

## Effectiveness of Video Assisted Learning in Histology among 1st Year Medical Undergraduate Students

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### Abstract

*It is observed that social media and digital platforms like Youtube are highly popular among the Gen Z learners. Histology is that part of Anatomy which is often neglected by the 1<sup>st</sup> year MBBS students. They often find it difficult especially the practical part where they have to identify the histology slides. This study was done to assess the effectiveness of YouTube as an adjunct tool for 1<sup>st</sup> year MBBS students. **Materials & Methods:** Two units of histology was chosen. The lecture class for both units were taken in regular manner. For unit 1 videos were shown before the regular practical classes and for unit 2, the videos were not shown. The students were assessed regarding their identification immediately after completion and 10 days after the completion of unit. The knowledge component was assessed. Student's feedback was collected by Likert's scale. **Results:** The mean score obtained by the students in identification test of unit 1 (with video) was 3.87 with a standard deviation of  $\pm 1.02$  whereas the mean score of unit 2 was 3.04 with a standard deviation of  $\pm 1.07$ . About 60% of students opined that the videos help in easier identification of slides and in memorising them. **Discussion:** The critical shortcoming in histology is the gap in student theory and practical knowledge. Videos can be as useful adjunct especially for the present generation. Planning of the content and creating it by the subject experts will ensure credibility.*

**Keywords:** Histology, YouTube<sup>TM</sup>, educational video, slide identification

### BACKGROUND

Histology, the microscopic study of tissues and organs is the science that provides the adequate learning of the tissue organization of the body, and is a fundamental part of medical education. Histology is taught as part of Anatomy in the basic science module during the first year of medical school in India. It provides an important basis for subsequent subjects in the clinical phase of the study, e.g. Pathology. Its teaching has however been influenced by novel approaches to keep with the trend of the new curricular changes.

Histology is often considered to be the branch of Anatomy that emphasizes the structural organization of tissues and provide together different perspectives to medicine.(1,2)

It has traditionally been taught in a lecture-laboratory based format in which the teachers use microscopes for demonstration. It consisted of didactic lectures given in the classrooms and then followed by laboratory practical where students are expected to master the microscopic features and functions of various tissues and organs by themselves.

YouTube has emerged as a growing educational resource for medical learners and educators. YouTube is a video-sharing website that was officially launched in 2005. Via this platform, users can create their own channels, view, upload, and share video clips at no cost. (3) It is the largest video sharing site and is highly effective as an educational tool in e-learning environments and blended courses. The advances in the digital technology, easy availability of smart phone with good internet and the ability to learn at their own pace without restrictions of time or place has made it popular among the 'Gen Z' learners. (4)

The present generation of students are termed as the "millennial" or "YouTube Generation" and have their own attitudes, expectations, and learning styles. Pedagogically accommodating these learning styles and preferences is central for achieving an optimal educational outcome. Utilization of computer- and web-assisted techniques and videos in teaching these digital native students denotes a quantum leap in anatomy education. Various studies reported a positive impact of implementing these activities into curriculum especially where the practical knowledge is must for learning.(1,5)

This study was done to evaluate the impact of YouTube videos to enhance the learning of histology, especially in the practical aspect.

