

Teaching Reform and Practice of Courses Based on OBE Concept and Civics Integration: Taking Epigenetics Course as an Example

Qianqian Xie^{1,2}, Xiaodong Chen², Siying Wu^{1,2}, Tao Luo^{1,2,*}, Xianrong Hu², Rui Zhu¹, Jiantao Liu^{1,2,*}

¹Key Laboratory of Bioprocess Engineering of Jiangxi Province, College of Life Sciences, Jiangxi Science and Technology Normal University, Nanchang, Jiangxi, China

²Jiangxi Hukou soybean science and technology small hospital, Jiujiang Liufang bean industry development Co., LTD, Jiujiang, Jiangxi, China

*Corresponding Author.

Abstract: The concept of output based education (OBE) focuses on the student-oriented and goal-oriented education concept of the outcome of learning. Course Civics can integrate the concept and spiritual pursuit into professional teaching, so as to realize the combination of scientific research literacy, innovation consciousness and Civics education, and to realize the cultivation of morality and nurture people. The curriculum reform of Epigenetics is a systematic project involving teachers, students, teaching methods, teaching content and educational philosophy. Based on the concept of OBE and the combination of Civic, the article focuses on the overall optimization of the course in the teaching of Epigenetics, which cultivates students' innovation ability and the quality of talent cultivation, and obtains a better teaching effect.

Keywords: OBE Concept; Civic Integration; Epigenetics; Teaching Model

1. Introduction

Epigenetics is a discipline of genetics that studies the nucleotide sequence of DNA that makes gene expression heritable due to factors such as gene methylation and changes in chromatin structure without alteration^[1]. Epigenetics is necessary to construct a complete genetic architecture, and is one of the focuses and difficulties of modern genetics teaching ^[2], at present, many universities in China have already opened this course, and epigenetics has become one of the fastest growing courses in recent years^[3]. However, for undergraduate students, the knowledge of epigenetics course is abstract and difficult to

understand, therefore, the author explored a teaching mode based on the OBE concept and the integration of Civics and Politics, which greatly enhanced students' enthusiasm and learning efficiency.

In recent years, China has been trying new methods for teaching undergraduate courses, but the improvement of these teaching methods has not been able to strengthen students' moral education and fully explore students' subjective initiative. Therefore, it is necessary to reconstruct and optimize the course content on the premise of satisfying the teaching content of undergraduate courses, following the inherent characteristics of the courses and based on the concept of OBE, taking the cultivation of students' scientific research literacy and innovation consciousness as the output orientation, and combining with the course of Civics and Politics. Teachers should explore and organize the Civic elements contained in the course content, find suitable ways to present them in the teaching objectives and content, integrate scientific research literacy, innovation consciousness and Civic education into professional teaching, so as to achieve full coverage of the course and enhance the knowledge and interest, scientific and popularization, and ideological nature of the classroom. The article combines the research of course ideology and politics to explore the appropriate online and offline three-dimensional teaching mode, which will be transformed into "student learning as the center", so as to adapt to the cultivation of innovative talents of both virtue and talent, and to achieve the educational goal of the trinity of education of literacy education, ideology and politics and professional education, and to be able to figure out the unique teaching

methodology for the relevant courses of biology education It will play an important role in guiding the improvement of teaching quality.

2. Teaching and Learning based on the OBE Concept and Curriculum Civics

Curriculum Civics is the craze of Civics education in recent years, the teachers of professional courses have a great influence and long duration on the ideological shaping of college students and the construction of the knowledge system, and the contemporary college students have active thoughts and wide sources of exposure to knowledge^[4], therefore, the integration of Civics into the professional courses is not only a requirement of the curriculum, but also a requirement of the society, the times . Teachers should actively combine professional knowledge with Civics and Politics in the course, excavate the spiritual connotation and ideological value contained in the course knowledge, strengthen the connection between the course and the display society, and increase the depth and temperature of the course knowledge^[4].

