the print¹. They can foster comprehension and learning. A good illustration can catch the attention of reader even before reading the text. Illustrations can be used to draw attention to read the text. Illustration can determine the general success of the book. They can say many things with short text.

They make a book attractive and can represent a topic without more length or difficult vocabulary². Illustrations help students to build relationship between the sentences of the text. They also help for better recall, better accuracy and shorter response times. They can also help to develop mental images in order to understand spatial relationship. They make the structural relationship more transparent. The facilitative effects of illustrations improve the comprehension of text and hence deeper understanding³. The Neuroanatomy text books also give more importance to figures now-a-days. Illustrations are better needed for understanding and can enhance thoughts of the students⁴. Illustration can raise the student's interest to learn the complicated Neuroanatomy. As for example if we consider the course of a cranial nerve or a tract or synapses within central nervous system are better understood by illustration rather than gross description. Illustration can highlight the details of the text. Students' attentions and attractions can be increased by using colored illustrations⁵. Increased use of illustration decreases the amount of text in the recent Neuroanatomy textbooks. Illustration can be used as major tools in teaching as well as in the oral practical exams along with the teaching- learning and assessment tools. They make the text easier for students⁶. We observe that the Neuroanatomy book of Snell is extensively illustrated. The figures used in Snell's Neuroanatomy are mostly simple⁷. The importance of illustrations have also been reflected in the textbook of several authors/editors^{3,8,9,10,11,12,13}. But unfortunately in maximum times students do not understand that illustration has a power to produce an image which last for a long time but text can not this alone. Students should also be realized that illustrations can help them to improve or develop their understanding and mental ability. There is no alternate way except illustration to express the different pathways in the nervous system. Similarly because of there is no use of electron microscope in our country, illustration is the best tool for understanding the electron microscopic features. It is observed that most of the schematic diagrams and all electron micrographs are categorized as 'practically the best

tool for the purpose' because there is no alternative tools that can be considered for these illustrations. This study will help to realize the utilization of illustration in teaching and learning and assessment in our country because we know that illustration can show something which can not express by language. There is no doubt that illustration in Neuroanatomy aids in the teaching, learning and assessment. So students have to be shown figure more and more in the lecture classes omitting the unnecessary details of the text.

Materials and methods

Two textbooks were selected for the analyses of text and illustrations. These were:

- (i) A.K.Datta (2007): Essentials of Neuroanatomy, and
- (ii) Richard S Snell (2006): Clinical Neuroanatomy.

Operational definitions

1. Illustration: An 'illustration' may be described as a drawing or picture in a book, magazine, etc. especially one that explains something. For the present study, all forms of picture presented as 'figure's in the Neuroanatomy textbooks were considered as 'Illustration's. These included different types of photographs, photomicrographs, electron micrographs, diagrams (line drawing). The figure legends were also included in the 'Illustrations' while measuring the weight given (i.e. proportion of printed area allotted) to each illustration.

2. 'Category' of illustration

The utility of an illustration as a teaching-learning and assessment tool is sometimes less than that of the real thing sometimes it is more. There are differences between different types of categories as well. For the present study, three categories of illustration were defined in terms of their utility as a teaching-learning and assessment tool in Neuroanatomy. Each 'category' is defined on the basis of:

- I. Whether it depicts something that cannot practically be depicted in a better way by any teaching/learning/assessment tool other than illustration and, therefore, may be considered as 'practically the best tool for the purpose'.

