Establish a Training Skills Courses to Meet the Local Needs—Use the Microbiology and Immunology Courses as an Example

XIANG NONG, YING HUANG, YAOJUN YANG, LI CHEN, ZI LIANG, CHAO-BING LUO and RUI-YAN SHEN

ABSTRACT

Microbiology and immunology is a compulsory subject, it is very important of cultivating modern talents and is very close to real life. However, this curriculum has many insufficient in teaching, such as the less teaching hours, and the content is abstract and not easy to understand., the space for students to think is small and the students' capability of practice is weaker, centered on "teaching" the drawbacks of the traditional teaching mode is more and more obvious. In order to mobilize student’s learning the enthusiasm and initiative, cultivate the students' innovation ability, as for microbiology and immunology course system’s construction, teaching content reform, link of experiment and practical teaching system construction of instant various comprehensive reform, improve the students' interest in learning, cultivate students' ability of independent thinking and solving practical problems, and stimulate students' learning motivation, the construction of a new type capable of serving local needs special talent cultivation system of establishing biological cultivation, mainly applied, each teaching link

KEYWORDS

Microbiology and Immunology, comprehensive reform, teaching system, utility-type.

INTRODUCTION

Microbiology and immunology course as the basic course of biological engineering, has significant curriculum, the content of the course plays an important role in improving the professional level of students and training application who have their own skills to serving parts. However, combined with many years of
teaching experience, I found that there are still many deficiencies in the course teaching, like the decreasing of teaching hours. Part of the knowledge description is too shallow, the content of the course and other related courses such as molecular biology, cell biology and other teaching contents have a large overlap. In the experimental class, the space for students to think by themselves is little, the beginning ability is weak. The experiment is given priority to with microbial cultures, Light weight training isolation and identification; regard "Teaching" as the center, the drawbacks of the traditional teaching mode is prominent. Course teaching don’t make students develop their independent thinking, is not conducive to the cultivation of scientific thinking [1-2], knowledge cannot be digested, and finally knowledge are forgot by students who won’t master the technical key points of operation as a result, the teaching effect is poor. Especially students should not be able to use professional knowledge in the service area after receiving the systematic study and training of the subjects. For the problems existing in the traditional teaching, the teaching reform in colleges and universities, to transform, to prepare the organic combination of production and scientific research in teaching, carries on the comprehensive design experiment, not only can meet the students' intellectual curiosity and raises the student independent thinking ability, also can exercise the student beginning ability, basic experimental skills and creative ability, to lay the foundation for training service landlord needs first-class talents. In order to cultivate solid basic knowledge, learning new knowledge and new technology ability, to adapt to the society and post ability fast high quality applied talents.

CONFORM TO THE LOCAL NEEDS OF MICROBIOLOGY AND IMMUNOLOGY COURSE SYSTEM CONSTRUCTION

The current problems existing in the curriculum system

Microbiology theory mainly through the way of teaching, according to the requirements of teaching outline, within the time prescribed by the teaching plan to complete the teaching task. As a result of the teaching material writing process compared with the science and technology, social development obviously lags. In this kind of teaching mode, students' theoretical knowledge is relatively solid, but they can not have informed of the latest microbiology related research methods and research results, not directly to the enterprises and institutions or research institutes in the work related to microbiology, which belongs to a kind of education method obviously lag behind the actual production of education [3]. The experiment courses are designed according to the theory, because of the time limit, these experiments are usually taught by teachers, and students follow the instructions of teachers to complete the experiment process and get the experimental results. This way of experimental teaching still emphasize that you should teach students basic knowledge and experiment skills, the students' ability of independent thinking and problem analysis would be bound, the way of thinking is restricted the cultivation of innovation ability is hard to do. And experiment content is designed on the basis of the experimental teaching material, experimental steps according to the textbook content. Through experiment study, students can master some general technical operation, but usually these experiment content are independent, not for the knowledge system, problems still don't know how to solve, after combined with experimental conditions and relatively insufficient practice base is imperfect, and
other conditions can lead to the students' application ability is low. Many students before class to preview before class, so they entered the classroom situation requires a long time, cause the teacher cannot finish the teaching task; Teach new lesson when using the knowledge of the last lesson, students don’t understand, this is not enough for review.

