

Teaching Innovation of Principles and Technologies of Food Green Processing Based on OBE Concept

Guangcai Niu*, Yanqing Li, Wenyi Wei, Yanjun Tang, Kun Wang, Rongan Cao

Food College, Heilongjiang Bayi Agricultural University, No. 5 Xinfeng Road, High-tech Zone, Daqing, Heilongjiang, 163319, China

**Corresponding author*

Keywords: *Principles and Technologies of Food Green Processing*; OBE concept; blending teaching mode; curriculum ideological and political education

Abstract: Under the new engineering background, the course of *Principles and Technologies of Food Green Processing* needs to further innovate teaching models and methods. Aiming at the problems of insufficient participation and low initiative of students in traditional teaching methods, this paper carries out teaching innovation design of blending teaching mode based on OBE (outcome based education) concept. According to the course objectives, the teaching contents are optimized and updated, the construction of online course resources is strengthened, the ideological and political elements contained in the knowledge system are fully explored and integrated into each teaching link. The blending teaching mode of “online independent learning and exploration + offline report and discussion + online consolidation and expansion” has been formed. The practical results show that the blending teaching mode based on OBE is beneficial to promote students' mastery of knowledge and comprehensive ability, which achieves remarkable teaching effects. The teaching achievements can provide reference for the reform of other similar professional courses.

1. Introduction

In June 2016, China officially joined Washington Accord and became the 18th official member of Washington Accord, which marked the beginning of engineering education professional certification with international substantive equivalence has been opened in China. The engineering education professional certification follows three basic concepts: outcome-based education (OBE), student-centered and continuous improvement [1]. Among them, OBE was put forward by William Spady in 1981, which points out that the goals of teaching design and teaching implementation are the final learning achievement of students through the educational process. OBE concept is a student-centered, teacher-led, problem-oriented, task-driven and continuously improved teaching model [2]. Different from the traditional courses, it focuses on what kind of ability students have after studying the course and what kind of contribution they can make to social development. In recent years, with the development of modern teaching methods such as “Internet + Education” and online teaching, the deep integration of informatization and teaching has played a positive role in improving classroom teaching effect, which has become the inevitable development direction of

classroom reform [3].

Blending Teaching is a learning mode that organically combines traditional face-to-face teaching with online learning. It can also be called an offline and online teaching model. These two teaching methods have the same status and complement each other. In the process of teaching, students mainly rely on the active guidance and inspiration of teachers, so that students can take the initiative and carry out creative learning [4]. Through three stages: preview before class, study in class and review after class, a student-oriented deep learning model has been established. Because it combines the advantages of both traditional teaching and online teaching, breaks the limitation of time and space, strengthens the communication between teachers and students, promotes teamwork and deep learning of learners, and achieves the teaching effect of 1+1>2, which makes it increasingly widely valued and applied [5].

The course of *Principles and Technologies of Food Green Processing* has many problems, such as many teaching contents, high difficulty coefficient, both theoretical and practical, and less class hours. At the same time, it also has the characteristics of fast change of cutting-edge knowledge and strong timeliness. In order to break the traditional "cramming" and "filling" teaching mode [6], according to the curriculum teaching objectives, the curriculum teaching team attempts to consistently integrate the OBE concept throughout the entire blended learning process. A student-centered teaching model was constructed. Students can learn by watching, doing by learning, thinking by doing, and ultimately achieving a mastery of classroom knowledge from elementary thinking to advanced thinking cognition, so as to have the ability to evaluate and create new knowledge.

2. The Construction of Blended Teaching Model Based on OBE Concept

The principle of "reverse design and positive implementation" was followed OBE education concept to carry out teaching activities. According to the "student-centered" principle in the OBE concept, in the *Principle and Technologies of Food Green Processing* course teaching, a blended teaching model combined online and offline teaching was implemented. Focusing on curriculum objectives, we optimized teaching content, integrated online and offline teaching resources, improved teaching methods, enriched teaching activities, and formulated diversified curriculum assessment and feedback mechanisms with students' learning output as the only evaluation standard, and the continuous improvements will be made to ensure effective implementation of output goals [7]. The blended teaching mode of online independent learning and exploration + offline report and discussion + online consolidation and expansion has been formed (Figure 1).

