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Research and Practice of Architecture Optimization of Applied Courses Based on OBE-Oriented Environmental Ecological Engineering

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Abstract: Because the environmental ecological engineering major involved in environmental science and ecology, professional field, talent training target and traditional environmental science and environmental engineering professional convergence, leading to students' professional skills that are not outstanding. In addition, the professional education time is shorter, social recognition is lower. Graduates have higher difficulty finding employment. How to cultivate environmental and ecological engineering professionals with distinctive professional characteristics consistent with the needs of social development has become a common problem faced by many universities today. On the basis of analyzing the main problems existing in the development of environmental ecological engineering in the College of Biological and Agricultural Sciences, Honghe University, according to the OBE teaching concept, this paper puts forward to many measures to optimize the applied curriculum structure of environmental ecological engineering.

Keywords: Environmental and Ecological Engineering Major; Applied Curriculum System; OBE Oriented; Structure Optimization

1. Introduction

Please follow the steps In 2012, the Ministry of Education newly revised the undergraduate major of ordinary colleges and universities to add a major in environmental ecological engineering, transitioning from traditional ecology (partial) to environmental ecological engineering, and a small number of colleges and universities began to enroll for the first time in 2013. After 9 years of development, the number and scale of enrollment schools of the environmental ecological engineering major have shown a significant growth trend, and the number of graduates has also increased accordingly. The OBE teaching model is guided by learners' learning output, focuses on cultivating learners' learning expectations, and conducts teaching activities guided by "reverse design and positive implementation". At present, there are still the following problems in the system structure of applied courses in environmental ecological engineering, and the OBE concept is in line with the theories, methods, practices and goals of college talent training. Based on the OBE teaching mode, this paper explores the optimization measures of applied course structure, which is of great significance to solve the problem of professional talent training and improve the teaching effect.

2. The Problems Existing in the Teaching Process of the Application-Oriented Course System of Environmental Ecological Engineering

2.1 Lack of Clear Professional Norms, Lack of Rationality in Curriculum System Setting

Through the analysis of the training programs of environmental ecological engineering professionals in some universities, it can be seen that there are certain differences in the basic courses of majors between universities[1], and some universities tend to take chemistry courses such as general chemistry, organic chemistry and analytical chemistry[2] , while other colleges and universities tend to botany, zoology and microbiology and other biological courses, and a few colleges and universities tend to engineering mechanics, chemical engineering principles, drawing geometry and engineering drawing and other engineering courses, in the setting of professional core courses are more confusing, professional basic courses and professional courses lack the necessary logical undertaking relationship, so

that it is impossible to build a reasonable professional knowledge system, environmental ecological engineering professional characteristics are difficult to effectively reflect.

2.2 The Connection Between Engineering Practice and Theory is Insufficient

Environmental and ecological engineering is an engineering science that requires a certain foundation in engineering practice, which is very beneficial for students to understand various principles and theories. However, because this major is a new major in colleges and universities, there is a lack of internship bases and insufficient practice venues. Moreover, the theory of teachers has also been limited, and there is always a certain funding gap in practical teaching, resulting in insufficient connection between theory and practice in professional teaching. In the actual teaching, some of the case and experimental principle analysis work on environmental ecological engineering, because it cannot be practiced, teachers can only explain the truth through simple engineering analysis or theoretical calculation when analyzing cases or explaining experimental principles. Under the influence of over-modularization and parametric teaching methods, students' enthusiasm for learning professional courses is greatly reduced.

2.3 The Course Assessment and Evaluation System is Relatively Single

The ultimate goal is to cultivate application-oriented talents specializing in environmental ecological engineering. Scientific and effective evaluation methods and assessment indicators are to evaluate the learning effect of students' professional courses, and it is also the standard for evaluating whether teachers' teaching methods are effective. At present, the evaluation index of environmental ecological engineering teaching adopts the method of combining a single examination score with a certain practical score [3]. However, in some practical activities, some students have the problem of going through the motions, they aim to pass the assessment, and do not apply and strengthen the theoretical knowledge learned in the classroom in the practical activities, and do not have an in-depth understanding and absorption.

