

Course construction and practice of water pollution control engineering in the background of carbon neutralization

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Abstract: Today, with the rapid development of the world economy, we have also made great achievements in the process of building a green ecological civilization. However, in this process, resources and environmental issues have attracted more and more attention. In recent years, problems such as haze and water pollution often occur. The growth rate of GDP has always maintained at about 10%, while China's resource reserves are relatively small and the per capita share is low. With the growth of China's economy, society and population, and the improvement of people's awareness of environmental protection, green GDP has gradually become an important indicator to measure a country's scientific and technological progress and national strength. This paper discusses the content reform and teaching practice of the water pollution control engineering course of environmental engineering specialty under the background of carbon neutralization. New concepts and new processes of sewage treatment are introduced into the teaching, so that students can establish new concepts of sewage treatment process design, make students clear the development trend of the sewage treatment industry in the future, master the new technology of sewage treatment, broaden their industrial vision, and cultivate their innovative consciousness, To enable students to have enough competitiveness and development potential in graduation employment and future professional work.

Keywords: Carbon neutralization; Water pollution control works; Curriculum construction and practice

1. Introduction

Under the "carbon neutral" environment, China's green consumption is gradually forming a new trend. In 2013, the state clearly pointed out that we should vigorously develop energy-saving technologies, develop recycling energy technologies, produce and use clean, efficient energy and other environmentally friendly products, and guide people to establish a scientific way of life [1]. At the same time, the government should increase subsidies to enterprises to promote the consumption of renewable energy. China's green industry will become a new trend in the "carbon neutral" era. At present, we are actively promoting the development of green economy, advocating low-carbon consumption, energy conservation and emission reduction. "Carbon neutrality" is an emerging energy technology [2]. In the process of China's development, there are many problems, the reasons include: first, the industrial structure is unreasonable; Second, low energy efficiency, environmental pollution; Third, because the cost of environmental governance is too high, the company's profit space is small. With the enhancement of environmental awareness and the continuous improvement of resource utilization, the concept of green consumption, energy saving and emission reduction has been increasingly valued by people, and gradually penetrated into People's Daily life, so that we realize the importance of saving resources and protecting the environment. In recent years, with the rapid development of China's economy and the acceleration of urbanization, water pollution control has increasingly become the focus of people's attention [3]. Training special water pollution control personnel can ensure the smooth progress of water pollution control in China, and play a positive role in human health and the protection of the ecological environment. However, when graduates of environmental engineering major look for jobs after graduation, there are some problems due to lack of actual engineering experience and technical level [4]. Therefore, the practical teaching mode of "water pollution control engineering" has been reformed and explored, which can not only help students understand and master professional knowledge, but also improve their actual engineering design and

operation management ability, and strengthen students' professional operation skills, Thus, the quality of talents and their popularity in employment have been improved, so that they can use what they have learned and make contributions to the society.

2. Carbon Neutralization Background

At present, ecological construction and environmental protection have caught the wide attention of the world, and our country is actively responding to the calls of developing low carbon economy [5]. In order to promote the sustainable development of society, our country has taken a series of energy saving and emission reduction measures; At the same time, with people's living standards and attention to the ecological environment, the concept of "gold and silver mountains" and "green city is the best city in the world" has been recognized by more and more people. With the rapid development of economy, a series of problems such as haze and water pollution have also been produced [6]. "Green, low carbon" is an important topic of building a well-off society at present. At present, our country is accelerating the industrialization process, because of industrial and environmental pollution, our ecological environment is worsening day by day, so the measures to implement energy saving and reduce energy consumption are imperative. At the same time, due to the improvement of people's life quality and environmental protection awareness, "low-carbon economy" has become an inevitable, therefore, green, low-carbon economy has been widely recognized by all countries in the world, the development of green, low-carbon economy is imperative. We should: 1) Actively develop renewable energy, new energy and clean production technology. China is a large population country. With the progress of science and technology, the use of mineral energy is also increasing. At present, many countries in the world are using new energy such as solar energy to replace oil and develop into industry and construction [7]. At the same time, we are also actively developing renewable energy such as solar energy and wind energy. 2) Strengthen the investment in environmental protection. At present, the development of renewable energy and new materials, but due to the immature technology, the application in energy conservation and emission reduction is not perfect. With the increasingly prominent issues of global economic integration and global warming, green economy has become a major issue of common concern to all countries in the world. In the context of carbon neutrality, we should actively carry out low-carbon activities, improve energy efficiency and strengthen environmental protection. 3) Accelerate the development of clean and renewable energy systems. At present, we should vigorously develop new energy sources to replace traditional fossil fuels and other non-renewable energy sources, such as solar energy, wind energy, hydropower, nuclear power, et al.

