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# Developing Fundamental Skills to Promote Innovation in Biotechnology Lab Teaching

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***Abstract* – Because lab teaching is the main form of developing experimental fundamental skills, and is also the main base on the lab teaching mode reform. This article by "biotechnology lab teaching" as an example, points out that the experimental fundamental skill of student could be improved by strengthening construction of teacher，enriching teaching methods，formulating teaching content and tests.**

***Keywords* – Biotechnology Lab Teaching, Fundamental Skills Teaching Mode, Reform Foundation Course.**

## I. INTRODUCTION

Biotechnology experiment, as a practical course linked with the actual social, has an important role in cultivating the students' comprehensive ability, innovation ability and the preliminary scientific thought[1] As a foundation course in the college of life science, the major aim of biotechnology teaching is to promote the understanding of the concept being taught with a view to applying knowledge of such understanding to real life situations. Extensive debate continues about what the best method of teaching is in biotechnology lab teaching. The projection of slides, model building, the showing of videotapes, the use of computers etc, are resorted to, in the search of the 'best' method for teaching. As classroom teaching is the main form of teaching organization and activity way, and is also the main base on the classroom teaching mode reform. So, on the basis of our own situation of biotechnology lab teaching, we go a little deeper into the objective of biotechnology lab teaching[2]

## II. STRENGTHENING CONSTRUCTION OF TEACHER

### *A. Students as Centre in Teaching Process*

Learning is a kind of activity, like swimming and cycling, is impossible master as not experience. Therefore, teachers should change the traditional teaching and students' learning model, and reflect to students as centre in design, arrange and organize the teaching process for lab teaching [3] Teachers' abilities base their instruction on the direct knowledge of their student's current understanding of the content under study, and their developmental readiness for and/or interest in particular activities. There are the following three ways organization students to participate in the study. I. Autonomous Learning. The cultivation of students' autonomous learning ability is not only a quality education basic requirement, and life-long learning society and the comprehensive development of people's needs. II. Group Cooperation. Cooperative learning group is a few persons to achieve a common goal in a learning activity joint cooperation consisting of a small group of people. A group of students in effective cooperation in communication can learn from each other, can promote their learning to be reflected the understanding and the Angle of thinking. III. Class Debate. In the classroom teaching, creating some students' conflict cognition, teachers can realize the teachers and students. The lab can become the student debate the wisdom of the stadium, so that students in the process of competition, and let the student feel participation of the happiness[4]

### *B. Inquiry Teaching Method*

Learning new knowledge of the process, is interactively activity between teachers and students, and is the process of mastering the knowledge and the basic skills, and is process combined by the subject's knowledge structure and the cognitive structure of the students.

The students to participate in the degree of learning are an important factor in the success or failure of biotechnology lab teaching. Teachers should actively create opportunities for students to experience the achievements of success. Firstly teachers encourage students to participate in the lively, creating the atmosphere, use many ways of learning for their present in the internal demand on enjoy. Secondly, providing opportunities for students in teacher's inspiration under the guide, they find out problems, to solve problems, to get rules and understand knowledge. Finally, students feel the fun of inquiry and the joy of success, which the power is also learning other incentive methods cannot substitute.

## III. ENRICHING TEACHING APPROACHES

### *A. Modern Teaching Method*

21st century the classroom teaching conditions from a piece of chalk, a textbook, a blackboard replaced by the application of multimedia, and the source of the teaching material are the multiple channels. Therefore, in the teaching, the teachers must use of books, the Internet, film and TV to provide students with more rich, the comprehensive resources for study, and guide students to compare, distinguish and abandon in various information resources. At the same time teachers have to enhance the attraction of the lab teaching, to completive the network teaching or kinds of open class web[5]

### *B. Microcomputer Program*

The classical method (blackboard and chalk) is looked down on as obsolete, although in fact this method is still used in conjunction with the modern ones by almost all teachers.

The advent of the inexpensive micro has greatly changed the perception of the role of the computer in education since Smythe and Lovatt in a comprehensive

review pointed out the deterrent effect of high initial capital costs. Microcomputers are already widely used in universities, largely in research and administration; there is now a growing awareness that they have wide applications in a biotechnology teaching environment[6]

There are sound reasons, apart from keeping up with students' expectations, for bringing microcomputers into the tutorial room, remedial classes and the laboratory. The term-personal computer' summarises their wide acceptability in contrast to 'teaching machines'. Students sitting at the keyboard have the advantage of personal instruction. Teachers providing or even writing the programs will be more closely associated with selection and presentation of material
than if they were using a main-frame computer, where there is often professional support for teaching program packages. As ever, the provision of appropriate program software is lagging behind the introduction of new computer technology[7].

## IV. Scientific Development of Teaching Contents and Testing Method

### *A. Additional Comprehensive Design of Experiment*

The 21st century biotechnology requires interdisciplinary approaches across different disciplines, such as engineering, computer science, physics, chemistry and mathematics to deal with higher level of complex problems, especially related to health, food, energy and environment which are becoming more dependent on other disciplines to collaborate in providing new applicants, new methods, new techniques and new tools. Solving complex, interdisciplinary problems will require that students go far beyond their biology content knowledge only. They are required to understand what connections exist across disciplines and how to make those connections.

We have designed and implemented a two-semester instrument-intensive biotechnology experimental course. In the early part of the course, student training is focused on experimental design, calibration curves, and statistical analysis. Students study biologically significant small molecules using HPLC, UV-Vis Spectroscopy, and electrochemical biosensors. In the last half of the first semester, experiments grow in complexity and students become more independent as they use multiple spectroscopic techniques to study lipid membrane dynamics, protein structure, and enzyme activity. In the second semester, students study the impact of structure on protein function, use qPCR to quantitate relative gene expression in plants, and study the dynamics of tRNA structure upon ligand binding using fluorescence, absorbance, and electrophoresis[8] Throughout the course, students are trained in both formal and informal scientific writing. The culmination of both semesters is a student-designed inquiry- based independent project. We will describe the structure of the course, how learning outcomes are addressed, and report on initial student responses to this integrative instrument-based biotechnology experience.

### *B. Refining Standard of Performance*

Learn knowledge is to use knowledge. The traditional teaching has put too much emphasis on "exam achievement", "basic principle and concept", but does not pay attention to the development of the students' consciousness and the ability on professional knowledge of material application. In the teaching, the teacher must according to different learning ability and the life experience of the students, to design carefully "training", to make students really stand in "the shoulders of giants" and not "beach"[9].

## IV. Conclusion

Reform of biotechnology lab teaching is providing teachers with a huge space exploration and innovation[10] The cause of teachers engaged in teacher education and teaching high up thinking of updating, and gradually worked out with the current thinking of university education, to vitality and viability of the new model of classroom teaching in order to achieve classroom teaching from concept to change behaviour, to develop student ability goals.

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