3. Optimization of the Application-Oriented Course System of Environmental Ecological Engineering Under OBE-Oriented

3.1 Teaching Content Design based on Professional Learning Output-Oriented

Colleges and universities should reasonably set up theoretical and practical courses of environmental ecological engineering according to the national and social demand for environmental protection talents and the expectations and standards put forward by enterprises for talent training. To this end, teachers need to understand the requirements of national policies and social development for talents, and provide special courses that can highlight the environmental ecological engineering major. When setting up courses, attention should be paid to the connection between various courses, and strive to achieve clear priorities and hierarchies in course arrangement, so as to facilitate the construction of a scientific and clear professional knowledge network. Because the teaching content of the course is usually inconsistent with the actual engineering and the knowledge content is missing or lagging behind, students are prone to feel clueless in the practice of professional teaching, resulting in confusion between the teaching of professional basic knowledge and practical skills. Therefore, it is necessary to update the content of relevant professional courses, remove relatively lagging knowledge, and add new ideas and technologies. Under the condition of environmental engineering, environmental science and ecology as the professional foundation, other relevant majors are selected for key teaching, such as ecological engineering for water pollution prevention and control, ecological engineering for air pollution prevention and control, ecological engineering for soil pollution prevention and control, ecological environmental impact assessment, etc.

3.2 Establish a Comprehensive Environmental Ecology Practice System

A reasonable practical teaching system is

essential to enhance learners' skills, so when conducting practical teaching of environmental ecology, you can improve the practical teaching platform by doing the following work: First, based on China's "production, learning, research and application" policy, school-enterprise cooperation, effectively integrate social resources, and build a stable off-campus practice platform; Secondly, improve the on-campus practical teaching system, such as organizing ecological environment investigation activities, college students' social practice activities, and participating in social organizations' volunteer activities related to environmental protection, and students learn and consolidate their knowledge on ecological governance and ecological restoration in cognitive internship, production internship and graduation internship; Finally, the teaching part of simulated practical training is carried out in a targeted manner [4]. For example, combined with the specific environment design supporting ecological restoration plan, design sponge city rainwater collection and reuse system, rain garden, rural residents' domestic wastewater small ecological wetland treatment system, landslide area ecological restoration system, etc. On the basis of consulting the information, students propose design concepts, so as to form a design plan. The students' participation in the whole process not only effectively improves their participation and sense of acquisition, but also cultivates their ability to analyze and solve problems, engineering practice ability and hands-on ability.

3.3 Expand the Professional Practice Teaching base Inside and Outside the School

The practical process is not only a process of learning, but also a continuation of learning. In the process of practical learning, students are usually due to the limitations of the venue and conditions, coupled with the lack of a good practical foundation, some learning processes are even similar to classroom teaching, which becomes "theoretical teaching" under the appearance of "practical teaching". Colleges and universities should strengthen the construction of on-campus practical teaching bases, make the bases more standardized and maximize the use of teaching resources; In addition, colleges and universities also need to strengthen the development of off-campus enterprise practice teaching bases, so as to solve the problem of practical activities limited by funds, and then form a practical teaching form based on on-campus practical teaching bases and supplemented by enterprise practical teaching.

3.4 Establish an Effective Evaluation System

It is necessary to set up a multi-angle and comprehensive evaluation system. First of all, in terms of curriculum assessment, we should organically combine theoretical assessment and practical assessment, grasp the balance between the two, build a scientific and reasonable practical ability assessment system, and effectively improve students' comprehensive practical ability. The academic evaluation system of environmental ecological engineering major courses mainly has seven mandatory parts, namely attendance, daily homework, stage test, group PPT special report, course paper, in-class experiment and final examination, and one optional part is scientific and technological innovation ability training. Secondly, it is aimed at the evaluation of teacher-student relationship, which is convenient to find out whether students are easy to accept the teacher's teaching methods in teaching. In the process of "teaching and learning", teachers and students are encouraged to establish a good interactive relationship, effectively improve students' subjective initiative, and reduce the teaching burden of teachers. The process of "teaching and learning" should be a link between teachers and students to communicate and communicate with each other, not the previous mechanical indoctrination teaching, the past teaching methods are detrimental to students' learning and mastery of knowledge, and may reduce students' enthusiasm for learning. Finally, regular teacher teaching competitions are organized to evaluate the teaching level and quality of teachers by means of teacher evaluation, student grading, or assessment of students' knowledge mastery. The competition can be a detailed evaluation of teaching content, teaching organization and teaching methods, such as whether teachers have adopted new technologies, new media, new methods, etc. Setting up an effective evaluation system can ensure that the teaching