OBE concept is a kind of result-oriented, student-oriented, based on the students' learning requirements and social needs to reverse design curriculum reform and the system construction of the curriculum. OBE concept emphasizes the implementation of result-oriented, OBE teaching focuses on the development of course objectives, reasonable and scientific customization of the course objectives is an important cornerstone of the students to achieve the expected learning results after passing the teaching and learning activities. At the same time, the OBE concept changes the traditional teaching with the teacher as the main body and students passive learning^[5]. Students take the initiative to understand and learn the knowledge through the expected results, and construct the knowledge structure system oriented to the final results; teachers take students as the main body of learning through diverse cooperative inquiry teaching, and guide students to understand and digest the knowledge. At present, the mainstream direction of educational reform in Europe, America and other developed countries is also the OBE concept^[6].

3. Analysis of the Current Status of Epigenetics Teaching

At present, epigenetics has become one of the main courses of most colleges and universities majoring in biology^[7], but the knowledge of epigenetics is more abstract, and the speed of updating professional knowledge is faster, and the new methods and knowledge are endless, but because of the limited time for each semester's study, it is more difficult for students to learn and understand, which is not conducive to the increase of learning motivation. In addition, the content of the current epigenetics course is relatively boring and numerous, and the connection between the courses of its related disciplines is very close, so in the teaching process should not only pay attention to maintaining the integrity and systematicity of the discipline itself, but also pay attention to the continuity and closeness of the discipline and other disciplines, and increase the interaction with the students. As epigenetics is an emerging discipline^[8], it is necessary for educators to explore the feasibility and efficiency of the teaching mode through practice.

4. Teaching Methods based on the OBE Concept and the Integration of Civics in Epigenetics Practice

4.1 Optimization of Teaching Content

Teachers in the teaching of epigenetics combined with the characteristics of the specialty, adjust and expand the teaching content, and integrate the connotation of Civic education into the syllabus, so that it can stimulate the students' interest in learning. On the basis of professional teaching, combining the elements of Civics and Politics in epigenetics (Table 1) and the latest progress, such as the recent research results published in professional academic journals, research findings, etc., and designing discussion topics at different levels of competence, including basic theories, extended knowledge, etc., for the important knowledge points and the current hot social issues related to epigenetics, so as to stimulate the interest in learning, improve the efficiency of the classroom, and enrich and optimize the teaching content of epigenetics. The teaching content of epigenetics will be enriched and optimized.

Table 1. Table of Civic Elements of Epigenetics Course

Teaching conten	Civic element	Integration of teaching content
Introduction to Epigenetics	He Jiankui's Gene-Edited Baby Incident	Regulations and Social Ethics of Genetic Engineering
Epigenetics and Human Disease	New Crown Nucleic Acid Testing	Gene Diagnosis and Gene Therapy
Epigenetic Regulation	1978 Nobel Prize in Physiology and Medicine Scientists	Restriction Nucleic Acid Endonucleases Characteristics and Usage
Chromatin modification	CRISPR-Cas9 gene editing technology	Principles of common vector construction
Genomic imprinting	Human Genome Project	Target gene acquisition method - genomic library method
Epigenetic inheritance in plants	Transgenic insect-resistant cotton	General principles of plant transgenesis
Animal Cell Culture	The Birth of the "Cloned Sheep"	Key Technologies for Transgenic Animals
Epigenetic inheritance of cancer	Detection of mutated genes in malignant tumors	Fluorescence quantitative PCR Principles and applications

