

Reflection and Reform of Genetics Experiment Teaching in Colleges and Universities

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Abstract: Genetics is a relatively basic course in college biology major. In response to the requirements of the new era of teaching, we should pay attention to cultivating students' innovative consciousness and practical ability in the teaching process of genetics. With the continuous development and progress of biology field, new professional knowledge theory and new biological technology appear constantly, genetics course teaching also ushered in new opportunities and challenges. This paper analyzes and discusses the improvement of the contents, forms and examination methods of genetics teaching in colleges and universities.

Keywords: University; Genetics; The experimental teaching

1. Preface

Genetics experiment is an important basic course for biology specialty and a teaching system to cultivate students' innovative spirit and practical ability. [1] We conduct research on genetics in order to discover the laws of heredity and gene variation of living things, and continue to explore and study the origin and essence of life. Nowadays, with the development of biological science, experts have developed new theories and technologies in this field, and the teaching of genetics in colleges and universities has been improved accordingly. We should not only pay attention to the teaching of theoretical knowledge for students of this major, but also pay attention to the experimental teaching, and further improve the quality of experimental teaching. This article will put forward the way of optimizing experimental teaching from the aspects of content, form and examination method.

2. Further optimize the experimental teaching content

Genetic experiment is an important basic course for biology major, which plays a very important role in cultivating students' innovative spirit and practical ability. [2] Genetics involves a wide range of experimental teaching content, which is similar to microbiology, cell biology, biochemistry and other disciplines, and has certain repetitive content. The duration of college genetics experiment teaching is relatively limited. In order to improve the effectiveness of experiment teaching within the limited time and enable students to make practical progress in theoretical knowledge and experimental practice, we must first optimize the experimental teaching content.

2.1 Optimize the comprehensive experimental teaching content of cytogenetics

Cytogenetics is an important part of genetics. The purpose of this experiment teaching is to improve the operation skills of students in related chromosome experiments and make students understand the principle of genetic chromosomes more thoroughly. In order to improve the effectiveness of teaching, we can optimize the experimental content of this part. For example, we can effectively integrate the chromosome karyotype analysis experiment of human peripheral blood with the chromosome analysis experiment of drosophila salivary gland to save experimental time and improve experimental efficiency.

2.2 Optimize the comprehensive experiment content of linkage genetics

In genetics experiment teaching, there are many repetitious experiments. In order to improve teaching efficiency, we will integrate similar experiments and carry out teaching. For example, there are many repetitions in maize genetic traits separation, observation of hybrid progeny of *Streptospora crassi* and genetic analysis of hybrid progeny of fruit fly. Therefore, we can organically combine the three into a comprehensive experimental teaching. The experimental teaching includes free combination, gene separation and chain exchange, etc. We can find that there is a certain logical relationship between the above three experiments, and the experimental teaching after the integration of the content is beneficial to save time and improve efficiency.

2.3 Optimize the content of population genetic comprehensive experiment

ABO blood group gene population analysis, RFLP molecular markers and olfacialblindness gene structure observation and analysis have a lot of repetition, and the internal principle has a certain similarity, so the above three can be combined experimental teaching. The comprehensive experimental teaching content mainly includes the study and analysis of population gene types and the study of gene frequency gap of population middle allele genes. Teachers should encourage students to participate in experimental

design and experimental data statistics in the teaching process, so as to effectively improve students' ability of genetic experiment design, stimulate their innovation in the study and operation of genetic experiment, and pave the way for students to participate in genetic research in the future.

3. Change teachers' ideas and enrich teaching methods

3.1 We will further develop the ranks of teachers

The reform of genetics teaching system has made great achievements since it was carried out according to the plan of the Ministry of Education at the end of the 20th century, which has effectively promoted the improvement of genetics teaching level in China and cultivated a large number of useful talents.^[3] In order to improve the overall teaching level, colleges and universities should insist on the construction and optimization of teachers. Experimental teaching requires higher practical ability of teachers, so it requires teachers to have certain practical ability and experience. Some teachers have been engaged in the research work related to genetics before teaching, so they have strong practical ability and sufficient experience. However, some teachers teach directly after graduation, so they are lacking in ability and experience. In this case, colleges and universities can organize internal genetics teachers to exchange experience and give full play to the advantages and abilities of excellent teachers to help young teachers improve their professionalism. In addition, in the teaching process, young and old teachers can be combined with teaching methods to carry out teaching. Young teachers have received more professional education, so they have advantages in theoretical teaching and can be responsible for the teaching of genetics theory. In the process of genetic experimental teaching, teachers with experimental teaching titles can be organized to lead young teachers to complete experimental teaching, so as to enhance the experimental teaching experience and ability of young teachers and improve the overall effect of experimental teaching.

3.2 Optimize experimental teaching equipment

As the saying goes, a good job must be done before it is done. Genetics experiment teaching has high requirements for experimental equipment, and colleges and universities should regularly maintain and overhaul relevant equipment to ensure the safety and functionality of equipment. Only with excellent experimental equipment can genetics experiment teaching be better carried out. For example, the traditional microscope does not have the function of storing images, but in many genetic experiment teaching, images need to be stored as subsequent teaching materials. In order to meet this demand, colleges and universities can increase digital microscopes with more functions such as image storage to improve the effect of experimental teaching. In addition, multimedia teaching can provide more convenience for teachers and students in genetics experiment teaching. Colleges and universities can introduce multimedia teaching system according to their own conditions. In experimental teaching, students can not only observe the characteristics of the research object by using microscope and other equipment, but also observe the characteristics of the research object by using multimedia. For example, when using digital desktop microscope for experimental teaching, we can observe the experimental results through the main monitoring computer. The tutor can comprehensively and intuitively observe the microscope observation status of all students, have a more adequate understanding of the actual operation status of students, and can also carry out the necessary picture storage. In a word, optimizing experimental teaching equipment is an effective way to improve the teaching effect, but it needs the university to invest some funds.

4. Conclusion

Genetics is a relatively basic course in modern biology research, which is closely related to human development, biological proximity and social livelihood. This subject has strong practicality, so the tutor should pay attention to the effectiveness of experimental teaching in the teaching process. Colleges and universities should actively improve the quality of teaching staff, optimize teaching equipment, teachers should enrich the content and form of experiments, and further optimize the assessment system, to promote students' practical progress.

References:

- [1] Lin Ling, Kan Xianzhao, WANG Ming, et al. Reflection and reform of genetics Experiment teaching in colleges and universities [C]// National Conference on Genetics Teaching Reform in Colleges and universities. 2010.
- [2] Xu G D. Thoughts and exploration on genetics experimental teaching reform [J]. Heihe Education, 2012, 000(006):56-57. (in Chinese with English abstract)
- [3] ZHANG Feixiong, LI Yaxuan, HU Yingkao, et al. Current problems in genetics teaching in Colleges and Universities and possible countermeasures in the next ten years [C]// Conference Manual of The National Conference on Genetics Theory and Experiment Teaching. 2014.