

VIRTUAL MICROSCOPY AS A LEARNING METHOD IN PART-TIME MEDICAL EDUCATION

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Summary/Abstract:

Part-time educational programmes offer a more flexible way to study because part-time students can studies around theirs career and other commitments. As a part-time students have access to the same facilities, teaching and training programmes, but they have a same regulations and monitoring procedures of exams as full-time students. Before 50 years ago, the best method by which students learned about histological, biological and pathological entities was by viewing specimens through light microscopes, after that, with availability of colour-printed textbooks and today with PCs and portable electronic devices. Aims of the study was to evaluated our experience of the advantages of virtual microscopy (VM) as learning methods in medical education of part-time students in vocation studies of Faculty of medical sciences in Stip, R. of Macedonia. This study was a cross-sectional survey with questionnaire which obtained information about sociodemographic characteristics of the participants, opportunities among the participants, their medical job positions, level of satisfaction and motivating factors to update their medical education. The very important factor as a tool of mesurment of learning, are their final results of exams, esspecialy of the course of cytology and histolgy. The results confirme that students today, are all highly computer competent, and greatly appreciate the advantages of the VM systems. The delivery of this material can easily be incorporated into existing e-learning resources that have been developed on the faculty. Part-time students performed better results in the examination with the virtual slide and they confirmed the facility and further evidence of this improved learning outcome using VM. Good number of them wanted to work so as to learn new skills for self-development but almost of them want to finish the study for finansical advantages. In that conditions to early and easily finish the study, VM provide substantial educational benefits esspecialy to part-time students. Part-time students of the Faculty of medical sciences in Stip are adopted to the new technologies of e-learning including VM.

Key words: e-learning, medical education, part-time study, virtual microscopy

1. INTRODUCTION

In Histology and Cell biology, as a morphological disciplines, a range of skills are needed to analyze specimens, localize objects and recognize structures (Goldberg and Dintzis, 2007). Virtual microscopy (VM) is defined in Wikipedia as a method of posting microscope images on, and transmitting them over computer networks. VM technologies use the platform of hardware accompanying with the software and include pre-and post-image processing, compression, transmission and visualization of the slides. VM allows on-line access to entire scanned sections of tissue that can be viewed on a computer in exactly the same way as conventional glass slides with a microscope and can be explored by the learner at several magnifications. VM takes the microscopy experience beyond the classroom by allowing whole slide microscopy at different magnifications in the on-line web page. Unlike traditional microscopic sections on glass slides, digital slides can be securely accessed on-line at anytime from anywhere and cannot be damaged. VM could be defined as a computer system that allows the observation of microscopic samples in a computer screen similarly to a real microscope allowing to observe, navigate an annotate on virtual slides (Glantz-Krieger et al., 2006) or as “an electronic digital technology that takes an original glass slide, scans it at high resolution, which then makes it flexible for study, analysis and dissemination via computer (Maybury et al., 2010). The use of high resolution scanned digital images, which can be stored in virtual archives on local or distant servers, has resulted in novel approaches in e-learning (both in the classroom and also for distance learning) (Coleman, 2012). Teaching and learning in developing countries have been characterized by the problem of an over population of students. Classroom facilities, laboratories, equipment, reagents, teaching materials, and personnel are usually inadequate (Anyanwu et al., 2011).

2. AIMS OF THE STUDY

Aims of our study was to evaluate and present our experience about effectivity of uses the VM and other tools of e-learning on part-time students in vocational studies of our faculty. This pilot study evaluated the acceptance of the VM and its learning outcomes compared with the conventional light microscopy (LM). We want to regarding the utilization of VM as a new teaching methodology and learning outcomes on part-time students.

3. MATERIAL AND METHODS

This study was a cross-sectional survey which was conducted at the Faculty of medical sciences, University “Goce Delcev” in Stip. The study tool used was a questionnaire with obtained information about sociodemographic characteristics of the participants, opportunities among the participants, their medical job positions, level of satisfaction and motivating factors to update their medical education. The very important factor as a tool of mesurment of learning, are their final results of exams, esspecialy of the course of cytology and histolgy.

Histology and cellular biology as a courses are included in first year of study program for nurses and medical laboratory technician. This study was a descriptive cross-sectional study conducted among medical part-time students (in vocational studies) in their first year of study. All participants were interviewed using a self administered questionnaire to obtain information about level of satisfaction with VM income and other tool of e-learning. Also we evaluated the exam grades and their’s time for learning.

