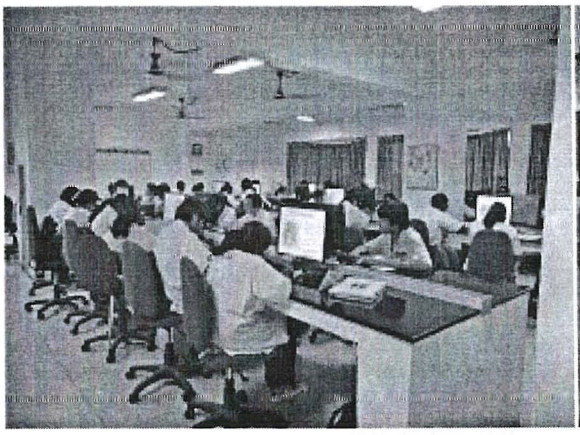
# TRANSITION OF HISTOLOGY PRACTICAL TEACHING FROM LIGHT TO VIRTUAL MICROSCOPIC METHOD

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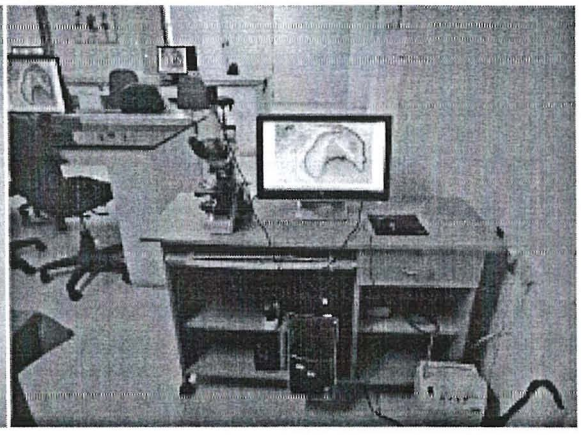
At present the oral and general histology practical classes for I BDS and I MBBS students in dental and medical colleges are taught by using light microscopy. In the Penang international dental college, Salem (PIDC), the teaching of histology practicals have been changed totally from light microscopic method to virtual microscopic method. The detailed plan for such a change over and the advantages of virtual microscopy, are explained in this paper.

For a dental or medical college with 100 admissions, the histology practical classes consist of 50 students being taught at a time, as 50 in oral histology and 50 in tooth morphology or 50 in general histology and 50 in osteology. In the new laboratory, 2 students are provided with 1 monitor at the existing laboratory table itself. 25 LCD square colour monitors of 19" size are installed in the laboratory for 50 students. It is advisable to provide square monitors, as an elongation of the picture was observed in the standard rectangular monitors on both sides, which causes loss of quality. There is a central computer through which the slides are projected simultaneously to all the 25 monitors. The existing glass slides have been digitized using a trinocular microscope with facilities for digital and video recording of microscopic pictures.

This change over to virtual microscopy has totally eliminated the use of microscopes in PIDC. The relationship of the computer to the monitor is based on server - client and is network based. The computer used is a standard Dell with dual core processor / 4 GB RAM. The monitors are not provided with keyboards but have minor adjustments for brightness, colour and contrast that is routinely built in all the monitors. The LCD monitors could be termed as dumb terminals, since the students cannot adjust the same, except for marginal increase or decrease in colour and contrast. Pre digitized microscopic slide pictures are projected from the central computer and are observed by the students in the monitors. The quality of the microscopic picture transmission to all



***Picture shows the histology laboratory having a trinocular microscope, computer and monitors.***



***Picture shows the virtual microscopic histology laboratory with monitors***

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the 25 terminals is excellent. The students in practical classes are usually taught in three steps, which are maintained. In the first step, the theory is explained with the use of microscopic picture by the teacher. In the second step, the microscopic picture that needs to be drawn in the laboratory record notebook is projected, which is used by the students to see and draw. The histological parts that need to be drawn in the laboratory pictures are already marked in the picture. In the third step, the salient features of a microscopic picture, which a student should learn are written down and projected.

