

## Original Articles

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# Illustration as a Teaching-Learning Tool in Histology Practical in Undergraduate Medical Education of Bangladesh: Teacher & Student Perspective

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### Abstract

**Objectives:** This study was aimed to find out the perception of students and teachers regarding illustration as a teaching-learning tool in histology practical class in undergraduate medical education of Bangladesh.

**Methods:** The present study was a cross sectional descriptive one involving quantitative and qualitative methods. Data was collected from 10 medical colleges. 824 1<sup>st</sup> year MBBS students were enrolled in the survey. A semi-structured questionnaire having multiple response answers was used for obtaining information from the students and in-depth interviews were carried out with 21 teachers of Anatomy.

**Results:** Students mentioned that use of illustration is interesting and helpful for proper understanding of histological structure. A majority of the respondents (66%) mentioned "schematic diagram as their choice of form of illustrations. The interviewee teachers agreed that illustration is very much useful for histology practical session.

**Conclusions:** Illustration aids in better recognition of histological structure.

**Keywords:** Histology practical, illustration

### Introduction

Histology is a morphologic science in which the structure of the cells, tissues and organs of the body are dealt with. A sound knowledge of microscopic anatomy and histopathology is of fundamental and indispensable importance in medical education.<sup>1</sup> In this regard Fawcett<sup>2</sup> says that a firm foundation in histology continues to be essential for recognizing and interpreting their changes in disease.

In histology practical cross sections through tissues and cells are studied by examining microscopic slides. This two dimensional forms makes it

sometimes too difficult for the learner to compile a clear picture of exactly what the tissue or cells look like in three dimensional view. Therefore illustrations are used extensively in histology to explain the morphology, especially the three dimensional morphology of cells and tissues.

Histology is a major discipline within medical and other life science curricula, is based on theoretical didactical strategies as well as on practical training. We all will accept that it is very difficult for first year students to imagine complex three dimensional inter relationship of body structures, various phases of complicated human development and microscopic anatomy.<sup>3</sup>

As illustration is a picture that depicts or enhances a piece of text, they are used for the decoration or explanation of a text or to reinforce concepts and thoughts delivered in written composition.

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Illustration aids in the recognition of histological structure in the field of microscope.<sup>4</sup>

Most undergraduate students get only a short period of time to actually view microscopic slides in histology practical session. More over explaining microscopic pathology to a group is difficult with only a microscope to aid the teacher. To counter this, photomicrographs of the slides used in practical were taken at scanner, low and high power view, enlarged ( A-4 size), laminated and made available to the students. This made microscopy both interesting and easy to review leading to more confident reading of the slides by the students, as evident in the good rating given to the use of the microphotograph by both the tutors and students. The A-4 micrographs proved very helpful.<sup>5</sup>

As the teachers are the experienced persons and as students are the direct beneficiaries of any teaching program their opinions may contribute immensely in improving teaching-learning of histology practical.

**Materials and Methods**

A cross sectional descriptive type of study involving quantitative and qualitative methods was undertaken over a period of one year, January 2014 to December 2014. Data were collected from four government medical colleges and six non-government medical colleges of Bangladesh. A total of 824 students were enrolled in a survey, 480 from government and 344 from non-government medical colleges. A total of 21 teachers having more than one year of teaching experience and being engaged in teaching in histology practical were selected

Two types of instruments were used. A semi-structured questionnaire having multiple response answers was used for obtaining information from the students. On that questionnaire for each question some options were provided in a list as answers. Students had to select one or more options from that list. The students were briefed about the questionnaire and necessary clarifications were provided by the researcher. It was explained to the respondents that the information gathered through the questionnaire

was needed to obtain insight into their views towards illustration and that the information would be used to the advantage of future histology learners. Another data collection instrument was a semi-structured interviewing guideline which was used for the in-depth interviews with teachers. A face to face in-depth interview was conducted using a semi-structured interviewing guideline. Each interview took 40 to 45 minutes on an average. Interview was recorded by an audio recorder with noting down of some of the important points. For the survey questionnaire having multiple response answers, the frequency for each selection was calculated. For the in-depth interviews, content analyses of the responses were done. From that information the themes were emerged out. Some of the themes were quantify and expressed in percentile and some of them were described in narrative form.