#### **MATERIALS AND METHOD:**

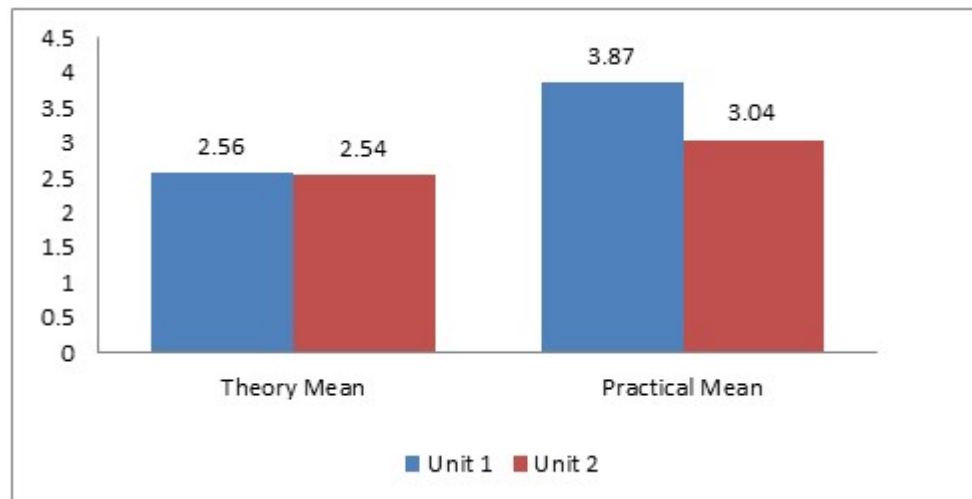
This study was conducted in our college among 250 first year medical students. Institutional ethical clearance was obtained for the study. All students gave their informed consent for their participation in this study.

The study was done during the histology practical sessions for gastrointestinal system, renal system and reproductive system. The gastrointestinal system was taken as 1 unit (Unit 1) and the reproductive with renal as another (Unit 2) as both the units have 9 slides each for practical demonstration. The theory classes were taken in a regular manner for the large group for both units. The practical session for both units was taken in small groups. For Unit 1 "YouTube" video by VBS HistoMed was played followed by the demonstration under microscopes. The students were allowed to study the slide and draw it in their records. At the end of practical session, the students had a test to identify the slides and these scores were tabulated. For Unit 2, the practicals were conducted in traditional manner with microscopic demonstration of slides. The students studied the slides, drew in their records and had a test to identify the slides at the end of practical session like that in unit. These scores were also tabulated. To test the long term retention a theory test was conducted after 10 days of completing the practical class. In this test there were 2 questions from both units carrying 5 marks each. These answers were evaluated and the scores tabulated. The students were asked about the usage of YouTube for learning histology before the study and also an anonymous questionnaire asking their feedback on the usefulness of video assisted histology learning using Likert's scale. The statistical analysis was done to analyse the scores obtained.

#### **RESULTS**

All the 250 students participated in the study out of which 7 students were absent on the day of theory exam. The students had to identify 5 slides in the practical test for both units. The mean score obtained by the students in theory test of unit 1 was 2.56 with a Standard deviation of 1.31 & unit 2 was 2.53 with standard deviation of 1.26, while the practical test of unit 1 (with video) was 3.87 with a standard deviation of 1.02 whereas the mean score of unit 2 was 3.04 with a standard deviation of 1.07.

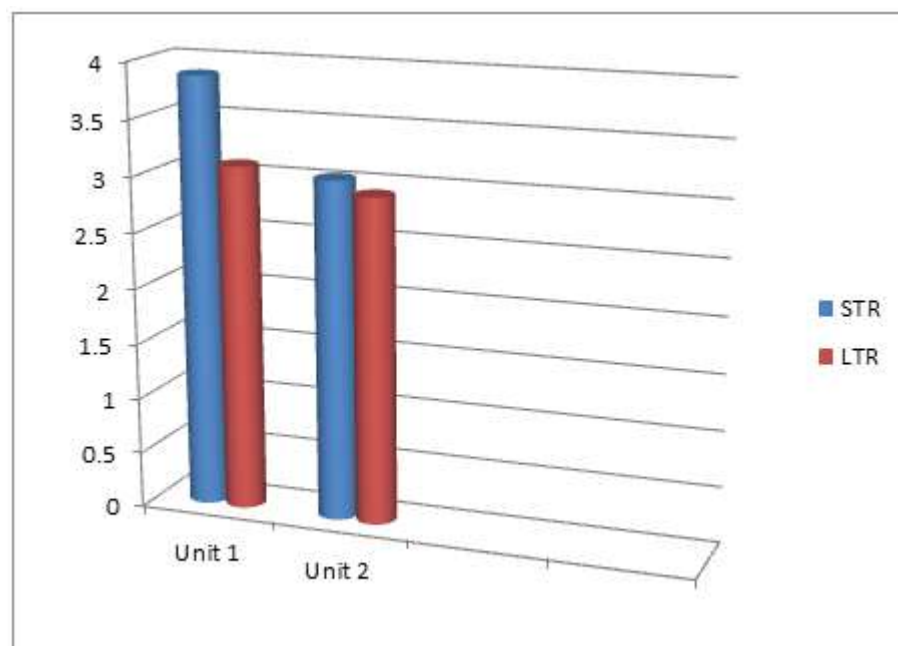
The graph 1 shows the mean of the marks scored by students in unit 1 & unit 2.



