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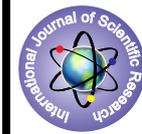
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A Simple Teaching Module For Histology: Integration Of Traditional Hands-On Laboratory Methods And Modern Computer Technology.



Biotechnology

KEYWORDS : Cat ions, Anions, Soda Lakes, Saline, Sodium sulphate

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ABSTRACT

With the reduction of teaching time for traditional laboratory course in Histology, it has become important to keep the teaching concept-based, and yet maintain a hands-on laboratory experience sufficient to ensure academic integrity of the course. This need led us to develop some simple and effective supplemental teaching aid that involved integration of traditional laboratory exposure and the use of computers. Here we present a module for teaching of histology. Digital images of our own laboratory slides were taken, and Adobe Photoshop software was used to edit and label them. These images were shown during the didactic lectures. A quick review of the important features was done during the pre-laboratory 'dark room' session. Also, soft copies of the same were sent to the students on their registered e-mail IDs. Students reported significant enhancement in the independence and proficiency of learning histology. However, the importance of a hands-on laboratory experience cannot be over-emphasized. Use of modern technology is only a supplement to traditional teaching-learning methods..

Introduction

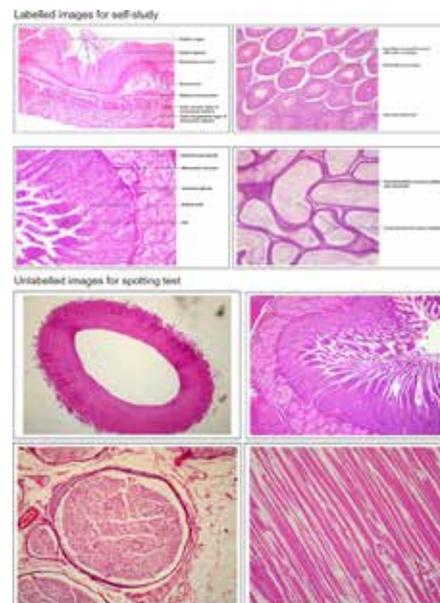
In the academic year of 1998, the Maharashtra University of Health Sciences introduced a new curriculum for undergraduate medical students, wherein the duration of pre-clinical course was reduced from three semesters to two semesters. The revised medical teaching curriculum placed severe constraints upon the time available for the teaching of traditional laboratory courses in the sub-disciplines of Anatomy (1, 2, 4). A 30% reduction in the time available for laboratory study of histology made it imperative to evolve creative approaches to teaching the subject. While evolving such approaches it was important to maintain the academic integrity of the course, to maintain a hands-on laboratory experience sufficient to ensure imbibing lecture concepts in the laboratory, and to prepare them for the pathology laboratory course that follows in the second year. In order to achieve these goals, we prepared power point presentations of labeled digital images of our own histology slides, that could be shown to the students during didactic lectures and 'dark room' sessions, as well as sent to the students through e-mail, for self-study at home, as per individual convenience.

Traditionally, histology is taught through didactic lectures, followed by a laboratory session, wherein students see the permanent slides of tissues under the microscope. The figures shown in the lectures are taken from textbooks, showing fine features that are rarely reproducible in slides prepared in standard histology laboratories. This leads to great confusion in the minds of the students, and makes it difficult for them to identify even basic tissues. In order to overcome this limitation, and to accommodate reduced time schedules, we considered using digital images of our own laboratory-prepared slides as the teaching material for our histology course. Hence, we prepared digital photo-micrographic exhibits in self-study modules prepared from traditional laboratory slides. Thus, the didactic lecture is followed by a detailed pre-laboratory 'dark room' orientation session, which is then followed by the actual 'hands on' laboratory experience. We present here our continuing experience with this teaching methodology developed for simplifying the study of histology.

Methodology

Traditionally prepared, good quality histology slides were selected for digital photography. With the use of an Olympus BX-41TF microscope, fitted with an Olympus E330 digital camera, the area/field of the slide showing typical identifying features of the given tissue were focused. Using magnifications of 4X, 10X and 40X, digital images were taken.

The digital images were uploaded on to a personal computer, and using Adobe Photoshop software, the images were edited and relevant/important structures were labeled. Subsequently, power point presentations (PPT) of the organs, arranged into organ systems were prepared. Similarly, images of basic tissues were organized into PPTs.



Results

In order to achieve high levels of comprehension by the students within the time constraints, it is important that the students maintain faithful lecture attendance, as well as attend the 'dark room' session immediately preceding the assigned laboratory. Histology lectures are held for the first year M.B.B.S. students, once in a week, on Wednesday. After this lecture, a batch of fifty students attends the 'dark room' session, conducted in a Demonstration room, close to the histology laboratory. The session lasts 10-15 minutes and consists of a review of structural features and hallmark identifiers of the tissues/organs to be studied in the particular laboratory session. This session is accomplished by an integrated presentation of the edited digital images of our own slide box material. The students are now well-informed and equipped to move more efficiently and effectively through the day's laboratory exercises.

In the post-lunch session, the 'dark room' session and laboratory exercise is repeated for the remaining 50 students. Thus each group of students gets a review of important structural aspects before the actual laboratory experience.

Since the digital images that the students have seen in the lecture and in the dark room session have been taken from our own slides, the students are immediately at ease during the laboratory exercise, and can easily identify the important structural features, without the need of much assistance from the

faculty members.

All our first year medical students have registered e-mail IDs. During the course of the academic year, as the topics are covered in the class, the students are sent e-mails of the PPTs of the last taught topic. This allows them to review course material at home, on their personal computers or mobile handsets, as per individual convenience. Before assessments/exams, we send e-mails of spotting tests prepared in a PPT format, except that the digital images are unlabelled. Students reported that identification of structures under the microscope was simple and straightforward since they were already familiar with the digital images of the same. Also, the e-mailed PPTs were reported to be a handy self-study tool.

Discussion

Computers can be a very convenient and effective format to display/communicate anatomical images. A wide variety of course material can be uploaded by the faculty and transferred to the students in this manner. In the US and Canadian medical schools, computers have been in use for teaching gross anatomy for more than 12 years (2). In India, with the increasing availability of computers and internet facility in medical colleges, and that of laptops and/or mobile phones among the student community, this can be a very convenient method of dissemination

of information. We have recently reported the use of computers for teaching brain sections (5). Increasing emphasis on computer-based learning in histology has given students the option of reviewing the topic from home, based on their personalized study preferences and learning styles (3).

Thus, study of histology can be done in the following sequence:

1. Attending didactic lecture and dark room session.
2. Transferring this information and extending their observations by using a combination of color prints of digital images and the through-focus capability of the light microscope.
3. Reviewing the material repeatedly, as per individual requirement and convenience, by viewing digital images received through e-mail.
4. Self-testing, by identifying tissues/organs from unlabelled digital images in the 'digital' spotting tests.

Conclusion

We have observed that combining traditional methods of study of histology and the use of computers enhances learning. However, the importance of hands-on use of microscopes cannot be over-emphasized. Use of modern computer technology is only a supplement to traditional teaching-learning methods. Technology should not be used to eradicate/replace traditional teaching methods, but only as a supplemental learning aid.

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