Micropolis – blending old and new for a rich experience in histology and pathology

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Summary

The renewal of the microscope equipment of the medical school of Lausanne was the starting point for a re-evaluation of this teaching approach and its general objectives. This led to the complete reorganization of the didactic approach and its architecture in order to combine the traditional microscopic approach with the use of computers to support collaborative work of small group of students.

How it started:
1 room, 140 microscopes

What can you do with 140 microscopes with over fifty years of due and diligent services other than renew them? Nothing else, but should those old microscopes be simply replaced by similar shiny new ones, or should we switch to a more modern computer-based approach and develop or buy a nice histology program? This very question was the starting point for reshaping our histology and pathology lab and their teaching approach at our medical school in Lausanne. The answer we gave was neither of both! Our medical school implemented, back in 1995, a mixed curriculum trying to combine traditional lectures and lab teaching with problem based learning (PBL). On the one hand there is this strong tendency – when sitting in front of a microscope or a computer – to a one-to-one interaction giving almost an autistic appearance. On the other hand there is this dynamism of the small group approach of PBL. It was enticing to go for the later but we decided to brew something on our own. Many persons from different departments were involved in the re-evaluation of our labs. The project matured over many months and emerged as a successful reorganization of our teaching.

The didactic concept: collaborative interactions

Fundamentally, the histology and pathology lab had one main function: learn to recognise normal or pathological histology structures. One decision we made was to modernise the goals of our labs by giving it a more integrative function. But how can the microscopic lab help the general learning process and what learning do we want to foster? The predominance of structure recognition was not so necessary anymore and emphasis was given on the understanding of function and the relevance and usage of those images for future medical practice. Put in other words: prepare the students to interact as a future clinician with the pathologist, and not be a mini-junior pathologist.

This change of goals forced us to rethink the didactic approach, the traditional one-to-one approach being not that adequate anymore. The three-tier approach of PBL was too complex and cumbersome for what we had in mind. We wanted the lab-session to be a complete teaching unit by itself. This would ask for some kind of feedback during or at the end of every session. The new concept that slowly emerged was to have small groups of students trying to solve collaboratively some kind of problems based on histological or pathological slides. But we wanted to keep the real slides and microscope and not switch entirely to a library of digitised microscopic images. The advantages in favour of a library of images were well known: no lost slides, no paling colours over the years, no microscope to keep up and running, and the possibility to label the microscopical structures interactively on-screen. The disadvantages were to continue to favour an individualistic approach focused on basic structure recognition. To some extent this would “virtualise” something already very virtual. The fact to hold the slide in your hands, being able to look at it directly before putting it
under the lens gives, as we assumed, a better link to reality and a more intuitive notion of proportion and size. Moreover we did not need the interactive label part. Structure recognition should be done by the group and discussed among them when needed. Hence the microscope was still an important player in the game, but we needed another species than we were used to.

The architectural changes: 1 table, 1 microscope, 1 computer, 6 seats

To initiate the didactic concept the lab architecture needed to be revamped. Incidentally we had to move the lab from one place to another and this eased the architectural changes tremendously. We named this new facility “Micro-polis”. The 140 working places of the old lab with as many microscopes, required 18 tables with 6–8 working places each.

We needed a microscope capable of sharing its images with all students around a table. We chose a two-headed binocular microscope equipped with a digitised camera linked to a computer (2.6 GHz, 500 MB RAM, Windows XP, DVD-CD-burner, Gigabit ethernet) and a 19” LCD-screen. Computers have free access to internet and are equipped with the software NetOpSchool that allowed the “teacher’s” computer interact with the “students” computers to perform some basic functionalities as putting a file into a certain place on all students computer in one step, having a look at what students do, taking over keyboard and mouse control (to perform image calibration for example), overriding all or some of the students’ screens to mirror the teacher’s screen (very handy to give general feedback to the whole class). Another dedicated software, IM 50, gives the possibility to look at the microscope slides by projecting the image of the digitising camera onto the computer screen. Students can choose pictures, annotate and save them locally for further use. IM 50 helps easily to calibrate the image to get the best possible picture. And finally all computers are equipped with Office suite (Word, PowerPoint, Excel) and have access to an online version of the Robins, a pathology textbook.

The learning scenario: 1 group, 1 case, many interactions

Different learning scenarios were developed and are successfully used in histology (2nd yr.) and pathohistology (3rd, 4th and 6th yr.). The basic principles of those scenarios exploiting this new lab are to give student groups a series of questions built around a clinical case. The teacher prepares in advance the case presentation, questions and additional material (pictures of gross anatomy) as a PowerPoint file. This file is distributed via NetOpSchool to every computer at the beginning of the lab session. The student groups will then use it as a lab guide or a lifeline and follow the predefined path. There will be places where they need to answer open questions, which they are invited to do directly within the PowerPoint slides. At some other places they will be asked to extract information from a microscope slide that they will have to comment and put into the perspective of the case. Microscopic images can be captured and labelled with IM 50 and pasted into the PowerPoint presentation. The clinical case presentation, the questions and the microscope slides trigger a lot of interaction among the students around the table. They dis-
cuss intensely together to find out their best answer, to mobilise their prior knowledge, to consult textbooks or online literature. Tutors can facilitate this intensive learning process. The histology labs of the 2nd year use a handful of student-tutors, whereas pathology labs of the 3rd, 4th and 6th year use one or two pathologist as tutors. At the end of the session the teacher usually gives some sort of feedback to the students. They will be able to burn their worked-out PowerPoint slide onto CD-ROM (freely available) or to copy it to their virtual disk space (each student has 250 MB of storage available at the university of Lausanne).

The experience

Our Micropolis lab has now been in use for three semesters. The experience has been overwhelmingly positive even if there’s much room for improvement and refinement. The students are very active during the lab sessions and this activity is highly appreciated. Students have a short introduction on the use of the computer (PowerPoint, IM 50, burning CDs) at the beginning of the year. Later on, spontaneous pair-teaching between tech-savvy and neophytes students seem to take place. Technical questions are seldom-asked and our surveys show that it is not always the same person that works at the computer or the microscope as in most groups all students did endorse the different roles at some point or other. We’re actively exploring ways to improve our learning scenarios and we slowly discover the flexibility of this approach. The facility is also used for non-microscopic lab work such as for collaborative e-learning with various Swiss Virtual Campus Projects. Web-embryology is used in the 1st and 2nd year, Immunology Online is implemented in the second year and Virtual Skills Lab and BOMS are planned for the 2nd and 3rd year.

Conclusion

We successfully managed to remodel our histology labs starting from an individual isolated purely morphological activity to an active collaborative learning experience. The new approach is based on both studying morphology and encompassing the contextual integration and the use of this knowledge. This was made possible by exchanging the old microscope with new ones, connected them to computers and a reconfiguration of the room that led to the name Micropolis. We are currently exploring different didactic scenarios in the domain of morphology and discover the flexibility of this room for collaborative use of some of the distant-learning programs developed under the Swiss Virtual Campus umbrella. The experience so far has been highly successful.