

## A Study on the Use of Digital Images in Learning Histopathology in Phase-II M.B.B.S Students

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Conflict of interest: Nil

### Abstract:

**Background:** With the recent advancement of whole slide digital scanners, tissue histopathology slides can now be digitalized & stored in digital image form, and these digital slides can be used as an effective tool for teaching histopathology along with the conventional histopathology slides. Learning to recognize & appreciate the histopathological features remains a difficult and time-consuming task for many. To improve the identification skills of the students, we have introduced a module containing digital histopathology slides. These slides can be used as an adjunct with old learning method in practical classes for learning histopathology.

**Aim:** To introduce study of histopathology slides with the help of digital images to develop a better clinico-pathological correlation.

**Objectives:** (1). To compare the learning outcomes of conventional method with digital learning method in histopathology practical classes. (2). To assess the student's perception regarding new method of learning histopathology.

**Methodology:** This study was conducted in Department of Pathology, ABV GMC, Vidisha. It was an educational intervention study that lasted for a period of five months. It was carried on 150 students which were divided in the batch of two each having 75 students. Total 75 students were involved at one time who were taught by conventional method, while remaining was taught the same topic through the new (hybrid) method. The same set of questionnaires was given to both set of students and their scores were compared. Perception to the teaching learning method was taken on the Likert scale. After each session the batches were flipped.

**Results:** Learning outcome of the students by new teaching learning method was much better ( $P < 0.001$ ) than the old method that was used to teach histopathology slides.

**Conclusion:** Newer method introduced for learning histopathology slides gave a better learning outcome if used as an adjunct with old learning method, without compromising the basic skills that were taught in the old learning method.

**Keywords:** Digital Histopathology, Clinico-Pathological Correlation.

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### Introduction

Pathology is a discipline that bridges Clinical practice & Basic science. Basic knowledge of histopathology is very essential to understand a disease.

When the tissue malfunctions like in inflammation & in a neoplastic condition; Gross and microscopic changes start taking place in the organ.

Histopathology slides and specimens help a lot in understanding of the disease in the practical classes.

In most of the college histopathology slides are studied with the help of the conventional glass slides and sometimes only the marked areas are

focused under the microscope for the students to identify the pathology in the lesion.

Incorporating hybrid teaching technique i.e. including the digital images of gross and microscopy of the pathology along with the conventional glass slides can improve the understanding of the pathology without compromising the psychomotor skill of focusing the glass slides.

### Aim & Objectives

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**Objectives:**

1. To compare the learning outcomes of conventional method with digital learning method in histopathology practical classes.
2. To assess the student’s perception regarding new method of learning histopathology.

**Methodology**

This study is an educational intervention study carried over the period of 5 months from September 2023 to January 2024 on a batch of 150 students of 2<sup>nd</sup> year M.B.B.S studying at Atal Bihari Vajpayee Government medical college Vidisha (M.P).

For new method of teaching histopathology; High quality histopathology slides were converted into digital histopathology images using research microscope with software under 100X & 400X magnifications. 150 students were divided into two batches each having 75 students, at a time 75 students came for practical classes in a week (Batch A) which were followed by another 75 students next day for the practical class (Batch B). In conventional method, the practical classes are taken by briefing the

Gross and Microscopic changes through lecture and slides were distributed to the students to focus it and see the pathological changes, while in this newer method pre practical briefing was followed by showing the digital images of histopathology specimens and digital images of the histopathology slide on LCD. Then, glass slides are distributed to the students and then students are allowed to focus it and see the microscopic changes. Control group (Batch A) was taught the same topic by the conventional method and the Study group (Batch B) by the newer hybrid method, evaluation was done at the end in the form of questionnaire. After each session we crossover the groups, now the control group becomes the study group and vice versa, Assessment in the form of questionnaire was taken. This process was followed for five months.