**Graph 1:** Mean marks of students in Unit 1 & Unit 2

Large sample 'Z' test was done to analyse the mean scores of both theory and practicals for both the units. For theory the value was 11.43 which is not statistically significant. For the practical the value was 93.47 which is statistically significant at 1%.

To test the long term retention, slide identification test was done after 10 days. The mean score of unit 1 was 3.1 and unit 2 was 2.92. Graph 2 shows the comparison of the scores obtained immediately and after 10 days



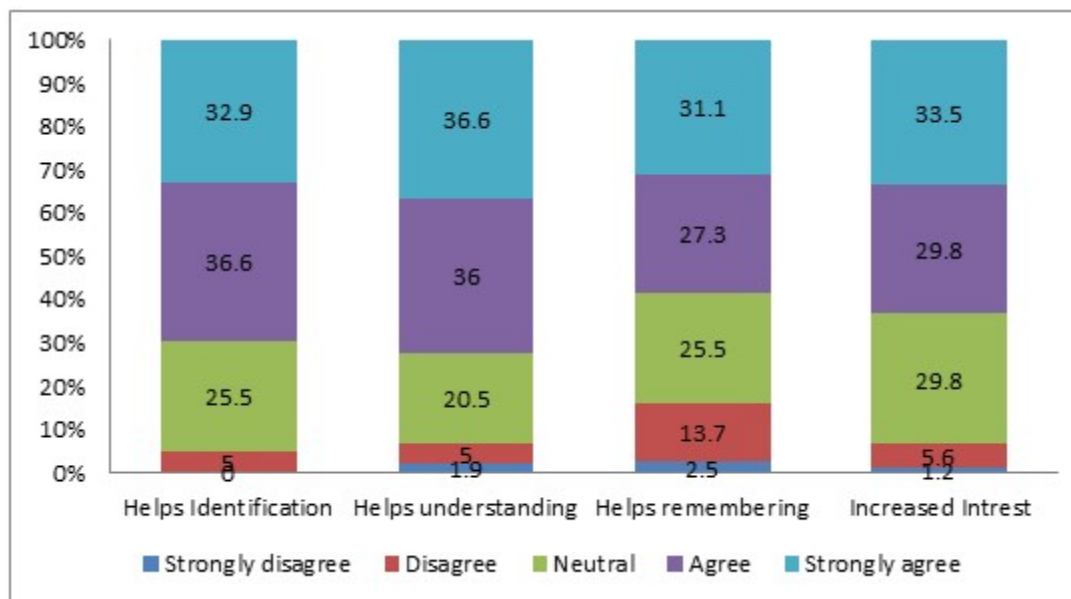
(STR – Short Term Retention, LTR – Long Term Retention)

**Graph 2:** Short term and long term retention of students in Unit 1 & Unit 2

When asked about the usage of You Tube by the students for learning histology or other branches of Anatomy -13.3% used it for histology, 47.9% for embryology, 72.3% for histology and 69.8% for gross anatomy.

The feedback from students was collected asking the usefulness and relevance as perceived by them using a

Likert's scale. The responses are summarised in Graph 3.



**Graph 2:** Feedback from students in Likert's scale

The students were asked on why they found the instructional videos useful. The responses are summarised in table 1.

**Table 1:** Reasons for usefulness of instructional videos as expressed in percentage

Reasons	Percentage (%)
Multiple Powers & comparison	55.3
Different Views & angles	46
Labelled parts with pointers	47.8
Differentiating points between confusing slides	47.2

Students also opined that an institutional video of the slides in the department would aid them in the better understanding. We are in a process of integrating it with the You Tube channel which our college already has with theory classes.