reform can be implemented in the teaching of environmental ecological engineering, so as to achieve the original intention of teaching reform [5].

4. Construction of OBE-Oriented Environmental Ecological Engineering Professional Application Course Evaluation Index System

4.1 Teaching Objectives

OBE-oriented is focused on learning outcomes and requires clear teaching objectives first. Taking the applied course of environmental ecological engineering as an example, it is necessary to determine the evaluation goals as knowledge goals, ability goals, emotional attitudes and value goals, etc. and carry out targeted cultivation of students' core abilities. Secondly, interest-oriented and problem-oriented can improve students' participation and initiative. Finally, if the overall goal of creation is expected to be achieved, teachers need to determine what students can eventually learn, what the learning effect is, and in what form, and design the curriculum teaching arrangement, teaching process, and teaching evaluation method in a result-oriented manner. Learning outcomes should not be limited to students' final grades and attendance grades, but also include what students actually learn.

4.2 Teaching Process

In the teaching process, teachers should choose appropriate topics to discuss with students according to the content of the teaching, so as to improve students' interest in learning and learning effectiveness, and let teachers and students have positive interaction. First, it is necessary to evaluate students' interest and innovation in the topic selection; secondly, it guides independent analysis and discussion of problems, provides students with time and space to solve problems independently, and designs diversified teaching links according to students' actual situations.

4.3 Teaching effectiveness

Learning motivation helps to increase students' sense of recognition of professional knowledge, which needs to be used as an important indicator of teaching effectiveness. Students' understanding is an important indicator of whether the course learning allows students to really learn something, and the understanding of the content is a direct embodiment of the teaching effect. The evaluation of examination results will be directly related to students' credits, so the evaluation of applied course teaching results should first determine the scoring standards, but also be fair and just to ensure the effectiveness of the course teaching effect. In addition, many students with good academic performance want to get better feedback on their grades, which is their motivation to keep improving. Under the OBE-oriented role, the application-oriented courses of environmental ecological engineering should establish a scientific and perfect performance analysis system, and continue to pay attention to the progress of students.

4.4 Teaching Feedback

Teaching feedback can be explained from the feedback of multiple evaluation subjects and timely feedback of multi-dimensional teaching evaluation system. In terms of feedback from multiple evaluation subjects, OBE can build a comprehensive evaluation scheme combining teacher evaluation, group mutual evaluation and self-evaluation, and introduce multiple subjects such as teachers and students and relevant experts into the course evaluation system. In the form of face-to-face communication, direct guidance and operation reports, all subjects are involved in the evaluation. Whether the feedback method of multiple evaluation subjects adopted by the course can be recognized by students is also an important evaluation indicator. In terms of timely feedback, nowadays, the phenomenon of untimely feedback in university course assessment is widespread, although some courses will conduct regular examinations and display the results in time after the course examination, and students will compare the measured points with the system score to find the shortcomings. There are also courses where grades are seen at the end of the semester, and students do not take these courses seriously, which is detrimental to the implementation of teaching. Under the OBE orientation, the application-oriented courses of environmental ecological engineering need to transform the above problems, continue to pay attention to the teaching process and students' progress, and provide timely feedback. In terms of multi-dimensional learning evaluation system,

OBE-oriented learning evaluation needs to be student-centered, evaluate students' knowledge, skills, qualities and emotions, and pay attention to students' initiative, enthusiasm and progress, and innovate previous teaching evaluations. In terms of designing the evaluation content, it is necessary to highlight the comprehensive characteristics, and evaluate students' learning outcomes by diversified evaluation methods such as summary evaluation and process evaluation, and various indicators such as learning tasks, learning reports, classroom discussions, classroom interactions, and final exams have different weights, and finally form weighted values. Under the leadership of teachers, establish a comprehensive evaluation index system for students' autonomy, which needs to include students' knowledge and skill mastery, course participation, learning methods and attitudes.

