Experimental Teaching Methods of Immunology Examination in Higher Vocational Institutions

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Abstract: The investigation and discussion on teaching methods of immunology examination course is crucial to improve students’ immunological thinking and experimental ability at today. Through the in-depth exploration of experimental teaching methods in immunology, we can help students solve the practical problems encountered in this course of immunology examination, effectively improve the efficiency of the use of teaching resources, and lay a good experimental foundation for high-quality education of students. This paper will discuss the existing problems of immunology examination in higher vocational education and help students cope with the challenges of learning methods such as theoretical incomprehension of immunology and long intervals between experiments. It will also explore how to improve students’ understanding of the complexity of the theory of immunology examination and the long lag between experiments, so as to improve the overall quality of students’ academic learning and enhance the efficiency of education.

Keywords: Higher vocational institutions; Immunology examination; Laboratory teaching; Methods

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1. Specific Problems of Current Immunology Examination Curriculum

(1) Set-up of Immunology Examination Course

As one of the important core courses in the field of immunology, the grasp of theoretical knowledge is a prerequisite for immunology examination experiments. Immunology examination is informative, complicated and difficult to understand, however, the short time-table of the course leads to a serious decline in teaching quality, which brings great difficulties to the promotion of immunology experiments. The special characteristics of the immunology examination course lie in the fact that the experiments themselves cannot be completed at once, and the long intervals lead to the overlapping of several experiments, which brings

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inconvenience to teachers. Secondly, the advancement of immunology is emerging. Most of the laboratory equipment in the school cannot meet the current scientific experiments with practical significance, which is far behind the development of the times and makes the quality of teaching greatly reduced.

(2) Student Origin in Vocational Schools

The student origin in higher vocational institutions is mixed, and the students themselves do not have very good learning ability and self-discipline ability. Nowadays, some majors mix single enrollment with general enrollment due to the problem of student population, which makes the morale, discipline and learning efficiency of the class decline as a whole. In this regard, the school should consider separating classes of single enrollment and general enrollment, and single enrollment students with excellent performance can also apply to join the general enrollment class again.

2. Discussion on the Current Teaching Reform Method of Immunology Examination

(1) Teaching Content Reform of Immunology Examination

The content of immunology examination technology is complicated; the principle is unfamiliar, for most of the higher vocational institutions students find it difficult to understand. It is proposed to adopt a focused, targeted lecture, leading students to learn in depth in the teaching process with a target. Adopt a variety of teaching methods, such as the combination of theory and PPT, science and humanities, so that students can be more intuitive experience of the course and improve learning efficiency. Secondly, the experimental contents that are no longer applicable to clinical practice would be removed, and the latest experimental techniques would be added, such as classical antigen-antibody reactions, preparation of antibody sera, isolation and purification identification, as well as immunofluorescence assays, isolation and purification of PBMC, and the principles and use of sophisticated instruments and equipment such as ELISA and LUMINEX. Through the understanding and mastering of basic experiments and high-tech instruments, as well as the improvement of students’ ability to collaborate in teams, we carry out teaching tasks corresponding to clinical departments, so that students can improve their practical skills in real clinical cases and enhance their understanding of the theoretical basis of the course. The clinical immunology laboratory conducts routine tests such as hepatitis B virus two-to-one, hepatitis C virus, syphilis spirochetes, HIV, and others, cultivating students’ ability to actively think and solve practical problems through clinical training. At the present stage, the opportunity for inspection students to study post-graduate has increased, and the research field is basically immunology-related basic experimentation, and the
basic experimental ability can also be effectively enhanced through a long period of specialized learning process.

