

# Large Wet Lab Converted to Computer Lab for Studying Microscopic Anatomy



**Martha Langley Ankeny, M.Ed., David Birk, Ph.D.**



Academic & Instructional Support & Resources, Thomas Jefferson University, Philadelphia PA

## Abstract

Virtual microscopy has replaced microscopes representing a sea change in how microscopic anatomy is taught at Thomas Jefferson University (TJU).

The class of 2009 inaugurated virtual microscopy made possible by updating a wet laboratory with new computer stations. Virtual microscopy retains the learning features of microscopes while promoting the learning of relationships through small group interactions. Multi-station computers, equipped with new hardware technology that allows up to 5 monitors and keyboards to run from a single CPU, were installed providing a cost and space effective way to bring virtual microscopy to a large number of students in a small group setting.

Students have access to the same resources for independent study on the University's public computers available in a 24/7 computer lab and in the library.

Access to the lab manual with linked histology images along with individuals' saved images and linked textbook can be used at TJU's public computers.

## Project History

Faculty at Thomas Jefferson University Medical College wanted to provide virtual microscopy for first year medical students studying Histology. According to faculty, virtual microscopy retains the learning features of microscopes with students studying whole slides rather than isolated images thus promoting the learning of relationships.

The system utilizes magnifications ranging from 1X to 1000X with real time pan and zoom comparable to the way a microscope is utilized. However, the virtual approach allows for better control of slide quality, content and resolution. The virtual laboratory setting promotes learning through small group interactions and the materials are available for independent study.

A traditional wet lab was equipped with enough computer stations to accommodate half of the 255-member class, seating 2 students per station. Multi-station computers have been installed and are equipped with new hardware technology that allows up to 5 monitors and keyboards to run from a single CPU.

The new hardware technology provides a cost and space effective way to bring virtual microscope images to a large number of students. Only 13 computers, rather than 64, are needed because up to 10 students can be assigned per CPU rather than only 2.

Students have access to the same resources for independent study on the University's public computers available in a 24/7 computer lab as well as in Scott Memorial Library (SML). Access to the lab manual with linked histology images along with individuals' saved images can be used at SML's public computers as well as those available in the Learning Resources Center and small group study rooms.



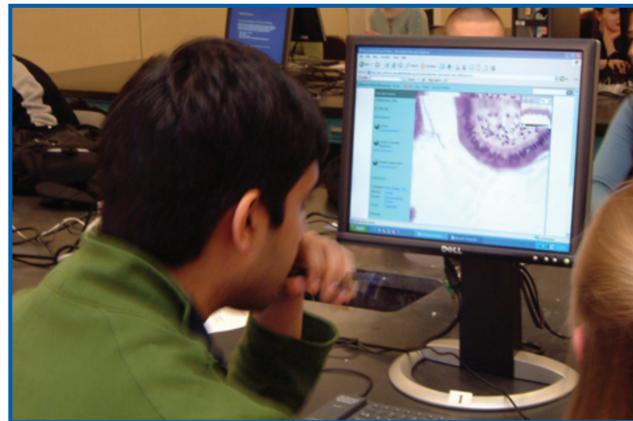
Students working individually with microscopes are less engaged with the assignments



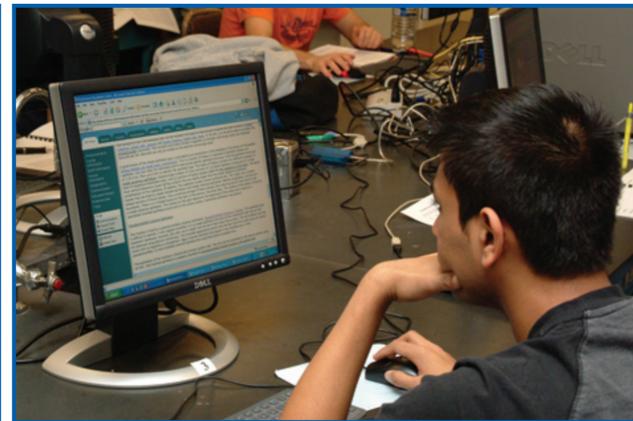
Students working in teams are engaged in active learning.



Professors are better able to interact with students and participate in their active learning.



Images have fine detail and can be annotated by professors and learners.



Interactive lab manuals provide links to images so students can seamlessly refer back and forth.



Interaction between students and professors becomes more engaging



Faculty spends far more time teaching and far less time troubleshooting equipment failure.

### Number of stations needed:

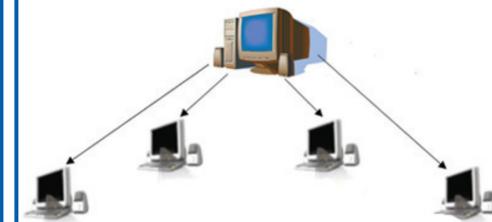
255 = Number of students in the class  
128 = half of the class  
64 = 2 students per station

### Comparison for 64 stations:

Standard Setup:	Using Special Hardware
64 *CPUs with monitors keyboards, mice	13 *CPUs 13 **ZLink cards 64 ***Monitors, keyboards, mice

\*Market prices of CPUs vary.  
\*\*ZLink cards cost approximately \$750/card  
\*\*\*Market prices for monitors, keyboards, and mice vary

The Technology:  
Special hardware allows for cost and space effective delivery of content over the network.  
1 slightly more powerful standard PC as host.  
1 ZeroLink card and DualOPS software.  
5 independent stations.



## Project Goals

- 1 Convert a traditional wet lab for use with virtual microscopy technology in a cost and space efficient way.
- 2 Provide lab access to half of the 255-member medical school class at a time.
- 3 Provide an interactive lab manual for students to use seamlessly with the images.

## Contact Information

Martha Langley Ankeny, M.Ed.  
Director of Learning Resources  
215.503.3124  
martha.ankeney@jefferson.edu

David Birk, Ph.D.  
Professor, Pathology, Anatomy,  
& Cell Biology  
215.503.7855  
david.birk@jefferson.edu

Thomas Jefferson University  
Philadelphia, PA 19107