4.5 Overall Satisfaction

Overall satisfaction is a subjective assessment designed for students. Whether the applied course has achieved the expected results, whether it has been supported by students, and the degree of recognition and attention by students need to be evaluated about overall satisfaction. Through the course teaching process, students form full understanding and feedback, and then evaluate the overall satisfaction of the proposal, implementation and effect evaluation of the course.

The main title (on the first page) should begin from the top edge of the page, centered, and in Times New Roman 16-point, boldface type. Capitalize the first letter of nouns, pronouns, verbs, adjectives, and adverbs; do not capitalize articles, coordinate conjunctions, or prepositions (unless the title begins with such a word). Please initially capitalize only the first word in other titles, including section titles and first, second-order headings (for example, “Titles and headings” — as in these guidelines). Leave two blank lines after the title.

5. Optimization Effect of OBE-Oriented Environmental Ecological Engineering Professional Application-Oriented Course

The architecture of the applied course of environmental ecological engineering needs to be continuously strengthened and improved in the process of practice. Through the process of research, training and study, collective lesson preparation, group discussion and other processes, teachers of each teaching group gradually solve various problems in the teaching process. In order to accurately grasp the implementation effect of the course and the feedback of teachers and students, online and offline surveys are adopted to understand. According to the survey results, 95% of the students believe that the teaching link is reasonably designed and the teaching content is very practical; 92% of the students believed that the teacher had fully prepared the lessons, the teaching was clear and logical, and the important and difficult points were well explained; 90% of students believe that teachers use a variety of teaching methods, the classroom atmosphere is very good, and they can mobilize their interest in learning; 93% of the students have a new understanding and experience of the learning attitude and learning methods of the applied courses of environmental ecological engineering. 98% of the students are very satisfied with the teaching of applied courses in environmental ecological engineering this academic year. In order to grasp the feedback results of students after the optimization of the course structure, the department also investigated the rationality of the course, the degree of teaching practicality, the overall satisfaction of the course, and the overall satisfaction of the teaching teachers. According to the survey, most students believe that the reformed curriculum system is more reasonable, the practicality of the course content is correspondingly improved, and the overall satisfaction of students with the reformed curriculum system is significantly improved. This survey result is consistent with the original purpose of this reform, which is to improve the practicality and applicability of teaching content, so that students can realize that "what they learn" and "what they should learn" can be, reduce students' learning anxiety, and improve students' interest and motivation to learn. After the optimization and reform of the curriculum system, teachers have improved the overall quality of the teacher team through collective lesson preparation and seminar learning. In short, based on the optimization and reform of the application course architecture of environmental ecological engineering under the OBE orientation, good

results have been achieved, mainly in the following four aspects.

5.1 The OBE Concept Penetrates into the Talent Training Model

First, the reform of the curriculum system has achieved remarkable results. Combined with the needs of enterprises for talents and the characteristics of environmental ecological engineering, the professional training goals are formulated, and the theoretical and engineering contents of environmental science, environmental engineering, and comprehensive embodiment of ecology are set up, including water pollution control engineering, air pollution control engineering, ecological engineering, ecological planning, environmental ecological monitoring, wetland ecological engineering and other courses[6]. Some courses, such as water pollution control engineering, have applied for and been approved as provincial quality courses, and some courses have applied for and received approval for MOOC online courses.