Establish A New Curriculum System

Microbiology is closely connected with modern biotechnology industry, we should combine the specific experience in teaching, contact production and scientific research practice, and introduce the application instance, development trend and frontier research. The basic knowledge of students is weak, and it is often hard to memorize and summarize in learning, eventually lead to poor study enthusiasm and poor teaching effect. Therefore, it is very important to cultivate the students' self-study ability and the innovation quality, and build a new teaching system based on students [4]. In view of the situation of microbiology teaching now, the present situation of microbiology teaching will be reformed, and the concrete implementation methods will be discussed. When teaching is given priority, strive to give students more teaching research direction and development trend which is the student of subject development, and actively carry out scientific research and teaching and researching activities, to combine the three can rationalize, promote each other, and actively add their own achievements to the teaching. This will not only enrich the teaching, but improve students' interest in learning. At the same time, it is significant to absorb students to participate in their own research projects, provide a platform for training students and further teaching reform. Class through the colorful microbial groups and individual photo to make the students of this in our daily life, to scratch their tiny life was not seen real perceptual knowledge, to guide them more quickly into the microbial world, to produce strong interest to learn microbiology [5]. In the aspect of experiment, reform experimental teaching improves students' innovation and practical ability. The reform of experimental teaching to construct the experiment curriculum system with distinctive features, to combine with the practical application, to improve the students' interest in learning, to change passive accept knowledge into active to obtain knowledge, to cultivate high-quality practical talents with innovative ability to provide strong support. We are going to the theory of microbiology experiment course and curriculum reforms [6] [7].
<table>
<thead>
<tr>
<th>Microbiology experiment course</th>
<th>The microbial theory course</th>
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<tr>
<td>1. the basic technology and method of the experimental section (also including use the basic experimental technology incorporated into comprehensive experiment)</td>
<td>1. The teaching of microbiology theory and experimental can't disconnect, it should be closely integrated, consistent the progress</td>
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<tr>
<td>2. The part of modular design research experiment (use the basic experimental technology into researching experiment)</td>
<td>2. Briefly write simple experiment instruction, prevent the students copy books, depend on the books</td>
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<td>3. The teacher of modular design research laboratory put forward series of experimental project in the form of special modules, students choose or proposed topics, independent thinking, discussion and design the plan of experiment, independent practice, independent analysis results, teachers' appropriate guidance during the period of research-oriented experiment.</td>
<td>3. Pay attention to students' individual ability, student preview experiments in advance, watch the experiment courseware and videos, finish their report</td>
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<td>4. Reform the examination method, the experiment will sample at any time, and check the student beginning ability, comprehensive evaluation of students' comprehensive performance</td>
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**THE LOCAL DEMAND A REASONABLE TEACHING CONTENT REFORM**

**The current problems existing in this content**

At present, the content of traditional microbiology teaching updates lag. The modular design research laboratory teachers put forward series of experimental project in the form of special modules, students choose or proposed topics, independent thinking, discussion and design experiment plan, independent practice, independent analysis results, teachers' appropriate guidance during the period of research-oriented experiment. Although the application of microbial pollution treatment like knowledge learning and time must be built on a solid theoretical basis, however, it is often difficult to ignore the applied practice teaching students the real "to do" [8]. The microbiology experimental high school is still centered on dyeing, sterilization operation, and microscopic observation, the comprehensive experiments, designing experiments involving less, the experiment project update slower [9]. Although some teaching reforms have been carried out in the past practice experiment teaching, there are still some theories, light practice, simple verification theory experiment, light comprehensive application and exploration. In
the experimental methods, the teacher used first teaching and demonstration, and students repeat imitate experiment method, neglecting the student independent thinking and analysis of operation, the cultivation of comprehensive ability and the student beginning ability and the ability to create and develop.

