Application Research of Digital Network Micro Interaction System in Experimental Teaching of Histology and Embryology

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Abstract

The digital network micro interaction system takes full advantage of current state-of-the-art digital imaging technology, network transmission and multimedia technology, it has powerful picture gathering, saving and processing functions, also multipicture monitoring rebroadcast function, and enables the real-time interaction of image and voice between the teacher and students, which significantly improves the quality and efficiency of histology and embryology experimental teaching.

Keywords: digital network micro interaction, histology, experimental teaching

1. Traditional Histology and Embry ology Experimental Teaching Model

Histology is a required curriculum in the foundation stage of medical specialty, and also a morphological curriculum, the experimental lessons share a large proportion of class hours, therefore, the teaching quality of experimental lessons have a direct impact on the teaching effect of the curriculum. How to apply modern teaching means in the experimental teaching, optimize and upgrade the effect of teacher-student interaction, mobilize the students' learning initiative, so as to improve the quality of experimental teaching have become a hot issue of histology and embryology curriculum reform. On the other hand, with the rapid development of modern information technology, the multimedia technology, computer network technology and microscope interaction technology has been more and more widely used in morphology teaching practice. Digital network micro interaction system integrates multimedia classroom, voice classroom, microscope laboratory function, and makes full use of the most state-of-the-art digital imaging technology, network transmission and multimedia and other information processing technologies, this system has been introduced to medical morphology teaching and generated a profound change of experimental teaching and provided histology experimental teaching modern with a full range of high-quality technical support, which significantly improves the quality and efficiency of histology and embryology experimental teaching.

1.1. Teacher instruction and demonstration oriented

Experimental teaching model of traditional histology and embryology: the teacher may review the relevant structure and theoretical knowledge on each class, explain and instruct the purpose and requirements of the experiment, emphasize the characteristic structure of key slice

using wall charts, slides or experimental map, students should use and operate the microscope alone to observe tissue in the slices, and then draw the map under the microscope according to the experimental requirements. Teacher should make an inspection tour in the laboratory only, so as to help the students solving problems.

1.2. Few teacher-student interaction and inefficient teaching

Since 3-5 slices will be arranged to be observed by the students in each experimental lesson, students often cannot find the correct structure or find it difficult to correctly identify when encountering with different structure from book or map in the observing the slices under a microscope, such as identifications of neutrophils, basophils, lymphocytes in blood smear, the teacher cannot know whether all the students did find the correct corresponding structure, and the students could raise their hands for questions, and then the teacher comes to the students for microscope operation and assistance, even if there is a widespread problem in the students, the teacher can only repeat such instruction, within a limited time, the students may not be assisted or directly do not ask questions, in such case, the teacher will not be able to understand the actual experimental and learning situations of each student, which results in location and structural errors of tissues and organs, improper proportion of cell size in the students' drawing tasks, some students also often imitate the color map drawing to bluff without understanding the map.

2. Advantages of Digital Network Micro Interaction System

2.1. Improve the teacher's leading role of experimental lessons

Teacher' computer has broadcast teaching, monitoring rebroadcast, electronic roll call, electronic pointer and remote control functions. The teacher can master the class present situation of the students via electronic roll call, operate the students' computers to help students to solve the problem of system operation settings through electronic pointer and remote control; as a medical morphology curriculum, demonstration teaching is particularly important to histology and embryology, the teacher could use broadcast teaching function to timely, clearly and intuitively transmit the multimedia courseware and special structure typical tissue under the microscope, which are elaborated by the teacher according to the students' professional characteristics and knowledge requirements, to students' computers for teaching with text and graphics, so that the students could better understand the basic essentials and operation method of the experiment; and can monitor the map under the students' microscope by monitoring rebroadcast at any time, real-time understand the operation situation of each student, so as to identify problems and guide and resolve them in a timely manner, or properly select the characteristic structure observed on one student's microscope for teaching to all students and group assistance; therefore, it enhances the leading role of the teacher. The monitoring rebroadcast function of multipicture can control the teaching schedule, and improve the curriculum efficiency and teaching effect of the experiment.

