



Use of Online Virtual Microscope to teach Pathology to Undergraduate Students in a Caribbean Medical School.

Dr Suvra Biswas

Associate Professor, St Matthews University School of Medicine, Grand Cayman, Cayman Islands.

Dr Amitabha Basu

Professor, St Matthews University School of Medicine, Grand Cayman, Cayman Islands.

ABSTRACT Virtual Microscopy is computer-based technology that offers the full range of traditional microscope functionality. We conducted a survey and a blindfolded test at St Matthew Medical University, Grand Cayman to identify the effectiveness of Laboratory sessions with Virtual microscopic slides.

At St Matthew Medical University, Grand Cayman we conducted a blindfold test among the fourth & fifth semester students of Pathology course to note how much they can recall about an image taught with virtual microscopy verses images taught with PowerPoint. It was followed by an online survey for their feedback on the benefit of this technology. Benefits of virtual microscopy to teach pathology was highly rated by over 90% of students. More students recall images when taught with Virtual microscopy after one semester. Nearly all medical students welcomed learning pathology via online virtual microscopy. This technology not only improves the student: faculty interaction but also help in demonstration of the histology with high quality images.

KEYWORDS :

Background

Fundamental knowledge of microscopic anatomy and pathology has always been an essential part in medical education. The traditional didactic concept comprises theoretical and practical lessons using a light microscope and glass slides. High-speed Internet connections and technical improvement in whole-slide digital microscopy (commonly termed "virtual microscopy") provide a new and attractive approach for both teachers and students. Virtual Microscopy is computer-based technology that offers the full range of traditional microscope functionality. Teaching pathology via digital microscopy is needed to overcome shortage of paraffin mounted glass slides, difficulty to maintain expensive microscopes and to take advantage of better resolution that can be achieved by virtual microscope with free choice of viewing areas and usage of computer by all students in our classroom. We conducted a survey and a blindfolded test at St Matthew University, Grand Cayman to identify whether an online virtual web-based slides can be used for delivering effective, practical pathology teaching to medical students.

Material & Method -

We present a review of pathology teaching with virtual microscopy, based on an analysis of students' acceptance. Two groups were reviewed with a total of 40 students between the 4th and 5th semester of medical studies (Spring and Summer of 2012 respectively) attending the theoretical & practical courses of general and systemic pathology who had access to both digitalized slide images and PowerPoint images.

This study was conducted in two parts-

In the first part of the study, prior to the block exams, students were asked to take an online assessment test which was a blindfold test to note how much they can recall about an image taught with this technology verses images taught with PowerPoint, where no magnification/field selection is available.

In the second part of the study an online survey with questionnaire was carried out via Moodle to collect feedback from fourth and fifth semester medical students on the importance of benefits and challenges of using virtual microscopy to teach pathology.

Results and Discussion

Forty students responded to this survey. Benefits of virtual microscopy to teach pathology was highly rated by over 90% of students. Many of them had used this technology before in their premed courses.

Students lauded higher quality images; faster learning, greater accessibility from home/library; and more opportunity for self-paced learning out-of-hours and the experience of a real microscopy. Challenges include slow internet speed, internet firewall used by school, or hazy images etc. Some students felt that they miss the actual

laboratory experience.

In both semesters, correct responses for the exam questions containing images taught in Virtual microscopy sessions were more than the questions containing images taught in PowerPoint slides (66% & 62% for 4th semester and 45% & 53% for 5th semester respectively - fig 2 & fig 3). Interestingly the difference between correct & incorrect responses is greater (18%) in fifth semester than the fourth semester (4%). It proves the long term benefit for students to memorize better after Virtual microscopy teaching.

Student responses indicate that learning pathology via online Virtual microscopic (VM) slides has a wide range of significant benefits but few significant challenges as well. Most of the medical students participating in the survey agreed that learning experience was better with online Virtual microscopy over traditional microscopy; having higher quality images, faster learning and opportunity for group learning. Mills and colleagues (1) suggested in their study that clarity of the microscopic image is the key issue to encourage student learning pathology.

The survey also revealed significant learning benefit of Virtual microscopy in terms of self learning and collaborative/group study. Storing of slide for later review, 24 hour access to online slide boxes, and the use of arrows, instructions and marked areas on the digital slides allow students to self identify structures quickly and correctly. Neel and colleagues (2) also found students preferred virtual slides for study and take home exercises.

Collaborative/group study is another important benefit of virtual microscopy teaching as all the students can see the same image simultaneously, students can collaborate in their learning in proper sense. Biggs JB and Johnson DW(4,5) in their separate studies found that collaborative learning is a powerful tool for gaining both understanding and a deeper level of knowledge.

The limitation of this study was a low response rate. One reason for this is likely due to this survey being undertaken just prior to their final block exam when students are preoccupied and the second reason may be that this online survey has attracted students who are more confident in using a computer and internet. Faster Internet service, better resolution and selection and skillful processing of representative microscopic field remains to be the significant challenge to deliver a really effective pathology teaching.

Conclusions

Fundamental knowledge of microscopic pathology has always been an essential part in medical education. The traditional didactic concept comprises theoretical and practical lessons using a light microscope and glass slides. High-speed Internet connections and technical

improvement in whole-slide digital microscopy (commonly termed "virtual microscopy") provide a new and attractive approach for both teachers and students. In our study, majority of the medical students welcomed learning pathology via online virtual microscopy. This technology not only improves the student: faculty interaction but also help in demonstration of the histology with high quality images.. However selection of representative diseased tissue/skillful processing is necessary for a better image quality that can improve the experience.

fig 1

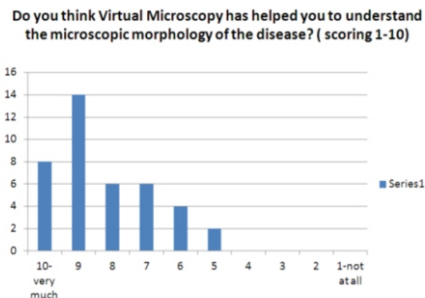


fig2

Online assessment of 4th semester students

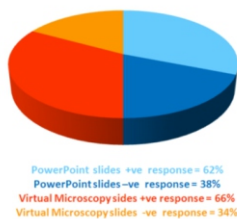
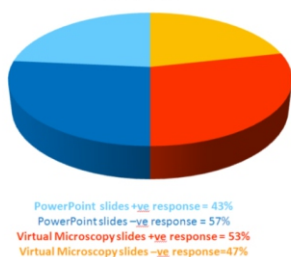


fig2

Online Assessment of 5th semester students



References

- (1). Mills PC, Bradley AP, Woodall PF, Wildermoth M. Teaching histology to first year veterinary students using virtual microscopy and traditional microscopy: a comparison of student response. *Journal of Veterinary medical education* 2007;34:177-182
- (2). Neel JA, Grindem GB, Bristol DG Introduction and evaluation of virtual microscopy in teaching veterinary cytopathology. *Journal of Veterinary Medical Education* 2007;34:437-444.
- (3). Sundaram Sivamalai et al , Teaching Pathology via online digital microscopy . *Australian journal Rural Health* 2011;19:45-51
- (4). Johnson DW , Johnson RT . Implementing cooperative learning . *Contemporary Education* 1992 ;63:173-180
- (5). Biggs JB . *Teaching for Quality learning at University* . London : Open University Press,1999.