**How to reform**

Update the teaching content timely, and reflect the latest developments in research, cultivate students' consciousness of innovation in this study which design experiment and improve students' ability to apply the theoretical knowledge to solve practical problems in the experiment. The former experimental teaching middle school students just passively to understand experiment purpose, principle, operation steps and mechanically complete experiment process, finally they are unable to grasp the basic knowledge. Many teachers scientific research experience combined with professional characteristic, guide the student to participate in related design experiments, train students independent thinking, design, operation, analysis and summary of comprehensive ability. The purpose of setting up comprehensive experiment teaching is to teach students at the same time, to pay attention to cultivate students' practical ability and innovation ability so that students learn some basic experimental methods and experimental skills, and then cultivate students use knowledge to analyze problems and solve problems independently. Comprehensive experiment can achieve this purpose. We divide the experiment into two stages: introduction and skills to improve two stages, and attain the goal of the experimental teaching well. First, students are required to master some basic operation skills, instead of requiring them strict aseptic, just to guide and inspire students to gradually realize the importance of aseptic operation. After several experiments, students have the basic laboratory skills, with the result of the experiment have internal, proactive higher pursuit (e.g. prevent contamination), then to strengthen the training of aseptic operation skills, and improve the results of the inspection standards (e.g., it is forbidden to produce pollution). In order to guide students in the pursuit of success of psychological, gradually grasp full-scale operational microbial technology. Establish a reasonable and effective evaluation system not only can assess students on free course content of master degree, also can test the quality of teaching, innovation of teaching system reform has a very important role.

**CONFORM TO THE PROCESS OF EXPERIMENT FOR LOCAL DEMAND AND STRUCTURE TO ESTABLISH PRACTICE TEACHING SYSTEM**

With the emergence of difficulty to increase comprehensive applied practice, the students in practice to recognize their own shortcomings, motivated them improving practice and enrich the initiative enthusiasm, build strong practice teaching atmosphere.
FIG. 1. The implementation process.

Clear the local demand

According to the distribution of local microorganisms, the teaching material and teaching are prepared, to cultivate practical talents in accordance with local future needs with the main hazards of microbiology in the region, let students get comprehensive improve various aspects ability to meet the local demand.

Expand experimental practice bases

In applied talents training system, practice base construction is one of the key parts. Developing the experimental practice base vigorously, using the practice base, on-site teaching [10]. The use of practice teaching base for teaching method can be used to describe the mechanism of the process, through the theory with practice to strengthen student's understanding ability, make the students master the knowledge in the process of practice, to improve the application ability of knowledge. Built after the base, we enrich the simple verification experiment, increase the comprehensive
applied experiments, and work together with the practice teaching base and the laboratory. For example, at the adding edible fungus seed production practice, students are required to reference experiment instruction which the configuration of the design from the culture medium, bagging, sterilization, inoculation and cultivation, until the hypha growth rate, morphological observation and strains of the preliminary appraisal, strains of production qualification have been judged. The whole practice processes is done completed by the students themselves, the teacher plays a role of guidance and often urge only.

**Lead the student to practice**

In the school semester teaching, collecting a school internship survey to lead students into local enterprise, understand the specific role of microbiology in the actual production process, lead the students to observe and microbiology related work large precise instrument. So that we can make students know more about microbiology applications in actual life, this course can also learn about the local requirements.

**Regularly carry out professional seminars and open academic frontiers**

Conduct professional seminars regularly which content could be disambiguation microbiology textbook knowledge, could also be practical application or disciplines. Students or teachers can put forward their own opinions and ideas, through the communication and discussion. Students can understand and master the knowledge of what they have learned, the teacher can also know knowledge, leak fill a vacancy, and then to consolidate[11].

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