## DISCUSSION

Histology practicals in India traditionally are taught by one of the following methods.

1. **Instructor guided learning**–This is guided in a step-by-step fashion by the instructor. The instructor focuses a specific structure and places the ocular pointer while using a specified magnification. The students are instructed to try and focus the same on their microscopes. The instructor then goes to the students' work stations to check the accuracy. If a student fails to find the correct structure, the instructor corrects the student & guides as needed. The instructor moves to the next part of slide or another slide once the students are able to focus the slides by themselves. (6)

Advantages of this method include the fact the students receive the instructor's direct supervision and guidance at each step in the discovery process with one to one interaction. The instructor can therefore easily identify students who are having difficulties with the subject and difficulties using a microscope. Disadvantages include the fact that this method is very time consuming, requires the instructor to be continually moving from one students' work station to another and even a single student if not managed properly can disrupt and hold back the forward progress of the entire class. One major problem that students encounter is that they may have forgotten the theories taught during lectures before they attend their histology

practical classes several days later. (7)

2. **Learning with preset microscope** - Microscopes are set up in the laboratory with slides in place each showing a good field of view, at an appropriate magnification with supplemental information if necessary. Each student visits each preset microscope to study the slides along with any supplemental material present and draw the tissues. The students need to be instructed how to use the fine focus adjustment on the microscopes and told not to move the slide and not to change the magnification.(8)

Advantages of this method are that it is less time consuming. The likelihood of students studying the wrong areas on the slides is lesser and when they draw students need to closely observe the tissues. When the drawings are done properly, this method often helps students retain mental images of the tissues and learn their distinguishing histological features. The disadvantage is the students accidentally moving the preset field of view. Also sometimes students either have to wait while others are at the microscopes or they feel pressure to rush through their work when they are using the microscopes because other students are waiting.

Students often experience difficulty in learning histology especially in the practical, because of their lack of experience with microscopy, the complexity of histological images, and the difficulty of integrating the knowledge obtained through lectures with what is seen through microscope.(9,10)

3. **Learning with Digitized Imaging**– Histological slides are projected on a screen (e.g., projector screen, video monitor screen, or computer screens) using microscopes coupled to a digital camera in the classroom. The instructor guides all the students at the same time, pointing out on the images the primary and distinguishing anatomical features of each tissue.

Advantages of this method include saving time by not having the students use microscopes and slides, focusing the students' attention on a single classroom activity guided by the instructor, providing the opportunity for students to see and hear the instructor's explanations of the tissues, having structured classroom time in which students can ask questions and there can be classroom dialogue, eliminating the likelihood of students studying the wrong slides and the wrong areas on their slides. Disadvantages include losing the valuable opportunity for students to have hands-on experience with microscopy and not being directly involved in the discovery process.(11,12)

There is a critical shortcoming in all formats which is the gap between theoretical study and practical application in laboratory. During the lecture, the teacher explains the microstructures of tissues and cells based on pictures in the textbooks, which would not immediately impact on the students in the classroom. This in turn could make it difficult for students to understand the theory of the histological structures being taught. Teachers may have to repeat the theoretical content when students attend the histology practice -since there is a time lag between the lecture and following practice.(6)

There have been studies in some institutions where they have integrated the theory and practical classes for histology with an improved result. There the identification was done with computer images and not microscopy focussing (virtual microscopy). Even with that for strength of 250, the method would not be effective and will require more resources especially the faculty. Also students lose the sense of dimensions in regards to the slides they are viewing.(11,13)

You Tube is only an adjunct and can be used as an excellent bridge between histology theory and practicals. In accordance with previous studies, our study concludes that You Tube is not just a media used for entertainment but a good educational tool as well as it is a popular media used by the students to learn various aspects. YouTube can be considered as an effective tool to enhance anatomy instruction if the videos are scrutinized, diversified, and aimed toward course objectives. (14) In our study there was a statistically significant difference in the practical identification of the slide which was the purpose of our study. Though there was no statistical significance in the theory marks with the videos, we believe this will help them in future especially in pathology. Most of the studies about You Tube and Histology done before did not include assessment part. It was only qualitative where the perception of the students was surveyed, whereas our study



took both their knowledge attained – as perceived by marks attained and their perceptions into consideration.