**Ethical issue:** Necessary permission was taken from the principals of the involved medical colleges and from each teachers and students for obtaining their views.

**Results**

**Table I**  
*Frequency distribution of selection of advantages of illustrations by the students participating in the survey (n=824)*

Given advantage	Frequency of selection	
	Absolute	Percentage*
Proper understanding of histological structure is developed	531	65.4
Structure-function correlation is better explained	385	47.4
A visual impression creates more interest	562	69.2
Others	18	2.2

n = Number of participants

\*The percentage frequencies do not add up to 100% as the respondents were allowed to choose more than one option

**Table II**  
*Frequency distribution of selection of types of illustrations by the students participating in the survey (n=824)*

Given type of illustration	Frequency of selection	
	Absolute	Percentage*
Low power light micrograph	95	11.9
High power light micrograph	348	43.6
Electron micrograph	322	40.4
Schematic diagram (including three dimensional diagram)	522	65.4
Others	18	2.3

n=number of participants

\*The percentage frequencies do not add up to 100% as the respondents were allowed to choose more than one option

#### **Teachers' opinions about use of illustration:**

The entire respondent agreed that illustration is very much useful for histology practical. Following are the advantages mentioned by them:

- Better understanding
- Interesting
- Builds up conception
- Helps in structure-function correlation
- Helps in long term memorization

#### **Some of the comments are as follows:**

"A picture is worth a thousand words".

"Illustration must be shown to the students for better understanding either by computer or by epidiascope or by manual drawing in the black board".

On the issue of selection of types of illustration, 50% suggested schematic diagram, 43% were in favour of high power (p-40) light micrograph and 33% opined that combination of all forms of illustration is necessary.

Regarding use of schematic diagram one of the comments was as such:

"It is not possible to understand HCL formation by parietal cell without the help of schematic diagram".

Findings of interview revealed that majority of the teachers used text books, Atlas along with microscopes with glass slides during practical sessions. Along with these 50% used laminated enlarged figures, 33% used poster boards as teaching learning aids.

About poster board some comments came up as such, "Poster board is a very useful teaching-learning aid for better clarification".

"With this poster board I can show the enlarged view of histological structure to all of my students at a time during delivery of my teaching instruction".

#### **Discussion**

Regarding advantage of illustration 70% students considered that visual impression would create more interest; 47% realized that it would help in proper understanding of the histological structures (Table I). The entire teacher respondent agreed that illustration is very much useful for histology practical; it helps student in better understanding of histological features.

Ross and Pawlina<sup>6</sup> believe that illustrations acts as a visual memory tool to facilitate learning. Findings of Amin<sup>7</sup> shows that Junqueira and Carneiro have translated their belief into action by using more than 60% of printed area for illustrations. It is calculated that illustration have been used about 1.5 times more per page in the recent edition in comparison to the second edition. By comparing the slide with its Atlas the student could easily identify the exact field and the labeled features with little or no help from an instructor.<sup>8</sup>

Regarding suggested forms of illustration, it was revealed that 66% student consider schematic diagram including three dimensional diagram as their choice of illustration ( Table II). 50% teachers also had the same view.

Amin<sup>7</sup> observed that most of the illustrations are schematic and three dimensional diagrams in Junqueira and Carneiro and in the Ross and Pawlina, the majority belong to the photomicrograph – routine stain high power form. One of the reasons behind very high percentage of schematic and three dimensional diagrams in

the book is probably their intent to help the beginner. Schematic and three dimensional diagrams is the illustration form that may not be able to show the morphological details but can express mechanism, phenomena, functional aspect and pathogenesis or even can express concepts or ideas. In this study it was noted that only 11.9% suggested low power light micrograph. Study findings of Amin<sup>7</sup> showed that mean of the proportion occupied by photomicrograph of low power is only 7%. Histology is in general a visual discipline. It combines observation with reasoning. Thus the illustrations must be considered as basic in histology, not supplementary material. One cannot develop the understanding of the structures of cells, tissues and organs and of their relationship with one another without looking at them. Their interrelated functions are also difficult to perceive without visual help.