4. RESULTS AND DISCUSSION

On the course of histology and cell biology we archive the slides (the images) on the web-page of the faculty. The most outstanding histology slides have been scanned and placed on the VM archive and made available for all students, no matter was, full time or part-time.

Photomicrographic images of various tissues (in different sections, with different stains and preparations, and at various magnifications) in the curriculum were made using light research microscope Leica DM4500 P ($\times 40$ and $\times 100$). The images were grouped according to systems and topics. Various images of each tissue, in different magnifications with different stains and focused areas, made up the different sections of the file. Electron microscopic images that were usually unavailable in the laboratory due to our inability to own an electron microscope were also made available in these virtual slides for some of the tissues. The delivery of this material can easily be incorporated into existing e-learning resources that have been developed in the Faculty (www.ugd.edu.mk).

Also, the part-time students can prepare the exams using the lectures and presentations attached on the platform e-learning, www.ugd.edu.mk. According to this, students can access the laboratory material at any time, day or night, prepare assignments and prepare for examinations. The same slides can be linked with commercial software for e-learning and the problems of copyright doesn't exist. On the exams of histology and cell biology, the activity of the part time students (in part of VM) are supplied with the virtual slides of each practical session and a document that indicates what to do on each of the digitized samples. Basically they have to capture different digitized slides areas and to point on it a particular microscopic structure.

Comparing students' practical evaluation scores and exam grades for the 16/17 academic year to prior (due to 2008/2009) we observed how the grade for the histology and cell biology, practical exams went up. That was our first aim of the study to performed the survey to assess students' impressions of the VM activity. Overall the students' responses were positive. 92% of part-time students reported that the use of the VM software was easy and they very appreciate the usefulness of the activity. The results of exam of part-time students which used the VM activity were better than those which used the conventional LM activity and they spend much more time for learning. Part-time students appreciate more interest and enthusiasm when used VM activity as a tool for learning. According to facts that students today, are all highly computer competent, they greatly appreciate the advantages of the virtual microscopy systems as a:

- the financial and administrative advantages (allow enormous economic savings in the long-term with regard to equipment, technical staff and laboratory facilities)
- there is no longer a need for individual student microscopes
- there is no longer a need of technical staff for microscope maintenance or repair or worries about the loss of valuable specimens
- there is no longer a need for individual slide sets or to prepare new slides.

In a study in Germany, students appreciated the whole slide imaging functionality, points of interest, auxiliary informational texts, and annotations (Brochhausen et al., 2015). A research group from the US found superior performance by VM students in a haematology course (Brueggeman et al, 2012). Lam et al., (2006) as a research from China, confirm that VM to be an effective and efficient educational strategy. Another study from China showed only statistically significant differences in the case analysis

and the identification of structure in favour of VM (Tian et al., 2014). The potential advantages of VM include active student engagement in sessions with one or up to three students per PC, increased depth and breadth of coverage of learning objectives, and the practicability of self-directed learning (Kumar et al., 2010). Some researchers have found that students' performances are comparable to their previous performances regardless of the learning method assigned (Scoville et al., 2007). While many institutions in developed countries have adopted the use of virtual microscopy (Blake et al., 2003; Bloodgood et al., 2006; Harris et al., 2001). Some authors have viewed this trend with reservations, expressing fear of the complete loss of traditional microscopy skills to virtual microscopy (Burns, 2006; McBride et al., 2008; Pratt, 2009). Another point to consider or disadvantages of VM activity is the large size of the digitized images and sometimes students referred problems with downloading the images files, so the necessity of computer system with high RAM memory and storage device of high capacity.

5. CONCLUSION

Virtual microscopy has been associated with the elimination of the skill barrier for part-time students overwhelmed with the material and interpretation of specimens using a microscope, teaching large groups of students, resolution of problems associated with slide variability, and maintenance of high-quality slides for all students. It is likely that in the coming decade all medical teaching units will move to virtual microscopy.

6. REFERENCES

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About the author

Nevenka Velickova work as a Associate Professor on Faculty of medical sciences, University “Goce Delcev” in Stip, R.Macedonia. She has gained experience in cytology and histology, mainly in the field of effect of pollutants on human cells. Also, her research interests include e-learning and teaching strategies, according to her previously experience as a teacher in high school and in communications technology in education. She participated in conferences at home and abroad (over 150) and published (at home and abroad) over 50 academic papers in the field of biomedicine.