

Combining the Curriculum Ideology and Politics Practice with Teaching Mode of OBE and BOPPPS: Taking Principle of Chemical Engineering as an Example

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Abstract: The teaching modes, including OBE (i.e., outcome-based education) and BOPPPS (bridge-in, objective, pre-assessment, participatory learning, post-assessment, and summary), which, respectively, emphasizes the results orientation and the teaching effect, efficiency and benefit, and highlights the importance of participatory learning. Curriculum ideology and politics requires that ideological and political education should be organically integrated into the teaching of all courses. In this paper, we take the principle of chemical engineering as an example, and create a teaching mode of curriculum ideology and politics combining with OBE and BOPPPS. The practice shows that the teaching model can improve classroom-teaching effect and enhance the innovation ability of students, which provides a workable case for the hybrid teaching in the new age.

Keywords: Principle of Chemical Engineering; Curriculum Ideology and Politics; BOPPPS; OBE.

1. Introduction

In the process of developing higher education for a long time, two teaching concepts have been formed: "teaching as the center" and "student-centered". Among them, the "teacher-centered" education concept emphasizes teacher-centered, classroom-centered, book-centered and exam-centered, which ignores the differences among students and lacks continuous tracking and effective evaluation of students' learning effects, resulting in large differences in learning effects among students in the same class [1]. In addition, the concept of "teaching as the center" is easy to cause students' personality to be assimilated and creative thinking to be stifled. In order to solve the problems of "teaching as the center" teaching concept in personnel training and improve the quality of higher education in our country, OBE (Outcome-based education) education concept has been widely applied [2]. OBE education concept is a result-oriented, student-oriented concept that adopts reverse thinking to construct curriculum system. The educational concept of OBE is to organize each educational link and clarify the learning objectives, so that students can achieve the expected results after completing the study. The BOPPPS model divides the knowledge point teaching process into six parts: introduction, goal, pre-test, participatory learning, post-test and summary [3]. The BOPPPS model emphasizes teaching effect, efficiency and benefit, and highlights the importance of participatory learning.

In 2019, the General Secretary pointed out at the symposium of teachers of ideological and political theory courses in schools that it is necessary to adhere to the unity of explicit education and implicit education, explore the ideological and political education resources contained in other courses and teaching methods, and realize the whole-process and all-round education of all employees [4]. This requires college teachers to give full play to the role of classroom teaching as the main channel and the main position in educating students, run ideological and political education

through the whole process of school teaching and teaching, and implement the connotation of teaching and educating people in classroom teaching.

The course "Principles of Chemical Engineering" is based on the theory of three major transfer phenomena - momentum transfer, heat transfer and mass transfer. It introduces the unit operations of fluid flow, fluid transport machinery, sedimentation, filtration, heat transfer, absorption and distillation. Applied chemistry, biological engineering, light chemical engineering, functional materials and many other majors are highly practical, and play an important role in cultivating students' engineering ability. In order to effectively organize the "principles of chemical engineering" classroom teaching, our school guided by OBE and BOPPPS teaching models, the teaching team of "Principles of Chemical Engineering" has created a teaching model consisting of OBE, BOPPPS, and curriculum thinking and politics, which cultivates students' subjective initiative, exercises students' practical ability to analyze and solve problems, and organically integrates curriculum thinking and politics into classroom teaching to comprehensively improve students' comprehensive quality [5]. This teaching mode is summarized as follows.

2. The Main Teaching Problems Solved by the Results of Curriculum Teaching Reform

The results of curriculum teaching reform are guided by the concept of OBE education, which solves two prominent teaching problems commonly existing in the current higher education: (1) It solves the problem of over-emphasizing teacher-centered, book-centered, exam-centered, and relatively ignoring the subject status of students; (2) It solves the problem that teaching methods and methods overemphasize knowledge transmission and relatively neglect the cultivation of students' innovative practical ability.