Implementation of digitalized learning was assessed by using a question-based survey. Responses were based on the questionnaire provided to the students and perception was assessed on Likert scale of 1-5 (strongly disagree, disagree, agree, strongly agree & neutral). The statistical analysis was done to analyze the collected data.

**FLOW CHART**

150 students dived in to batch A, B (75 each after randomization)		
Session-1		
conventional method		Hsybrid method
Batch A	cross over	Batch B
Batch B		Batch A
Session-2		
Batch- A	Cross Over	Batch- B
Batch- B	Session 3	Batch- A
Batch- A	Cross Over	Batch- B
Batch -B		Batch- A
This will be continued for 5 months.		

**Figure 1:**

Permission was taken by Institutional Ethical Committee. To carry out the study.

**Inclusion criteria:** 150 students were taken in this study. Voluntary informed consent of the students by the junior faculty and those willing to participate were included in the study.

**Exclusion criteria:** Students not willing to participate/ absent/had fallen sick during the study period were excluded from the study.

**Type of consent:** written consent

#### Data collection method

1. Questionnaire (The process of validation of questionnaires was done by involving internal & external expert)

#### 2. Likert scale

**Statistical Analysis:** Quantitative analysis: Data was collected and entered in Microsoft excel. Data was analysed for comparison of mean test scores obtained by conventional and digital method; unpaired t test was applied in which  $P < 0.001$  which is highly significant.

Qualitative analysis: Feedback for perception analysis was done on Likert Scale

#### Results

Table 1- shows comparison of average test scores obtained by the students during five months duration between two groups.