In Anatomy the popularity of You Tube is more in concept based areas like embryology and histology. While embryology needs a 3D imagination by the student and histology needs more visual stimulus to remember. A student who grew up in a technological environment, surrounded by computers, laptops, smartphones, and iPads, is certainly very different from one whose books at the library were his/her main educational resource. Thus, one can predict that a traditional, old-fashioned lecture in which the presenter relies on using a chalkboard, for example, is most probably far from the expectations of these digital native students.(1,15) So it is very important for medical teachers to modify themselves & use media in educating the students. Faculty of average computer literacy should be enabled to produce videos on their own YouTube channels to support independent learning and integration in a PBL curriculum.

As perceived by students, successful anatomy learning involves various combinations of memorization, understanding, and visualization. Actually, videos are suggested to have a positive impact on these mental processes. This suggestion is fortified by the results of a study in which videos uploaded to an anatomy YouTube channel were reported to be helpful in creating memorable visual images. (16,17) Although there has been very little research addressing the question of teaching method with assessment and student knowledge, some recent data suggest that the technology used in the laboratory may not be a very big factor in student performance on course level assessments of histology knowledge.

Tools for better learning of human anatomy based on evolving technologies are being actively sought and evaluated. Nevertheless there is no consensus on the best methods for teaching of human anatomy. (18) Very few research in the literature exists on the use of YouTube as a platform for human anatomy education. The use of online social networks in medical education could change and improve human anatomy teaching and learning; one such network is the video-sharing site YouTube.(19) Prior to this study, there has been very little research that addressed these trends in histology laboratory teaching in India.

The new era of cloud computing and huge video sharing communities involves additional cautions as many videos are uploaded by no specialists in human anatomy and contain deficient human anatomical content coverage and unclear information. Planning is the most important stage of the process. The planning stage must be given due care and attention so that appropriate video is downloaded and shown to the students.(20,21) We selected the histology videos from VBS HistoMed by the well known Anatomy Professor Dr Balasubramanyam as we found it accurate and in a simple language. These are used as the lab warm up sessions and have been perceived much better than to the lab warm up using chalk and talk or PowerPoint which we used to do before.

During the last years the educators have observed a paradigm shift toward the use of web and user-generated content especially social media websites like Face book, YouTube, Twitter, Flickr, and Instagram. Because of their popularity, availability, and users' acceptance, several studies postulated that a beneficial educational role could be played by such websites.(1) Videos when properly embedded within the curriculum make learning subjects such as histology much more engaging for medical students, possibly as they include visual and auditory stimulation, coupled with ease of access for the learner. Video usage empowers the medical students to learn in an active manner. (22) The web based technology had become an integral part of everyday life and undoubtedly influences in the way medical student learn. The proliferation and continued adoption of web based technology has increase new learning opportunity in human anatomy education outside conventional instructional setting.(23)

Video as an aid saves time. By focusing the students' attention on a single classroom activity guided by the instructor, they are provided with the opportunity to see and hear the instructor's explanations of the tissues. Helping students form proper mental models is an important task for educators. Videos can help students overcome the visuo spatial and temporal barriers inherent in static depictions. In the Competency based curriculum it will help in achieving the competency by covering both knows how & show how part.(24,25)

## CONCLUSION

As educators who know that change is the only constant, we should adopt the emerging educational tools including YouTube. This tool has the power to captivate digital native students and enhance their anatomy learning. Since the available YouTube anatomy-related content is deemed inadequate, the responsibility of creating new content that fully exploits the potential offered. YouTube has the potential to play a valuable role in sowing the seeds of a fruitful histological knowledge that can be successfully applied in clinical practice. Medical students are used to this platform which can be used in augmenting their anatomy learning. As perceived by the majority of them, YouTube videos can potentiate understanding, memorization, and recall of anatomical information leading to a good learner's satisfaction.

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