3. The Results of Curriculum Teaching Reform to Solve Teaching Problems

3.1. Leading Students to Improve Their Independent Learning and Changing "Passive Input" for Active Learning

BOPPPS teaching mode emphasizes the introduction of the classroom, highlighting the important role of students' learning interests in teaching. In the course of teaching, the ideological and political aspects of the course are integrated into the introduction. For example, when teaching hydrostatics, the case of "Striver" is introduced, and how to determine the pressure under which "Striver" dives to 10,909 meters; In the teaching of Bernoulli equation, the collision case between "Hawker" and "Olympic" is introduced, and the cause of the ship suction phenomenon is proposed. In the teaching of centrifugal pump, the course content is introduced from the South-to-North Water Transfer project, and how to adjust the flow rate of each pump in the pumping station group of the east line of South-to-North Water Transfer project; In the teaching of heat exchanger, the hot issues of carbon peak, carbon neutral introduction of the course content - man and nature is a community of life, "adhere to the harmonious coexistence of man and nature", "green water and green mountains are gold and silver mountains" and other ecological civilization ideas in the scientific view of nature and green development. Heat transfer operation is an important part of industrial production to achieve energy saving and emission reduction, through the process strengthening, such as strengthening the efficiency of heat exchanger is an important embodiment of the practice of green development concept. So, how to design efficient heat exchangers? On the one hand, such a question is conducive to stimulating students' interest in learning; On the other hand, it is helpful for students to establish a correct world outlook, outlook on life and values, cultivate students' patriotic belief and selfless dedication, enhance students' sense of responsibility, and make students deeply realize that personal development should be closely linked with the development of the country, and implement what they have learned and thought into practical actions to serve the country.

In BOPPPS teaching mode, participative learning is an important link to embody the student-centered status. In the classroom, students are carefully organized to participate in the learning process and highlight the centrality of students. For example, in the Bernoulli equation, ask students to discuss in groups why when they blow air between two pieces of paper, the paper moves toward the center. In explaining gas-liquid equilibrium, have students discuss in groups how to determine whether the solute is moving from gas to liquid or from liquid to gas when a gas mixture with a partial pressure of solute p comes into contact with a solution with a concentration of solute c . In the discussion teaching, teachers "walk" to the students, teachers and students fully interact, each student can integrate into the learning of knowledge, play its learning potential, improve the learning effect. Discussion teaching has greatly improved students' enthusiasm for participation, changed the dull classroom, and made students accept the knowledge they want to learn in the form and language they like, so as to achieve the teaching effect of wetting things silently.

3.2. Combining with Modern Science and Technology to Realize the Reform and Innovation of Traditional Teaching Mode

Combined with modern information technology, the teaching team adopts various forms of modern new teaching methods such as learning and rain class to form experiential learning and improve the learning effect of students. The teaching team combined with the super star platform, made comprehensive use of the characteristics of QQ, WeChat and Tencent conferences, gave full play to the advantages of different software, combined use of multiple platforms, complementary to each other, teaching, tutoring, question-answering, testing, supervision and other teaching links do not fall, to ensure the quality of teaching. This fragmented, multi-channel, information-based learning method is a useful supplement to traditional teaching methods. It is beneficial to improve the learning efficiency of students, so that students take the initiative to participate in learning, so as to complete the learning task easily and happily.

3.3. Establishing a Curriculum Ideological and Political Case Base

In the course of teaching, the curriculum ideological and political content is embedded in many levels, so that the curriculum ideological and political and knowledge education penetrate each other. According to the knowledge framework and knowledge points, the ideological and political content of the course is mined, and the course ideological and political teaching case of "Chemical Engineering principles" course is determined.

4. The Effect of Popularization and Application of the Results of Curriculum Teaching Reform

4.1. Effectively Improving the Teaching Effect

In order to evaluate the effect of teaching reform comprehensively, the grade ratio and mean difference of the two combined classes were compared after the course study. Both the pilot class and the control class are 2022 undergraduates, and the final exam papers are reviewed by the teachers of the teaching team. The practice shows that nearly 10% of the pilot classes have good grades and above, and only 5% of the control classes have good grades and above. Meanwhile, the average score of the pilot class was 4.5 points higher than that of the control class. The above data show that the teaching reform adopted by the pilot class can improve students' test scores, make students better grasp the knowledge of chemical engineering principles, and then train students' engineering thinking, so that they have the ability to independently acquire and control chemical engineering knowledge.

4.2. Improving the Students' Innovative Practice Ability

Classroom teaching is not only to impart knowledge, but also to cultivate students' innovative practical ability. After school, teachers guide students to participate in Shandong Province College students Chemical process experiment skills competition, so that they can use the chemical principle knowledge to solve practical engineering problems. In recent years, the students have won four first prizes, seven second

prizes and seven third prizes in Xinjiang Autonomous Region Chemical Design Experiment Skills Competition, and the team members have won five outstanding instructors in the competition. The teaching reform has enhanced the students' ability of chemical design, so that students can better adapt to the work of design institute in the future.

5. Summary

The teaching reform of curriculum ideology and politics combining the OBE and BOPPPS is promoted into the students to learn, optimize the teaching, to achieve moral roots. This purpose effectively improves the teaching effect of the course and the students Innovative practical ability.

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