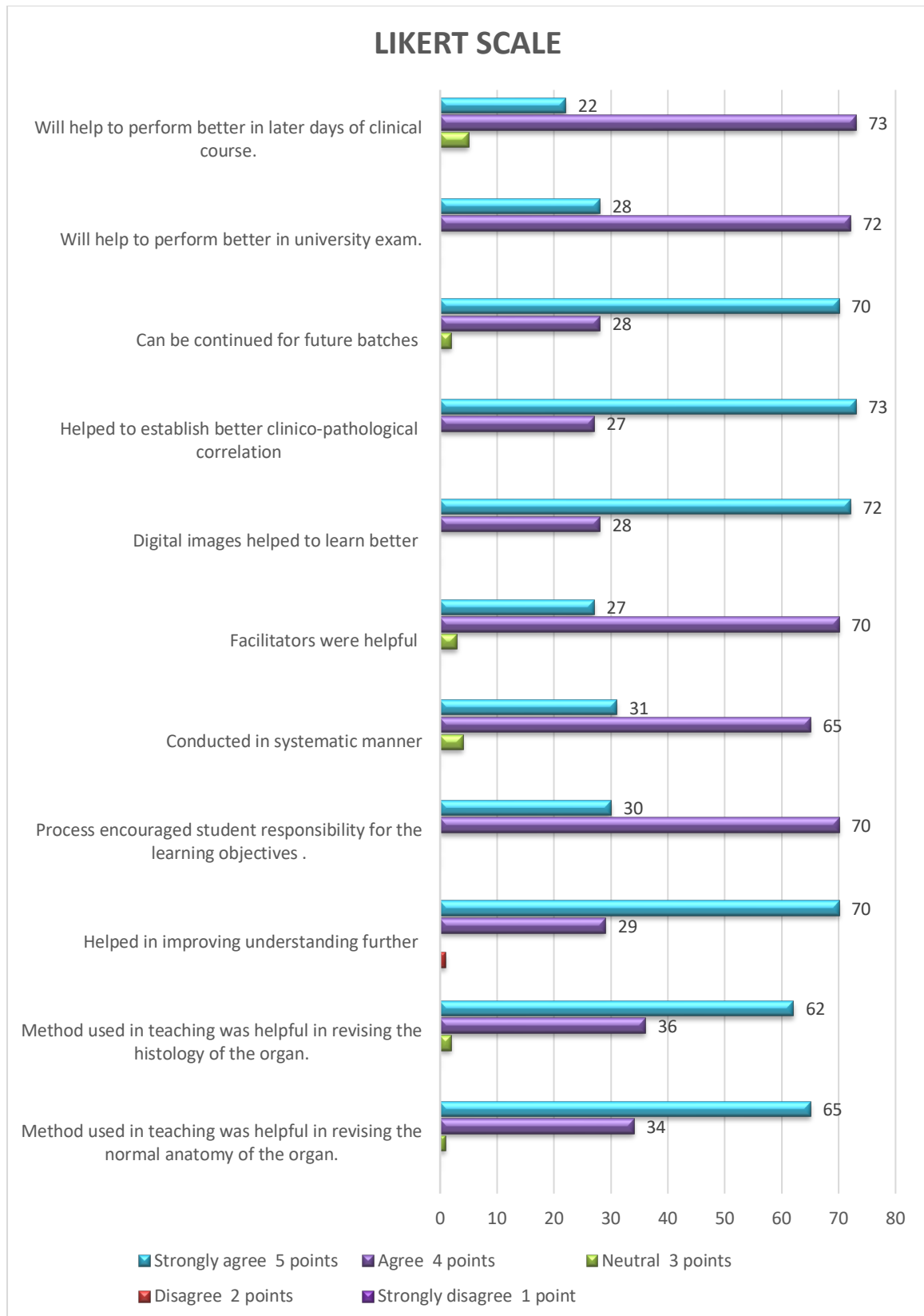
**Table 2:**

Type of teaching method used	Group A	Group B	P Value
Conventional method	9.54 ± 3.15	8.52±2.57	0.0314
Digital method	13.92 ±2.81	12.64±2.63	<0.001
P value	<0.001	<0.001	

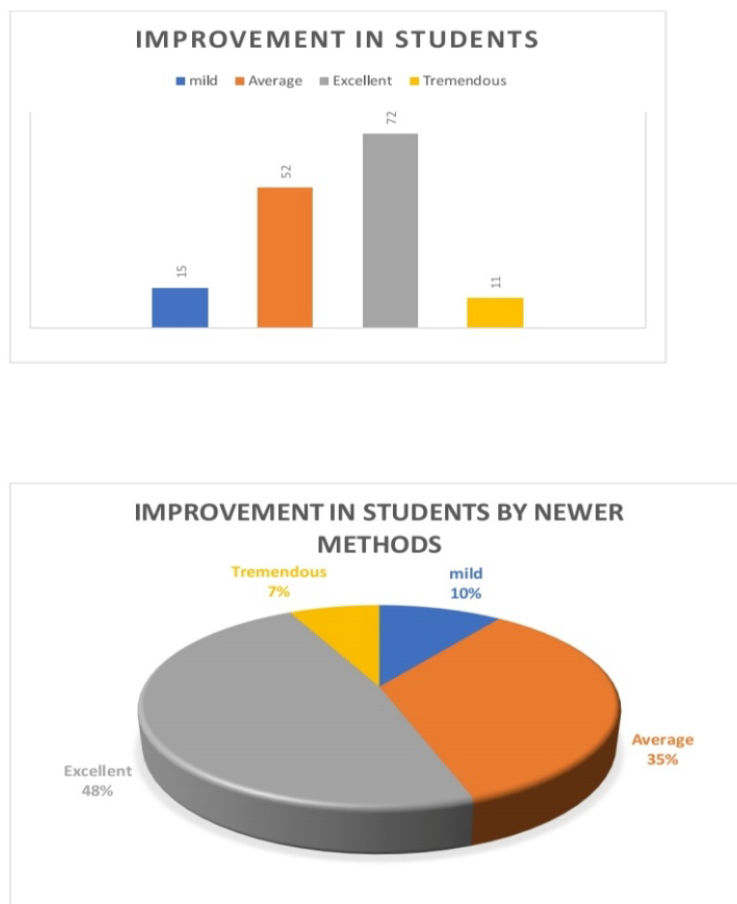
Two groups of students were made namely A & B comprising of 75 students in each. Both the groups have been individually exposed to the conventional method as well as the digital teaching method. After each method an assessment test and the marks obtained were compared by unpaired t test and p value turned out to be highly significant in the favour of the digital method of teaching.