I am enumerating below the numerous advantages of the virtual microscopic method:

1. All the student microscopes are replaced by LCD monitors. The cost of repairs and maintenance for the monitors is minimal.
2. All microscopic slides are replaced as images which are captured and stored in the computer. Breakage or damage to slides is eliminated, as there is no need to handle or adjust the slides or microscopes.
3. The colour of the original slide does not fade away in computer images, thereby maintaining the quality of teaching for years.
4. The microscopic images of the slides can be captured either in 10 x or 40 x or any other magnification, as required.
5. The qualities of the pictures seen in all the monitors are of the same standard and the time taken to draw the laboratory record pictures is drastically reduced.
6. The concentration of the students is much more, as the classes are held with the lights on.
7. The teaching is by a single senior teacher and hence the chances for errors are eliminated.
8. Slide changing is easy, which provides more time for expanded teaching on site.
9. Slides can be projected either as digitized prerecorded images or as live images focused by the teacher during the class using the trinocular microscope.
10. Videos can be projected either as pre recorded images or as live by the teacher during the class using the trinocular microscope.
11. During prerecording or live teaching, the microscopic slide picture can be adjusted for light, colour and contrast, in the computer, if desired. However, the projected image is always uniform in all the monitors.
12. The time taken to setup a class is reduced to minimum as focusing in different student microscopes by the teacher is dispensed with.
13. The examination pattern remains unchanged. The external examiner shall still continue to select the microscopic image (slide) from the available stock of computer images (slides), with provision for immediate transfer of the picture to a separate file. The time change between each slide of 3 to 5 minutes, can be fixed automatically in the computer, along with the buzzer sound. If necessary, questions can even be changed for each slide. There is no musical chair movement of students during the practical examinations as they sit in front of the monitor in the laboratory without moving for the next slide, while the slides change automatically.

The required expenditure for a complete change over in a college with 100 admissions, where each batch has 50 students can easily be discussed under three individual headings:

a) Capital Expenditure: The existing laboratories with the existing tables and chairs can be used. No additional capital expenditure is required.

b) Initial expenditure: 25 monitors (1 for 2 students), 19" square (Dell) LCD colour monitor at Rs. 8,400, costs Rs. 2,10,000/-. The complete laying including splitters cost Rs. 90,000/-. Thus a total expenditure of only Rs. 3 lakhs is required for a turn key project.

Note: All dental and medical colleges already have a Trinocular microscope with computer and accessories. The cost of a trinocular microscope

(PZRM 700 unomed) used in PIDC is Rs.60,000/- and a Dell computer is Rs. 40,000/- making a total expenditure of Rs. 1,00,000/-.

c) Maintance expenditure : Nil or minimal

The students are provided a pen drive which contains all the teaching images, laboratory record images marked with parts and laboratory record notes in the beginning of the course. This makes it easier for the students to review the microscopic picture after the class or at leisure. As all our students have individual laptops, there was no additional expenditure to the student.

The present Dental and Medical Council of India regulations suggest the goal of teaching histology as: "Study of microscopic structure and gain the knowledge to identify, integrate and interpret the anatomical structures and tissues". No departure has been envisaged from the goal of Dental and Medical Dental Council of India, in any manner. From the present method of teaching of the microscopic structure with light microscopy using individual microscopes, PIDC has moved to an advanced easier method of teaching by virtual microscopy using LCD colour monitors.

In the interest of imparting quality education, in a student friendly atmosphere, it is strongly recommended that the use of microscopes to teach histology is dispensed and replaced with LCD colour monitors as per the following suggested plan:

a) Colleges: It is easier to change at a cost of Rs. 3,00,000/- as an one time investment.

b) University, Dental and Medical Council of India:

   i) To change in all new colleges

   ii) To permit existing colleges who are willing to change.

   iii) To make it mandatory from 2016 admissions.

The additional advantages for University, Dental and Medical Council of India are:

i) The slides can be selected by well qualified teachers and digitized by the respective bodies, serving as a central service provider.

ii) The slides can then be supplied to all the colleges within their jurisdiction, to maintain uniform standards in teaching in all the colleges.

iii) In the event of a slide which needs to be changed, it could be done very easily.

iv) The colleges can be provided with a pen drive containing all the teaching materials.

v) The students can then be provided with a pen drive by the colleges containing all the teaching materials.

It is feasible to extend the virtual microscopic practical teaching to Physiology in I year, Pathology and Microbiology in II Year and Oral Pathology in III year, progressively.

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**Reference**

1. Weaker, F.J and Herbert, D.C. Transition of a dental histology course from light to virtual microscopy. Journal of Dental Education., 73, 10: 1213 – 21 October 2009.