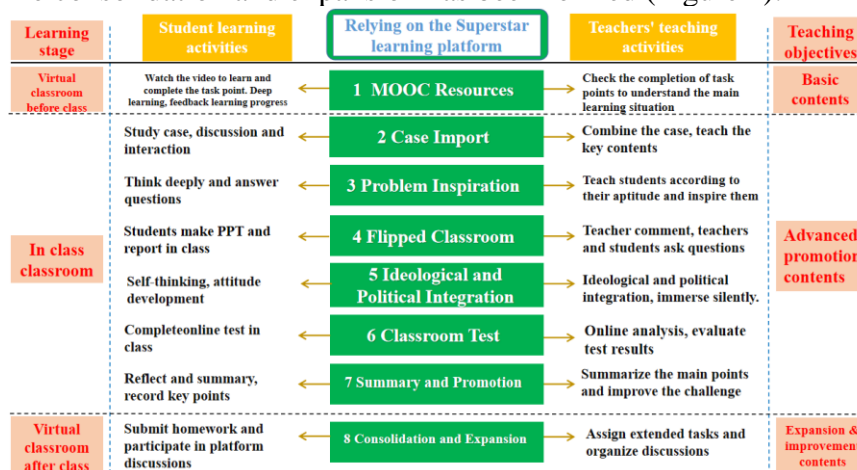


Figure 1: The blending teaching mode of *Principles and Technologies of Food Green Processing*

3. Implementation of Blended Teaching Model Based on OBE Concept

3.1. Optimizing and Updating Course Contents

Principles and Technologies of Food Green Processing mainly involves the basic principles of various food green processing technologies and methods, such as food drying and dehydration processing, heat treatment and sterilization, canning processing principles and processes, low-temperature processing, chemical preservation principles and technologies, and biological preservation principles and technologies, and so on. Through learning, it is required to systematically learn and master the basic principles and methods of food green processing and preservation, and correctly apply the principles of food green processing technology to analyze and solve the main problems in food processing, master the causes of food spoilage and its control methods in the process of food production, circulation and sales, clarify the selection basis of the main process conditions and methods in food production, and further grasp the theory and application of food processing technology [8].

Under the background of new engineering, according to the index points supporting students' graduation requirements, the teaching objectives of knowledge, ability and quality are determined, based on the concept of OBE, the contents of the course *Principles and Technologies of Food Green Processing* are updated and optimized, and the latest theories and methods in the field of food processing are supplemented. The latest development results of scientific research and teaching reform are introduced into teaching, and the characteristics of scientific research feeding teaching are obvious. Through a variety of forms and ways to increase teaching hours, introduce the latest research hotspots and cutting-edge knowledge and technology in the food industry in the form of specific cases, and focus on cultivating students' ability to solve complex engineering problems in food processing.

3.2. Construction of Online Resources for Courses

Since the start of the course *Principles and Technologies of Food Green Processing*, the teaching team has been building the course contents and resources. In 2020, the SPOC course *Principles and Technologies of Food Green Processing* was self-built, and courseware, chapter tests and extended learning were made, the teaching resources such as courseware, chapter tests, question banks, and product standards are abundant and increasing. At the same time, the collected news, videos, animations and other network resources are uploaded to the course resources of the Superstar platform, so that students can watch and discuss in groups in their spare time, which better meets the advanced learning needs of students.

3.3. Exploration and Integration of Ideological and Political Education in Curriculum

The curriculum focuses on the knowledge, ability and quality objectives of food green processing and preservation, fully excavates the ideological and political elements of food processing, integrates the requirements of socialist core values and the ideals and responsibilities of realizing the great rejuvenation of the Chinese nation into the teaching of this course [9], and fully embodies patriotism, social responsibility, scientific spirit, professional quality and saving consciousness.

According to the characteristics of the curriculum “*Principles and Technologies of Food Green Processing*”, the ideological and political elements are systematically excavated, and the reform and practical exploration are carried out from the aspects of course ideological and political objectives, design ideas for the integration of ideological and political elements and improvement of teaching methods. The course is closely integrated with Chinese traditional diet culture, food quality and safety awareness, scientific spirit and professionalism, craftsman spirit, ecological civilization and

green development concept and resource conservation awareness. In the offline teaching, teachers adopt diversified teaching methods such as typical cases, standard interpretation, students' reporting, on-site discussion and so on, the students' participation and sense of gain in the course are enhanced through group discussion and presentation.

3.4. Reform of Teaching Methodology and Blended Learning Design

The course teaching team changed the original teacher-centred teaching methodology and transitioned to a student-centred online and offline blended teaching methodology with discussion-based interactive teaching. It mainly based on pre-course student-centred online independent learning and output orientation, offline classroom teaching design remained student-centred, and explained key points and difficulties, inspired students to think with questions. This teaching method is related to some examples of food processing in production, it guide students' interest in learning and cultivate their ability to solve practical engineering problems.

3.4.1. In-Depth Preview before Class

The teacher released preview announcements and discussion topics before class by online SuperStar platform, and students study independently online, focus on conceptual and knowledge-based contents to achieve a first-order knowledge of the subject, which can bridge-in class.

3.4.2. In-Depth Participation in Classroom Teaching

Based on the output-oriented teaching model, online learning contents are reviewed and examined. By combining teaching methods with more students' participation activities such as case teaching and flipped classroom with curriculum ideology and politics, and group discussion is appropriately adopted to enable students with the ability to apply, analyze and evaluate food processing knowledge, and focus on cultivating students' innovative consciousness, professional quality and teamwork spirit.

