

The Research on the Cultivation Mode of Innovative Talents by the Diversified Teaching Methods of the Tutorial System ----- Take the Teaching of “Cell Engineering” As an Example

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Abstract

Review Article

In view of the teaching reform of cell engineering, this paper puts forward the application of diversified teaching *methods*: reconstructing the teaching content of cell engineering with the method of discussion case study, and combining theoretical analysis with practice. Through the tutorial system of cell engineering, tutorial system diversified teaching methods and informationization of teaching tools, this study can help teachers successfully complete teaching tasks and improve students' comprehensive quality and practical skills.

Keywords: cell engineering; Teaching reform; Diversified teaching; Case teaching; Tutorial system.

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INTRODUCTION

In the era of globalization and diversification of information and technology, higher requirements have been put forward for the current practical biological talents. The society is short of the supply of biological engineering innovative talents, and the talent market is increasingly demanding for the quality of talents. Therefore, higher education to cultivate practical professional talents is also facing more severe challenges. In order to improve the comprehensive university bioengineering specialty core curriculum the teaching quality of the “cell engineering”, train and bring up innovative biological engineering talents in the 21st century, this article from the perspective of upgrading comprehensive ability, the diversified teaching method of the tutorial system in the teaching of “cell project” integration, namely effective “discussion-based teaching”, design reasonable “case type” teaching, choose more suitable real cases, adopt the tutorial system in a variety of ways of practice teaching.

The “cell engineering” course knowledge structure and teaching contents are unique, its curriculum knowledge numerous and disorderly, in order to make the students master the basic theory of “cell engineering, familiar with the cell engineering” each link of the theoretical and experimental skills, especially understand the theory

and experimental methods of various ideas, improve the students' professional literacy and skills, dealing with traditional “cell engineering” courses teaching content and rebuilt a new teaching mode, teaching new thinking, and the Internet technology is introduced into the “cell engineering” curriculum teaching process, to build “Internet + ” “cell engineering” teaching system of the tutorial system diversified teaching method.

Combining with the professional characteristics, the research “problem set” and “discuss case type”, the tutorial system combining teaching with practice method in the “cell engineering” and application in the teaching objective to improve the “cell engineering” quality of teaching and enhance students' learning efficiency of the “cell engineering” curriculum, improve the students' ability to analyze and solve problems, to shape student's unique competitive advantage in the job market.

To formulate the teaching reform objectives of cell engineering

Cell engineering teaching process has many problems: because many enterprise data belong to confidential data, it is difficult that the teacher obtain the real case of the enterprise, most can only use the simulation cases, even just depend on materials and PPT courseware complete teaching tasks, teaching means and methods of the single, unable to vividly interprets the essence of cell engineering, is not

convenient to students' understanding and learning. It is an inevitable trend to realize the teaching reform of "cell engineering" course, because it is basically unable to mobilize students' enthusiasm, the experimental practice learning effect is not ideal, and students do not like to think.

At present, the integration of "Internet +" and the biological industry enables the rapid processing of biological information and data through Internet technology and electronic devices. The teaching reform goal of cell engineering course should be: (1) training bioengineering talents based on practice. Guided by the market demand for talents of pharmaceutical enterprises, reform the teaching method of cell engineering course to cultivate students' comprehensive ability to adapt to the work of enterprises [1]. (2) Establish diversified teaching methods through WiFi, discuss teaching methods based on real cases, reconstruct teaching mode, and cultivate students' new thinking. (3) We apply the practical teaching method of the tutorial system platform in the teaching of cell engineering, so as to make the teaching closer to the actual production process of pharmaceutical enterprises. Moreover, the tutorial system platform can better improve students' professional quality [2]. The course focuses on cultivating students' practical and innovative thinking, using bioinformation technology to help student's complete practical tasks, so that students can further understand the course principles of cell engineering.