Textbooks have changed dramatically from thousand page tomes to more concise, visually appealing books characterized by less text and more colorful eye catching figures and photomicrographs.<sup>9</sup> Analysis of prefaces of some book also reveal that there is a tendency in the histology books to increase the number of illustrations with each edition. Special mentions have been made in Cormak<sup>10</sup>, Gartner and Hiatt<sup>11</sup>, Ross and Pawlina.<sup>6</sup> These illustration have been claimed to summarize the materials of the text and make the presentation of cell biology and histology comprehensive. Amin<sup>7</sup> suggested integration of reduced amount of text with increased number of illustration.

In recent years, application of visual aid as a teaching learning tool has increased tremendously in the developed countries. Textbooks and online resources are now full of illustrations. Cell biology and histology are structure oriented subjects where appearances of cellular and tissue structure speak for their functions. Therefore better use of illustration in the teaching and learning process as well as in assessment would add to better understanding of those subjects.<sup>7</sup>

Teaching must be approached from the perspective of how students learn most effectively. In recent years, application of visual aid as a teaching-

learning tool has increased tremendously in the developed countries. Textbooks and online resources are now full of illustrations. Cell biology and histology are structure oriented subjects where appearances of cellular and tissue structure speak for their functions. In fact histology is in general a visual discipline. Therefore better use of illustration in the teaching and learning process in histology practical would add to better understanding of the subjects and it will help the students to achieve the desired learning outcome. Histology practical session should be delivered using a student centered approach guided by a specially designed practical strategy that will motivate the students and help encourage self-learning.

### Conclusion

Study findings reveal utmost importance of use of illustration in histology practical. Illustration reinforces concepts and thoughts and makes the histology practical more comprehensive and interesting. Illustration complements the microscope slides and plays a major role in the better understanding of histology.

### References

1. Paulsen F P Eichhorn M , Brauer L. Virtual microscopy- the future of teaching histology in the medical curriculum ? *Annals of Anatomy*.2010; 378-382.
2. Fawcett D W ed. bloom and Fawcett a textbook of histology.12<sup>th</sup> ed. Newyork: Chapman and Hall.1994.
3. MC Pherson B R Brueckner J. (2003). Enhancing the dental histology curriculum using computer technology. *Journal of dental education*. 2003.
4. Cotter JR (2001) laboratory instruction in histology at the University at Buffalo: Recent replacement of microscope exercises with computer applications. *Anatomical Record*, 2001;265(5):212-221
5. Wader J V, Kumbhar S S and Mankar D V. An appraisal of innovation in practical teaching in anatomic pathology –A students' and teachers' perspective. 2014.

6. Ross , Pawlina W. Histology a text and Atlas with correlated cell and molecular biology. 5<sup>th</sup> ed. USA; Lippincott Williams and Wilkins. 2006.
7. Amin N F . Recent trend in the presentation of cell biology and histology in the histology books and their reflections in the written summative assessment at the medical undergraduate level in Bangladesh [Thesis], Dhaka; Bangabandhu Sheikh Mujib Medical University: 2008
8. McMillan P J.Exhibits facilitate histology laboratory instruction:Student evaluation of learning resources. The Anatomical Record 2001;265(5): 222-227.
9. Hightower JA, Boockfor FR , Blake CA and Millette CF. The standard medical microscopic anatomy course :Histology Circa 1998.
10. Cormack D H.Ham's Histology. 9<sup>th</sup> ed. Philadelphia. B.Lippincott Company.
11. Leslie P G, Lisa M J L.Gartner & Hiatt's Atlas & Text of Histology. 8<sup>th</sup> ed. Lippincott Williams & Wilkins;2022.