- II. Whether it is useful as 'a complementary tool to another tool'.
- III. Whether it should be "substituted by a better alternative tool".
- I. **Illustration as 'practically the best tool available for the purpose':**

Counted under this category were the illustrations that express some aspect of Neuroanatomy which cannot usually be expressed using any other tool. Such Illustration included the schematic diagrams showing mechanisms and many others Illustrations that represent images which are not practicable to be produced in our country and have to be reproduced from the book were also counted under this category. Practically speaking, these Illustrations have no alternatives in our country. Example: Fig.1

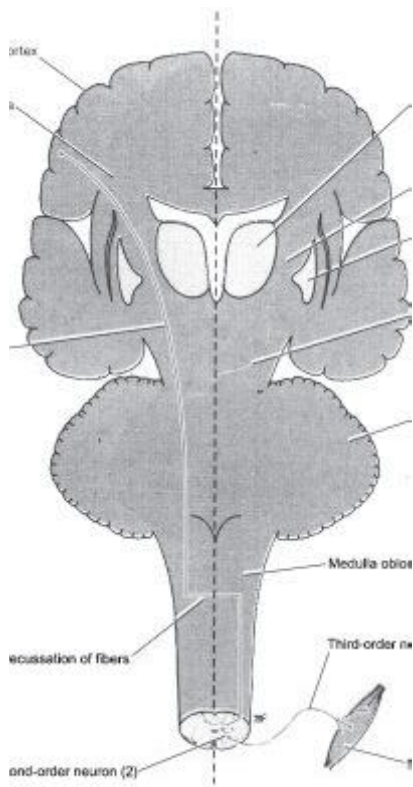


Fig.-1: An example of a specific 'category' of illustration from the textbook analyzed in the present study- an illustration that is 'practically the best tool for the purpose.' It shows the simple form of the descending motor pathway from the cerebral cortex to the skeletal muscle⁷.

II. Illustration as 'a complementary tool to another tool': Counted under this category were illustrations that were useful as complementary tools to other better tools. For example, schematic diagram of radiograph may be used along with radiograph to explain this. These illustrations are also useful in situations when radiographs are not available. These situations are not uncommon in our country. Example: Fig.2

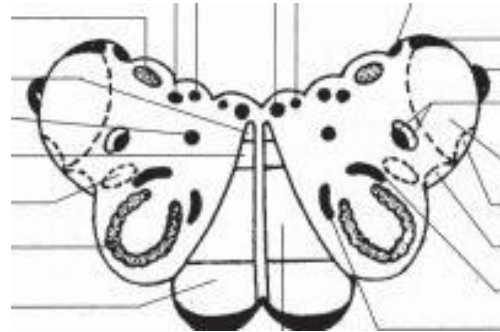


Fig.-2: An example of a specific 'category' of illustration from the textbook analysed in the present study- an illustration that is 'a complementary tool' to a- microscopic slide. It shows the cross section of open part of medulla oblongata at mid-olivary level¹³.

III. Illustration 'to be substituted by a better tool' These illustrations have definite better alternatives as tools. Such tools include viscera, slides and reports of various diagnostic images as well as models of Neuroanatomical components. Example: Fig.3

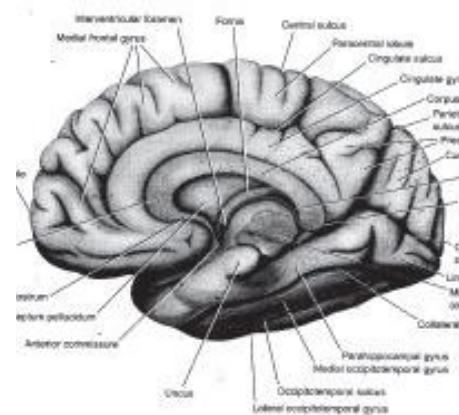


Fig.-3: An example of a specific 'category' of illustration from a textbooks analysed in the present study- an illustration that is 'to be substituted by a better tool'- in this case by a viscera of brain. It shows medial surface of the right cerebral hemisphere⁷.

Methods of determination of the frequencies of different 'categories' of illustration

For the purpose of the study, each illustration of the parts of the textbooks analysed was observed thoroughly to judge its utility as a Neuroanatomy teaching-learning tool and classified into a particular 'category'. The illustrations were marked with different symbols according to their categories. Later, they were counted following the symbols. Then, the number of each 'category' of illustration was counted and expressed as a percentage of all the illustrations used in presenting all the 'topic's under all the selected 'chapter's of each selected textbook.