Discussion of the teaching method and reconstruction of teaching content

The teaching content of cell engineering is assisted by Internet technology and tutorial system platform, and the teaching method is discussed to reconstruct the teaching content. For example, students learn video "in vitro culture method of early embryo, in vitro fertilization process" [3]. Discussion: early embryo "in vitro development block" and its solution. What happens when embryos fuse? Do you accept chimera monsters? And so on. Cloned animals in addition, learning this chapter, we first set up the problem: in the process of mammalian embryonic development, cell differentiation, but in a suitable environment, has a differentiated cell can restore to the development of the initial state, to develop into other types of pluripotent cells, can develop into a complete individual totipotency? Is there an irreversible change in cell differentiation?[4] then, students learn micromanipulation techniques of cloned animals, including micromanipulation instruments and methods of embryo segmentation.

Case study: the key to successful allogeneic nuclear transplantation by Professor Chen jing of Fudan University in Shanghai; Can non-human mammalian oocytes reprogram human cells? Are students against human cloning (reproductive cloning)? What changes

took place after nuclear transplantation. All these greatly stimulate students' interest in learning and tap their independent thinking ability.

The theoretical analysis and practice of cell engineering are combined with case teaching method

Cell engineering is a comprehensive course with strong practicality in biotechnology and biological drug research and development [5]. In the course of teaching cell engineering, vivid cases are made by combining "Learning tong" and Internet resources, which is very conducive to enhancing students' interest in learning [6]. Students learn by actively discussing and elaborating case studies in class, which is not only not boring but also strengthens their professional practical skills, promotes their mastery of theoretical knowledge, and improves their ability to analyze and solve problems.

The traditional teaching of cell engineering mainly adopts the single teaching method and means taught by teachers [7]. In our teaching research group, discussion case teaching is adopted: the teacher divides students into groups according to the experimental class and works as a team of 6 people to complete the discussion tasks together [8]. The teacher asks the student to take the group as the unit, can take the initiative to check the data before the class, and is familiar with "the cell engineering" certain chapter theory knowledge point and understands the related newest progress. In class, teachers lead students to discuss and elaborate their own content, encourage students to express creative ideas, cultivate and train their ability to respond to questions and divergent thinking [9, 10].

Adopt diversified tutorial system to practice teaching

The diversified mode of tutorial practice teaching is very suitable for the cultivation of bioengineering talents [11, 12]. Freshmen should enter their tutor's laboratory as early as possible to deepen the understanding and mastery of theoretical knowledge of biology majors and complete the graduation experiment paper as soon as possible, which can effectively improve students' practical operation ability.

Strengthen the practical teaching of the tutorial system so that students can truly understand the actual department of biological enterprises, enhance students' effective use of biological knowledge and make reasonable work decisions, and cultivate students' practical professional skills and experience in enterprises [13].

The practical teaching of cell engineering course can be carried out in the following ways. Tutors can organize students to participate in the national college students' life science competition, enterprise practice competition, national innovation and

entrepreneurship competition and other competitions related to life science [14]. Through competitions and writing business plans focusing on biological engineering, students can improve their comprehensive ability to analyze and solve problems with biological knowledge.

In addition, expert lectures on the platform of bioengineering tutors can be held, and the students can also be invited to give special reports by experienced staff and famous tutors from the actual departments of biological enterprises. Students can listen to special reports to complete the basis of their performance scores and report their experience.

To enable students to have a deeper understanding of the problems faced in the actual production and management of enterprises and their solutions, how to choose an appropriate technical solution according to the enterprise's reasonable production motivation, and how to plan the corresponding work according to the enterprise's actual production.

For the highly professional teaching of cell engineering, if all the teaching knowledge points are taught by flipped classroom and mooc, the difficulty of learning will be reduced. In addition, the diversified case teaching model of the tutorial system also puts forward higher requirements for teachers. Besides playing a guiding role, teachers are also required to be able to solve problems in real time, inspire students to think about problems and answer the puzzles encountered in students' discussions [15].

Through the implementation of the diversified teaching methods of the tutorial system of cell engineering course, the teaching quality of classroom and practical links has been significantly improved, students have changed from passive to active learning, and their innovation ability and teamwork ability have made great progress. This diversified teaching method of the tutorial system platform is also significant for the implementation of other courses; so as to do more work for cultivating comprehensive and high-quality bioengineering talents [16].

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