4.2 Strengthening the Reform of Teaching Methods

Teachers explain to students in the classroom based on this teaching model based on the OBE concept and the integration of Civics, so that students understand its key points. Clarify the relevant requirements, urge the establishment of study and discussion groups, and explain to students about the class report requirements. The class report can be the notes and summaries of students in the process of learning and understanding the content of the knowledge points, or they can further write their own thoughts and experiences on the basis of their understanding. Before class, teachers should take students as the main body based on the OBE concept, with teachers providing catechism resources and sharing classroom videos and other resources to students, who will watch them before class and use the results as a goal-oriented course prep. In the classroom, teachers need to actively explore the cases that link the course knowledge with current affairs, morality, ideals and other aspects of life, and implement the course Civics by combining the course knowledge with vivid and interesting cases, and guide students to explain the phenomena in the cases with the course knowledge, and conduct group discussions and sharing, to guide students to form the correct

values and achieve the effect of knowledge transfer and other effects, so as to increase the course Civics' The holistic nature and effectiveness of the course Civics and Politics is increased. In the classroom activities, the main position of students is fully guaranteed, and students are guided to have group exchanges, sharing, discussions, etc., so as to make students the main body of learning activities and improve their learning enthusiasm. In addition, after class, teachers should encourage students to make use of platforms such as Chinese university catechism to carry out cooperative inquiry learning and independent learning, so as to gradually form a global vision.

4.3 Enhance Students' Practical and Innovative Ability

In order to cultivate students' scientific research quality and innovation consciousness, extracurricular practice competitions and "scientific research training and innovation and entrepreneurship projects for college students" have become an effective way to internalize the knowledge of the curriculum and enhance students' practical and innovation ability. Teachers can introduce competition mechanism in teaching, stimulate students' enthusiasm for learning in competitions, cultivate students' interest in exploring the unknown in scientific

research training and innovation and entrepreneurship programs, and guide students in various disciplinary competitions, such as "National Life Science Innovation and Entrepreneurship Competition" and "Internet+ College Students' Innovation and Entrepreneurship Competition". "We guide the students to fully utilize the modes of online learning, research learning and competition integration in various disciplinary competitions, scientific research projects and thesis publication, etc., so as to cultivate the students' ability of applying theories to practice. In order to achieve the integration of teaching and research integration of intracurricular and extracurricular and the first classroom and the second classroom, so as to strengthen the cultivation of students' practical and innovative abilities.

4.4 Changes in Teachers' Roles

With the wide application of information technology in teaching, the roles and functions of teachers and students have changed dramatically. In the new learning environment, teachers need to re-examine their roles to meet the requirements of teaching and educating under the new situation. Guide teachers to shift their roles from "teacher", "indoctrinator", "transmitter" and "implementer" to "researcher", "researcher" and "implementer". "researcher", "guide", "designer" and "facilitator". Cultivate a value proposition that goes beyond standardized answers and memorization of knowledge and encourages students to plan independently. Through discussion among students and Q&A by the teacher, and questioning by the teacher and exploration by the students, ideas are exchanged, standardized knowledge is formed, and finally internalized and absorbed by the students. This model improves students' listening and learning efficiency, enables students to participate in the whole process of teaching, and fully embodies the educational concept of "people-oriented", teacher-led and student-led.

5. Effectiveness of the Implementation of Teaching Methods based on OBE Philosophy

5.1 Effective Teaching

Epigenetics is offered in the first semester of the junior year of biological science majors in

our university, with a total of 60 class hours. The author adopted the teaching method based on the OBE concept and the integration of Civics to the undergraduate students, and compared the comprehensive scores of the students after the teaching reform with the comprehensive scores of the students before the teaching reform (Table 2). From Table 2, it can be observed that the average score of students' performance after participating in the teaching reform experiment has increased by 15 points, which indicates that the students after the teaching reform are able to comprehensively master the knowledge points and construct the inner connection between the knowledge points, and are able to understand the deeper connotations of Civics and Politics after the knowledge points. From Table 2, it can be seen that the effect of teaching reform based on OBE concept and Civics integration is very obvious, and students' performance has been significantly improved.

