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Teaching reform of "food engineering literature retrieval and scientific paper writing" course based on outcomes-based education concept

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Abstract

There are problems in the current teaching process of the course "Food Engineering Literature Retrieval and Scientific Paper Writing", such as emphasizing theory over practice, insufficient guidance on course outcomes, lack of modern teaching methods, and single evaluation methods. Therefore, based on the concept of outcome oriented education, the teaching objectives, contents, methods, and assessment methods of this course were reformed. The reformed teaching objectives, contents, methods, and assessment forms of the reformed course "Food Engineering Literature Retrieval and Scientific Paper Writing" are more scientific and reasonable, which has a positive effect on improving students' literature retrieval, scientific research and scientific paper writing abilities, and provides a prerequisite and guarantee for improving the quality of students' graduation theses.

Keywords: OBE concept, Teach reform, Literature retrieval, Scientific paper writing

Introduction

The course of "Food Engineering Literature Retrieval and Scientific Paper Writing" is currently a compulsory or elective course offered by various universities in food engineering, which is based on the traditional course of "Food Engineering Literature Retrieval and Utilization" and adds a section on scientific paper writing.^[1] Its purpose is to enable students to master the operations of literature retrieval, citation, as well as the methods and skills of scientific paper writing, in order to help them successfully complete course papers, graduation theses or graduation projects, and lay a solid foundation for their future work or further studies.^[2] The traditional teaching methods of the course "Literature Retrieval and Scientific Paper Writing" mainly follows the "Teaching+Assessment" approach, which has many drawbacks such as insufficient support for graduation requirements and their indicators by course objectives, insufficient correspondence between teaching contents and expected learning outcomes, and unreasonable evaluation of the achievement of teaching objectives, directly affecting the quality of teaching and talent cultivation.

The education model based on the concept of outcomes-based education (OBE) is an educational philosophy guided by students' learning outcomes, with the goal of teaching design and implementation being the learning outcomes that students ultimately achieve through the educational process.^[3] This concept is a structural system that drives the entire curriculum activity and student learning evaluation through the output of learning, and is an innovation in educational paradigm. With the implementation of the 2020 version of the "Undergraduate Professional Talent Training Plan" at Jiangsu Ocean University, the applied talent training model of OBE education concept has been fully launched in our university. Therefore, we apply the OBE concept to the teaching of the course "Food Engineering Literature Retrieval and Scientific Paper Writing", and innovate and reform the teaching objectives, contents, methods, and assessment methods of the course.

Teaching objectives

The OBE philosophy emphasizes 'what learning outcomes we want students to achieve'.^[4,5] According to the training plan for the food engineering major, we have optimized the teaching objectives of this course as follows:

[1] Being able to recognize that there are multiple solutions available to solve food engineering problems, and being able to seek alternative solutions through literature search and research in food engineering; [2] Based on the principles of food science and engineering, they are able to use food engineering literature retrieval to conduct literature research, analyze the impact of various factors on the food processing process, and obtain effective conclusions; Based on the principles of food science and engineering, they are able to conduct literature research, investigate and analyze solutions to complex food science and engineering problems through food engineering literature search; They are capable of language and scientific paper writing skills for cross-cultural communication, customs, beliefs, and other cultural backgrounds. They can communicate, exchange, and collaborate on issues related to food science and engineering in a cross-cultural context.

Teaching contents

Based on the teaching objectives of this course, we have analyzed the teaching focus and difficulties, and optimized the course content in combination with the graduation requirements of the Food Engineering major.

[1] Definition of information and literature; Information resources, literature resources, and their types and methods; The significance and role of literature search. Retrieval methods, retrieval formulas, and retrieval steps; Basic knowledge, characteristics, and roles of China National Knowledge Infrastructure, VIP Database, and Wanfang Database; The characteristics and retrieval methods of commonly used Chinese database systems (teaching objective 1 and 2; 2 class hours).

[2] Search for foreign languages on CNKI, common foreign language databases such as Elsevier, Springerlink, EBSCO, etc; Basic methods for searching foreign dissertations, conference literature, scientific reports, domestic and foreign patent literature, and standard literature (teaching objective 2 and 3; 2 class hours).