**Table 2: Feedback of students on Likert scale**

S no		Strongly disagree 1 point	Disagree 2 points	Neutral 3 points	Agree 4 points	Strongly agree 5 points
1.	Method used in teaching was helpful in revising the normal anatomy of the organ	0(0%)	0(0%)	2(1 %)	51 (34%)	97 (65 %)
2.	Method used in teaching was helpful in revising the histology of the organ.	0(0%)	0(0%)	3(2%)	36(36%)	91 (62%)
3.	Helped in improving understanding further	0(0%)	2(1%)	0(0%)	43 (29%)	105 (70%)
4.	Process encouraged student responsibility for the learning objectives.	0(0%)	0(0%)	0(0%)	105 (70%)	45 (30%)
5.	Conducted in systematic manner	0(0%)	0(0%)	6 (4%)	97 (65%)	47(31%)
6.	Facilitators were helpful	0(0%)	0(0%)	4 (3%)	105 (70%)	41 (27%)
7.	Digital images of slides and specimen images helped to learn better.	0(0%)	0(0%)	0(0%)	42 (28%)	108 (72%)
8.	Helped to establish better clinico-pathological correlation.	0(0%)	0(0%)	0(0%)	41 (27%)	109 (73%)
9.	Can be continued for future batches.	0(0%)	0(0%)	3 (2%)	42 (28%)	105 (70%)
10.	Will help to perform better in university exam.	0(0%)	0(0%)	0(0%)	108(72%)	42 (28%)
11.	Will help to perform better in later days of clinical course.	0(0%)	0(0%)	8 (5%)	109 (73%)	33 (22%)



**Figure 2: Showing distribution of parameters of Likert scale**



**Figure 3: Showing improvement of scores in the test after implementing digital method**

### Discussion

Education & training in histology, histopathology & cytopathology remains essential in undergraduates & post graduates. In most of the colleges histopathology of the lesion is taught through conventional glass slides, where most of the time teacher focus the slides and student sees the marked area, but most of the student couldn't understand any component of the lesion except the blue and pink stains used in the slide, some of them leave the practical class without even focusing the slide. Providing simultaneous picture of the digital images of the specimens and slides will help in the better understanding of the lesion, student's interest will develop in focusing the areas which are shown in the digital images. If the images of specimens are also shown to them with the microscopy, it will help in establishing the better clinico-pathological Correlation [1-4].

In brief, use of digital images will provide a better understanding of the disease. Though digital pathology has drastically grown over the last 10 years & has created opportunities to support specialists, few have attempted to address its full implementa-

tion in routine clinical practice also. [5]. Digital microscopy has become a useful alternative to conventional light microscopy; several approaches have been used to evaluate students' performance & perception. Digital microscopy has created enormous opportunities in pathology training & education [6]. Students can learn key histopathological skills to identify the areas of diagnostic relevance from an entire slide by the help of digital slides. New medical curriculum requires teaching to move into a more digital imaging form in this digital era. Improvements have been made to move from passive highly detailed teaching of these studies to a more functional & clinically relevant method [7-8]. Digital microscopy has been introduced as a new aid of demonstration of histopathology slides at several medical schools. It has an advantage over traditional microscope in its accessibility, easy to use over long term without losing their staining quality; images can be shared with the students for revision as well. [9-11].

### Conclusion

Teaching histopathology with the conventional glass slides along with digital images is emerging to

be the better teaching learning method, without compromising the techniques that student should be acquainted with like focusing the microscope. This new teaching approach has enabled large teaching groups with equal opportunity to see high quality slides.

Time management was found to be effective while conducting practical & OSPE exams also with this new technique.

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