Table 2. Analysis of Students' Performance

Program	Number of students	Achievements
Grades for Students Participating in the Reform Experiment	103	87.9±6.5
Grade of students who did not participate in the education reform experiment	110	72.1±7.3

5.2 Improved Learning Effect and Student Evaluation

Through the teaching reform based on the OBE concept and the integration of Civics and Politics, the classroom atmosphere is warm, the students' thinking is active, their interest in learning is strong, and the students have sufficient confidence in subsequent learning. Under the teaching mode based on the OBE concept and the integration of Civics and Politics, teachers should actively explore the Civics and Politics ideas embedded in textbooks in the curriculum, and pass the correct values, outlook on life, and world view to students, and this kind of teaching method can strengthen the students' moral education and fully tap the students' subjective initiative,

so that the students can comprehensively use the knowledge of the disciplines and methods of thinking to analyze and argue about the phenomena in their lives in a reasonable and justified way, and make the correct value and argumentation, and make the correct value. 71% of the students were able to demonstrate the learning purpose based on the OBE concept in their assignments, and had a deeper understanding of the knowledge points after integrating the course Civics. This reflects that the teaching reform based on the OBE concept and the integration of Civics and Politics has significant teaching effects. At the end of each semester, students evaluate the teachers of the course, and it is found that the epigenetics course after the teaching reform has adopted a more reasonable and effective teaching mode, and it can be found from the evaluation results that the students' evaluation of the course has been significantly improved. Meanwhile, at the end of the semester, the author conducted a questionnaire survey on the teaching effect of the epigenetics course, a total of 103

questionnaires were sent out, 101 valid questionnaires were collected, the validity rate of the questionnaires was 97.06%, and the results are shown in Table 3. The results of the feedback from the students show that, compared with the traditional teaching modes and methods, the adoption of teaching modes based on the concept of OBE and integration of Civic Studies in the teaching of epigenetics has significantly improved the students' satisfaction of their teaching. teaching mode, it obviously enhances students' interest in learning, teamwork consciousness; exercises the ability of independent thinking; and improves professional knowledge skills. Overall, the satisfaction of all indicators in all aspects reaches more than 90%, and the dissatisfaction is 0%. From Table 3, it can be seen that the teaching reform based on the concept of OBE and the integration of Civics and Politics has effectively improved students' learning interest and effect, and students' evaluation of the course is positive.

Table 3. Feedback Form on Teaching Process (%)

Evaluation content	Evaluation effect				
	Very dissatisfied	Unsatisfied	Unsure	Satisfied	Very satisfied
Improvement of professional knowledge skills and application ability	0	0	0.8	70.1	29.1
Improvement of professional thinking ability	0	0	3.2	69.4	27.4
Stimulate interest in learning	0	0	2.5	62.8	34.7
Team-based learning, helpful for your study	0	0	1.2	65.9	32.9
Enhanced sense of cooperation	0	0	1.9	72.2	25.9
Exercises independent thinking ability	0	0	3.6	54.2	42.2
Enjoy this teaching mode	0	0	2.6	46.8	50.6

6. Summary

In conclusion, the article explores the OBE concept as the guide, integrates the elements of civics and politics, organizes and designs the teaching needs with the principle of highlighting its moral education and professionalism, and strives for excellence in content and form, promotes the organic fusion of civics and politics elements and professional education, organizes the students to promote independent learning, and strengthens the interaction and communication between students and teachers, and between students and students. With the orientation of enhancing

students' patriotic sentiment, special vocational skills and innovation ability, students are equipped with strong scientific research craftsmanship and cultural self-confidence in the development of China's biological sciences, and it effectively breaks the inertia thinking of students' passive learning so as to continuously stimulate students' enthusiasm and improve the quality of teaching. The article carries out the curriculum reform of Epigenetics from the aspects of optimization of teaching content, improvement of teaching methods, cultivation of students' practical and innovative ability and change of teachers' roles, in order to promote the cultivation of innovative talents for

graduate students of biology with the orientation of "cultivating the sense of social responsibility and improving the ability of practice and innovation".

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