[3] Title, author, abstract, role of keywords, basic requirements, and common writing errors in scientific papers; Introduction, main text, acknowledgements, the role of references, basic requirements, issues to be noted, and common writing errors in scientific papers; Introduction, main text, acknowledgements, the role of references, basic requirements, issues to be noted, and common writing errors in scientific papers; The general usage, common errors, and correction methods of punctuation marks, numbers, quantities and units, foreign characters, figures and tables, mathematical and chemical formulas, etc. in scientific papers; The main purpose and general procedures of thesis defense, the key points to be noted in each stage of thesis defense, and how to create PowerPoint presentations for undergraduate thesis proposal writing, mid-term assessment writing, and the requirements for the form and format of undergraduate thesis at Jiangsu Ocean University; The basic process of submitting to scientific journals, the writing method of submission letters and revision instructions (teaching objective 4; 4 class hours)

Teaching methods

The OBE philosophy emphasizes 'how to effectively help students achieve these learning outcomes'.^[6] However, during our regular teaching process, we found that due to the fact that undergraduate students rarely come into contact

with scientific literature materials and have not written scientific papers, they do not have much understanding and knowledge of the course contents. Therefore, the traditional teaching methods of "cramming" and "spoon feeding" mainly based on teacher lectures cannot achieve the expected results. Therefore, the teaching methods of this course will adopt more case-based teaching methods and student-centered participatory teaching methods.

[1] For the literature search section, in addition to teaching basic knowledge such as different types of literature and databases, the classroom mainly adopts case-based teaching methods for specific methods and techniques of literature search. For example, regarding the relevant content of references, the export process of various literature searches can be demonstrated in class as an example to help students become familiar with and master the formats and annotations of various references. In addition, participatory teaching can also be conducted based on each student's academic year paper, that is, grouping according to the similarity of academic year paper topics (3-4 students per group), selecting one student from each group to demonstrate the topic retrieval process, and other students to participate in questioning and discussion.

[2] Regarding the writing of scientific papers, in addition to teaching the format and techniques of scientific paper writing, case studies can also be conducted in conjunction with previous student academic years and graduation theses. By explaining and analyzing the relevant issues that arise in the paper, students can avoid making various low-level errors in their final year and graduation thesis. How to enable students to truly master the ability of writing scientific papers requires participatory teaching. For example, by selecting a food related literature and removing the abstract and conclusion, we asked students to write the abstract and conclusion sections based on the research background, experimental materials and methods, results and discussion, etc. Then, through teacher comments, interactive discussions between teachers and students, and among students, we elevated the writing of research papers from a simple memorization level to a skill development mode.

Assessment methods

The OBE philosophy emphasizes "how to know that students have achieved these learning outcomes".^[5] According to the previous outline requirements, the final grade consists of 50% of regular grades and 50% of internship grades, and thus this assessment method is difficult to fully reflect students' performance. The core concept of teaching reform is to refine the assessment indicators, specifically by breaking down the original regular grades into parts such as attendance, classroom impression, question answering, and evaluation by other students. We decomposed the assessment indicators for internship courses into sections such as "article analysis", "performance reporting", "self-evaluation within the group", and "peer evaluation between groups". We assigned different percentages to each section and then score them comprehensively to determine the final grade for the students.

Teaching effectiveness

This teaching reform has been implemented among students majoring in Food Engineering in 2022. From the perspective

of teachers, after the reform, the interaction between students and teachers has significantly increased, and the classroom atmosphere has become lively; Students have exercised their stage performance ability and comprehensive quality through the final simulated defense; Due to the introduction of content specific to undergraduate thesis writing in the reformed teaching curriculum, many students who are currently or have already completed their thesis have expressed that learning in the course is of great help to practice; Due to the refinement of assessment indicators, the attendance rate of students has greatly increased, and it is also more convenient and clear for teachers to calculate grades. At the same time, in order to more objectively verify the effectiveness of the reform teaching, an anonymous survey was conducted on all selected students after the course ended, and students were asked to fully agree, somewhat agree, or disagree with each statement. Among the students who participated in the survey, 88.9% expressed full recognition of the teaching reform.

Conclusion

We have applied the OBE concept to the teaching of the course "Food Engineering Literature Retrieval and Scientific Paper Writing", reformed the teaching objectives, contents, methods, and assessment methods, and improved students' interest in the course, achieving good teaching results and meeting the teaching objectives of the course.

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