3.4.3. Consolidation and Expansion after Class

The improvement and self-testing after class were also completed independently online, and students were urged to consolidate and expand after class in the form of homework, group discussions, unit quizzes, and so on. Through online and offline discussion, students and teachers can communicate and interact, and online and offline can be linked together to form closed-loop learning, so as to achieve the ability of higher-order thinking cognition and creativity [10].

3.5. Evaluation of Curriculum Achievement and Reform Effects

Based on the quantitative assessment method in the whole process, the achievement of students' academic performance and ability were assessed according to the curriculum objectives. Quantitative assessment was conducted by online and offline respectively, with online data achieving full process quantitative calculation. Online grades include 40% of self-directed learning (video learning + test + discussion + homework + sign in + interaction), the offline scores include 60% of final exams or course papers.

After several years of practice, students' overall satisfaction with this course is gradually improving, the breadth and depth of knowledge acquisition are gradually increasing, the classroom atmosphere of mixed teaching is more active, and students' participation, satisfaction, practical innovation ability and team spirit are getting better and better. In particular, it has achieved remarkable effects in students' independent learning ability, independent thinking ability, problem analysis ability, communication and expression and literature review ability.

4. Conclusion

Based on the OBE concept, the scientific and reasonable curriculum objectives are put forward, and the online and offline blended teaching mode is constructed and implemented, which has achieved remarkable effects in student training and curriculum construction, solved the obstacles in students' learning time and space, promoted students' personalized development, improved their abilities of independent learning, independent thinking, literature review, communication and expression, and practical problem solving, and enhanced the higher-order, innovation and challenge of the curriculum.

Acknowledgment

This work was supported by Heilongjiang Province Postgraduate Curriculum Ideological and Political High Quality Construction Project [Ideological and Political Teaching Cases of the Course “Principles and Technologies of Food Green Processing” (No.YJSKCSZ-05211502)]; Heilongjiang Bayi Agricultural University Postgraduate Core Curriculum Construction Project (No.HXKC202111); Heilongjiang Bayi Agricultural University Teaching Reform Key Project [Construction of High-level Innovative Talent Training System for the Food Industry in Agricultural Universities under the Background of New Engineering (No.YJG202202)]; Heilongjiang Province Higher Education Teaching Reform Project [Research on the Training Mode of Innovative Full-time Profession Degree Master in Food Processing and Safety (No. SJGY20190465)]; the First Batch of New Engineering Research and Practice Projects in Universities of Heilongjiang Province [Reform and Practice of Collaborative Education Mode of New Engineering in Food Specialty (Hei Jiao Gao Letter [2018]681)].

References

- [1] Zhang K., Fang W., Li J. S (2022) Analysis of the path to improve college students' ability of “entrepreneurship and innovation” under OBE concept. *Education and Teaching Forum*, 13(26), 177-180.
- [2] Li Z. Y (2014) Analysis of the result-oriented concept of professional certification of engineering education. *China Higher Education*, 17, 7-10.
- [3] Tong Y. Y., Zhang J. Y., Zhang Y F (2023) Application of BOPPPS teaching mode based on OBE concept in the course of electrical control and PLC. *The Theory and Practice of Innovation and Entrepreneurship*, 6(10), 35-39.
- [4] Feng X. Y., Wang R X., Wu Y. J (2018) A review of the research status of blended teaching at home and abroad—based on the analytical framework of blended teaching. *Journal of distance education*, 36(3), 13-24.
- [5] Yue W., Yang W. T., Gong N. C (2021) Blended teaching practice of inorganic and analytical chemistry based on outcome-based education. *Chinese Journal of Chemical Education*, 42(10), 11-17.
- [6] Shao Y., Jia X. D (2021) Inquiry teaching and its enlightenment to online teaching. *Western China Quality Education*, 7(24), 141-143.
- [7] Liu J. P., Peng H., Liu C. M., Peng J (2023) Practice of Mixed Teaching Mode of “food factory design and environmental protection” based on OBE concept under the background of new engineering. *The Food Industry*, 44(7), 193-195.
- [8] Lin X. L., Huang Y. P., Huang Y. S., Hu L., Zheng Y. Z., Nie Y (2023) The teaching reform and practice of curriculum ideology integrating OBE concept to implement flipped classroom—take “functional foods” as an example. *The Food Industry*, 44(4), 229-233.
- [9] Wang T., Xie X. M., Tan C. Y (2023) The dilemma and realization path of integrating curriculum ideology and politics into professional courses in universities. *Journal of Higher Education*, 9(15), 13-16.
- [10] Li F., Zhu H. Q., Tan B (2023) “Intelligence+” project-based teaching model of virtual teaching research office and development of students' higher-order thinking. *Higher Education in Chemical Engineering*, 40(3), 61-70.