2.2. Fully mobilize the students' initiative

As a morphological curriculum, the experimental lessons of histology and embryology are the best way to help the understanding and memory of theoretical knowledge. In the theory classes, the teacher uses wall charts, models, slides, projectors and other tools for teaching, but there are still some differences between its form of expression and students' microscope observations. Due to the lack of three-dimensional spatial

structure concept, different sections of the normal tissue structure and morphological structure of the tissue cells in different function state cannot be a properly presented [1]. Students identify the various organ tissues under the microscope through the experimental lessons, and it can deepen the understanding and memory of theoretical knowledge. However, the students may still encounter many problems when observing the tissue slice, such as the tissue morphology and stain differences of different sections and function state of the tissue structure, they may confuse the students in practice, the guidance in teaching is poor and there are always many doubts [2], students often need lots of patience to find identifiable tissue structure, and any remaining problems may greatly affect the initiative of the students. The digital network micro interaction platform can enable the students to gather and snapshot the typical structure or puzzled structure in the process of slice observation at any time, so as to communicate with the classmates or ask the teacher at any time, which mobilizes the practice ability and learning initiative of the students.

2.3. Maximize the achievement of teacher-student interaction

The digital microscope interaction system provides the most convenient two-way communication platform for teachers and students. Students can click the "electronic hands raising" at any time to submit questions to the teacher, and the teacher can solve the students' issues in a timely manner via the "remote control" and "voice intercom" functions, if any universal problem is encountered, the teacher can click the "students demonstration" to explain and instruct all the students.

2.4. Build scientific research platform for teachers and students

The teacher's computer and students' computers in digital microscope interaction system are equipped with advanced OLYMPUS microscope, YM310 high resolution digital camera with USB2.0 digital interface output, MiPrd Echung digital microscope image processing software, such computers can realize the statistics and morphological automatic analysis and determination, such as the tissue cell morphology analysis, measurement and statistical analysis, boundary detection analysis, etc., it provides an efficient and convenient platform for teachers and students to carry out histology and embryology scientific research.

3. Teaching Effect contrast of Experimental Lessons

3.1. General information

Choose the five-year clinical medicine undergraduates of 364 in 2009, 358 in 2010, and 359 in 2011. The groups have identical teaching plan, lecture teacher, experimental lesson teacher and class hours (36 hours), and the traditional microscope observation for tissue slice (control group) is only applied by the group in 2009, and the groups in 2010 and 2011 apply digital network micro interaction system for experimental lessons (experimental group).

3.2. Evaluation items and methods

3.2.1 Contrast everyday drawing performances (10-point system).

3.2.2 Contrast experiment examination performance: the examinations for control group and experimental group are both observing the mixed slice to identify tissues and organs (to identify 10 tissues and organs and describe one of them, 20-point system).

3.3. Statistical treatment

The data is represented by x ± standard deviation, test and analyze q by SPSS13.0 statistical software, the difference at $p < 0.05$ was significant.

3.4. Result

3.4.1 The drawing performance of students in 2010 and 2011 improved significantly ($p < 0.05$) due to using digital network micro interaction system, and there is no difference between students in 2010 and 2011 ($P > 0.05$). (Table 1)

3.4.2 The tissues and organs identification performance of students in 2010 and 2011 improved significantly ($p < 0.05$) due to using digital network micro interaction system, and there is no difference between students in 2010 and 2011 ($P > 0.05$). (Table 2)

Tab1 Drawing performance contrast of histology and embryology experiments of clinical medicine undergraduates in 2009, 2010 and 2011

	2009 (n=364)	2010 (n=358)	2011 (n=359)
Drawing performance	8.6±1.14▲*	9.57±1.11▲	9.56±1.2▲

▲P<0.05, *P<0.05

Tab2 Tissues and organs identification performance of histology and embryology experiments of clinical medicine undergraduates in 2009, 2010 and 2011

	2009 (n=364)	2010 (n=358)	2011 (n=359)
Tissues and organs identification performance	16.3±3.58▲*	17.14±3.62▲	17.1±3.84▲

▲P<0.05, *P<0.05

4. Conclusion

The digital microscope interaction system is a major innovation in the field of morphology experiment in recent years, and it is a brand new experimental teaching tool having significant driving effect on medical morphology experimental lessons teaching. On one hand it eliminates the communication barriers between teachers and students on microscope image and makes the teacher-student exchanges more intuitive and effective; on the other hand it also enables the teacher to quickly and effectively give guidance or help to all or individual students during the experimental teaching, and also utilizes the powerful image processing and saving functions of computer, these will bring revolutionary changes to experimental teaching [3]. The histology and embryology experimental teaching in recent years shows that, applying digital network micro interaction system in histology and embryology experimental lessons will have significant advantages compared with purely using traditional microscope, and it is an effective method suitable for medical morphology experimental teaching in new era. There are still many new issues we are confronted with, such as how to timely and efficiently develop the advantages of the system to enhance teacher-student interaction, how to develop and design the experimental materials more suitable for the system, how to develop the experimental evaluation function of the system, and how to make full use of the advantages of the system to serve the teacher-student research, etc., we also need to constantly keep the application and exploration.

5. References

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