Secondly, the teaching content keeps pace with the development of the times. Through the reform of the teaching content of the course, teachers have supplemented some cases in actual projects for the teaching content, such as environmental impact assessment cases, wetland sewage and wastewater ecological engineering cases, sponge city construction and other different types of cases, as well as some of the latest achievements formed in teachers' scientific research projects, so that students can understand various types of cases and the latest research progress through learning, greatly improve students' interest in learning, and improve the teaching effect of the course.

Thirdly, the teaching conditions in schools have improved. For the problem of the lack of internal and external sites for the applied courses of environmental ecological engineering, under the communication between the college leaders and the school, several teaching laboratories have been obtained for the environmental ecological engineering major, mainly environmental ecological monitoring laboratory, environmental ecological engineering laboratory, environmental ecological restoration laboratory, as well as environmental ecological engineering design, solid waste treatment, sewage treatment, land and spatial planning, and GIS Several off-campus internship bases including internship, environmental and ecological monitoring and evaluation. In addition, the school and college leaders continue to establish cooperative relations with a number of ecological environment enterprises, which has built a platform and provided opportunities for students' internship and employment. The above measures not only meet the teaching needs of the OBE-oriented talent training model, but also effectively improve the comprehensive quality of students.

At the end, the teaching evaluation system has been continuously improved. For the problems existing in the current curriculum teaching evaluation, the school has gradually optimized the existing teaching evaluation system, and comprehensively evaluates teachers with a combination of learning evaluation, peer evaluation, random listening evaluation by leaders, and teaching supervision, rather than unilaterally listening to students' views. In addition, the school organizes a teacher teaching competition every year to provide certain spiritual and material rewards for outstanding teachers, so as to improve teachers' enthusiasm for class, and at the same time create a good campus atmosphere in the whole school and even the whole school.

5.2 Students' Interest in Learning and Overall Quality Are Improved

Through updating the teaching content, implementing case-based teaching methods, and establishing practice bases inside and outside the school, students' enthusiasm for learning has been effectively improved, and the previous indoctrination teaching has been transformed into a situation of actively discussing innovative results with teachers. Most students learn how to apply for projects, finalize projects, defend projects, and experiment creatively. The 2019 environmental and ecological engineering students actively participated in the application of science and technology innovation projects for college students.

5.3 Strengthen Evaluation and Feedback on Students' Learning Achievements

Timely review and feedback on students' learning achievements can help students find

gaps and make continuous progress. However, classroom teaching time is limited, such as flipped classrooms can not achieve everyone's comments. The solution to this problem can be done by making online teaching videos from the traditional classroom teaching, and students can learn independently, watch repeatedly, and practice related tasks before the class. In the classroom teaching, teachers have time to focus on the problems reflected when students do homework before class, solve the difficulties for students, and guide the students' learning process, so that students' learning achievements can be communicated, feedback and evaluated in a timely manner, effectively improving students' learning efficiency and orientation.

5.4 Teachers' Teaching and Scientific Research Capabilities Have Been Greatly Enhanced

Through curriculum teaching reform, school-enterprise establishment of cooperative relations, and the establishment of innovation and entrepreneurship bases for college students, teachers and students have carried out good interactive exchanges, some teachers lead students into enterprises, and some teachers lead students to carry out academic exchanges [7-9]. In this way, the comprehensive quality of students has been greatly improved, and the teaching and research ability of teachers has also been enhanced.

6. Conclusions

In summary, the applied courses of environmental ecological engineering in colleges and universities have attracted the attention of teachers and students, and many universities in China have actively participated in the teaching reform practice of the course, including theoretical teaching, experimental teaching, practical teaching, etc., and gradually improved the construction of the course teaching materials, teaching methods, teaching evaluation, and platform system. By applying the OBE teaching mode to the teaching content design, practice system, practical teaching base and evaluation system of the applied course of environmental ecological engineering, the OBE teaching mode can be made clear in teaching content design, the teaching practice system more reasonable, the course implementation more operable, and the course evaluation more objective. However, in order to better integrate the OBE teaching model into the teaching of applied courses in environmental ecological engineering, it is necessary to conduct in-depth research on the future curriculum teaching reform.

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