Results:

The numbers of illustrations analyzed (for their 'forms' and categories) in two textbooks were as follows:

- a. Datta (2007): 178 illustrations
- b. Snell (2006): 478 illustrations

Thus a total number of 656 illustrations were analyzed for their categories.

The frequencies of illustrations of different 'categories' (according to their utility as teaching-learning tools) used in two Neuroanatomy textbooks are shown in Figure 4. They show that about 50.22% of the illustrations can be categorized as 'practically the best tool for the purpose', while 28.43% can be categorized as 'a complementary tool to another tool'. Thus, around 79% of the illustrations may be considered useful in one way or other, even if there are other tools available.

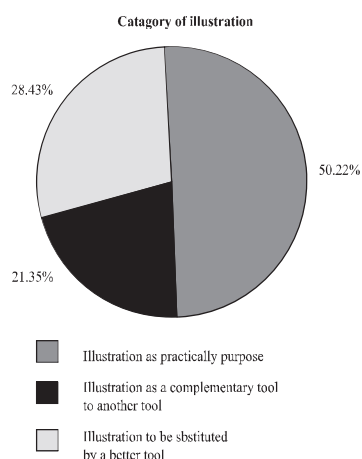


Fig.4: Mean percentage frequencies of illustrations of different 'categories' (according to their utility as teaching-learning tools) used in the Neuroanatomy textbooks.

Discussion:

In the present study, the illustrations of two commonly recommended Neuroanatomy textbooks were categorized on the basis of their teaching-learning and assessment tools. The system of categorization, although arbitrary, was consistent throughout the present study. The frequencies of different 'categories' of illustration indirectly represent the utility not only of illustrations but also of the other teaching/learning/assessment tools. Figure 1 represents the category of illustration termed 'practically the best tool for the purpose' meaning what these illustrations have depicted, could not (at least commonly) be depicted in a better way by any other teaching/learning/ assessment tool. The motor pathway from cerebral cortex to skeletal muscle shown in Figures 1 is 'schematic diagram'. It is not possible to express this thing other than illustration. The understanding from this figure can be developed only by schematic diagram. In our country, there is no use of electron microscope. So, our students have no chance to see electron microscopic features by electron microscope. They can see these only by illustrations. This is why most of the schematic diagrams and all electron micrographs are categorized as 'practically the best tool for the purpose'. There is no substitution of these illustrations. From the results of this study, it is observed that illustrations of two commonly recommended textbooks are categorized as 'practically the best tool for the purpose' is more than 50%. Therefore if the students are expected to be attracted to these illustrations and understand Neuroanatomy, they must be made to study these illustrations. The easiest way to do this is by including these illustrations in various ways in the examinations. Illustrations are also needed to understand microscopic slide, photo or electro micrograph may be used as 'complementary tool to another tool'. Figure 2 is a 'diagram of photomicrograph'. This illustration represents cross section of open part of medulla oblongata at mid-olivary level. It helps the students to understand the slide under the microscope. Illustrations of two textbooks are categorized as 'complementary tool to another tool' is more than 25%. Therefore, it is

observed from this study that illustrations of the two textbooks are categorized as 'practically the best tool for the purpose' and 'complementary tool to another tool' are 79%. So, with the availability of scanners, computers and laminating machines, there is no reason why illustrations cannot be properly utilized, especially when many of the techniques (use of electron microscope) that are used for Neuroanatomy are not be available to the postgraduate students. We can use viscera, reports of diagnostic images, glass slides for photomicrograph as' to be substituted by a better tool'. It is observed from the results of this study that only 21% of the total illustrations have fallen into this category.

Conclusions:

For improving the methods of teaching, learning and assessment in Neuroanatomy in Bangladesh, illustrations identified according to their utility as teaching- learning tools in Neuroanatomy and it is observed that there is no alternate way except illustration to make the complicated Neuroanatomy easy and enjoyable.

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