(2) Strengthen the Teaching Reform of Basic Operations for Students in Vocational Colleges and Universities

In view of the role that higher vocational institutions plays in the industry, it is proposed to carry out intensive teaching mode of basic operations for students, targeted to enable students to be standardized and normalized in their later professional processes. For the use of pipettes, teachers should ensure that each student has a firm grasp of the standard practice of pipette ranging, shifting, sucking, transferring, and sorting. For the use of centrifuges, the teacher should demonstrate various companies, models and specifications of centrifuges in use at this stage, and on this basis, show students how to change the pedestal, how to place different volumes of tubes, how to prepare for centrifugation, set the temperature, centrifugal force, speed, and so on, and turn off the centrifuge in time after centrifugation and return the pedestal to its normal position for others. Students can enter the laboratory in groups and follow the instructions at different times, so that each student can master the operation of the basic instruments and the standardized procedures. And make students through the operation of the steps to master the experimental principles, to do the combination of theory and practice, to learn from one example, to enhance the initiative and enthusiasm.

(3) Reform of Teaching Methods

The experimental teaching mode is changed to video microclassroom. Through videos, cartoons, PPT and other forms, students can understand and master the basic principles of immunology experiments and experimental procedures more intuitively and clearly. By creating microclassroom, we can effectively solve the practical problems such as heavy information content, complicated process of basic operation, few experimental opportunities for students and fast promotion of the course, and improve students’ learning efficiency by allowing them watch repeatedly, watch frequently and enter the laboratory at any time. Through the method of microclassroom, students will watch it again and again in the later learning and revision period to deepen their impression, and it also has obvious effect on the improvement of learning performance. In the future, we are planning to strengthen the construction of microclassrooms in more fields, and produce high quality microclassrooms to transform the complicated book knowledge into vivid and concrete practical skills in a variety of forms.

(4) For the Replacement of Laboratory Equipment in Schools

The quality of clinical equipment in schools is far from the current national standards, and most of the instruments and equipments cannot meet the requirements of national personnel training at this stage. According to this issue, the
school should invest in the renewal of instruments and equipment, and encourage the financial investment to support the school’s research, so as to replace the instruments and equipment that have been outdated and have long been completely incompatible with the clinic, so that the hardware facilities can support the targeted teaching policy and be close to the clinic, thus better serving the research. On the other hand, the university should strengthen the communication and cooperation with affiliated hospitals, and let students go to the hospitals more often, so that they can understand the current clinical application technology more intuitively and clearly and at the same time, they can improve the basic skills of experimental operation through specific training, such as the immunofluorescence technology for tumor marker detection, and the application of flow cytometry to accurately detect the number and function of molecules inside and outside the cells and sort the meaningful cells on this basis. By enabling students to understand and master the key core technologies of this category, students can quickly and effectively dive into the field for effective learning.

(5) Improvement of Assessment Method

The assessment will focus on the use of the instrument. Whether the operation is normalized in the operation, detailed interpretation and explanation of the meaning of the action can be used as the examination content. Students will be expected to choose their own instruments and equipment, and to perform standardized operations and produce test results within a specified period of time. The final purpose of the assessment is to teach the students last time. After the assessment is completed, the reviewing teacher will make comments and summaries for the problems that the students have in the operation and the places that can be improved, and correct the students for the irregularities in the operation. The assessment score accounts for seventy percent of the total grade, and the usual grades are accounted for, urging students to strengthen their usual learning and training, and to build their basic skills solidly and firmly. Assessment is the last barrier for teaching quality, a critical step to detect whether teaching methods are effective and students’ learning performance. How to make an accurate assessment of students’ learning effectiveness in the assessment process and how to make students realize their shortcomings through assessment is the meaning and value of examination.

(6) Improve Students’ Awareness of Biosafety

Laboratory students are in the front line of clinical work, which requires researchers to be in contact with various pathogenic microorganisms for a long time, so it is necessary to strengthen students’ awareness of self-protection for teaching clinical laboratory science. Researchers first introduce students to the basic requirements of the laboratory, such as entering the laboratory should change protective clothing, wear aseptic gloves and slippers; check whether the
test equipment is in good condition before each use of the instrument and sign the record; disinfect and sterilize before using the ultra-clean table, and promptly replace the waste liquid tank disposal after use, and put other items back to their original location. Students are not allowed to bring any personal belongings into the lab, and documents taken from the lab should also be first disinfected in an acid tank for at least 20 minutes. During the experimental operation, students are forbidden to flip through the phone with their gloved hands at will, causing unnecessary pollution.

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