3. Practice innovation points of water pollution control engineering course in the background of carbon neutralization

3.1. Connection in practical teaching

The teachers' research topics and practical engineering projects are linked, closely linked, with strong coherence. The combination of theory and practice enables students to maximize their innovative ability, enable them to learn independently, research and analyze problems scientifically, cooperate and help each other, and communicate. The course of water pollution control engineering mainly teaches the basic principle of sewage treatment, the structure and design calculation method of treatment facilities, and the selection of sewage treatment method and process flow [8]. In the teaching process, teachers should pay full attention to the combination of practice and course explanation, such as integrating the new technology of energy conservation and emission reduction of sewage treatment into the course teaching, so that students can have a deeper understanding of the current common sewage treatment methods and processes, which also helps students to have a deeper understanding of the content of the water pollution control engineering course.

With the development of the sewage treatment industry and the update of technological progress, the "carbon neutralization" concept has been incorporated into the new sewage treatment technology in the actual project [9]. In the specific curriculum design, teachers need to collect and sort out relevant information, such as the background of the "double carbon" goal, the innovation awareness of sewage treatment technology, the "carbon neutralization" sewage demonstration plant process and operating parameters, and then determine the specific chapters to be incorporated according to the content of the information, According to this, the course outline is revised, the lecture notes and lesson plans are rewritten, the corresponding courseware is made, the teaching plan combining practice with teaching is

formulated, and the course of water pollution control engineering which is newly supplemented with new technologies and new processes in the industry is taught in the subsequent classroom teaching, so as to explore and improve the teaching methods and realize the connection of practical teaching.

3.2. Make students' subjectivity fully manifest

The traditional teaching method mainly focuses on teachers teaching knowledge points and students listening to the lecture and taking notes. Although there are questions in class and answering questions after class, such setting can only meet the needs of students who ask questions, but cannot fully mobilize the learning initiative of all students. In such teaching process, students usually follow the teacher's explanation ideas closely. It's hard to think outside the box and think independently [10]. The practical course is mainly designed and completed by students from the perspective of students, and the teacher is only responsible for guidance, so that students can give full play to their talents and creativity, encourage students to think actively, stimulate their learning enthusiasm, make students become the subject of classroom teaching, and fully demonstrate their initiative in the teaching process.

3.3. Positive interaction between industry, university and research

The cooperation between university and society is the inevitable trend and demand of current social development. The education and research of colleges and universities, especially the development of application-oriented majors, must be based on the needs of society. Therefore, in teaching and scientific research, we should strengthen cooperation with relevant enterprises to solve practical environmental problems and avoid disconnection with society. Combine teachers' scientific research and practical teaching organically, combine practice with practical engineering, meet the needs of society faster, and become a real application-oriented talent.

4. Practice strategy of water pollution control engineering course in the background of carbon neutralization

4.1. Teachers should make reasonable teaching design according to the course content

At present, monotonous teaching mode, monotonous classroom atmosphere, lack of interaction between teachers and students, unable to stimulate students' learning enthusiasm, resulting in low classroom efficiency. Any teaching method cannot adapt to various learning methods, so one or more forms can be chosen according to different chapters, or bold innovations and attempts can be made in flipped classrooms. For example, some simple chapters can be divided into groups of students to make PPT, and then supplemented and corrected by teachers, which can not only deepen the understanding of knowledge, but also help students to summarize and analyze. In the abstract part of content, such as biological treatment technology and process, basic concepts are combined with field practice, engineering examples and BIM animation are combined to deepen students' understanding of biological treatment and enhance their interest in teaching. Teachers should give students ample opportunities to communicate and think, and guide them to discuss the topic of inquiry. Through the understanding and grasp of water environment, cultivate their innovative thinking.

4.2. Analysis of teaching content reform

There is a great disharmony between the class hours and the course contents of Water Pollution Control Engineering, resulting in tense class hours. Students have no time to understand, digest and absorb in the class, and cannot achieve the teaching objectives. This book is divided into three categories: principle, tool and application. It can be used for auxiliary teaching in various ways according to the characteristics of the course content. In terms of teaching content, we should fully consider the mutual connection and coherence between the front and the back courses, and strengthen the link between the preceding and the following. Through the use of mind mapping, students can better understand and remember the connection of these knowledge. Through the online teaching platform, the college will upload the PPT courseware in advance, let students download it in advance, let students preview it in advance, get familiar with the key points and difficulties in teaching, and make records. Immediately after class, the wastewater treatment processes and disposal devices required for this course will be displayed on an online teaching platform for consolidation and understanding after class. The mixed teaching method of "preview before class+listening plan+offline

consolidation" can not only effectively improve students' learning efficiency, but also deepen the understanding of sewage treatment process, and train and cultivate students' engineering thinking. At the same time, along with the continuous development and innovation of our water treatment technology and technology, it is very important to update its teaching content in time and keep pace with the trend. For example, the anaerobic biochemical treatment of wastewater, although a variety of different anaerobic treatment technologies and reactors are listed, some parts have been eliminated or basically abandoned, but still in the textbook, and as time goes by, new teaching methods have appeared, these new teaching methods have not entered the textbook, the knowledge structure is not very new, the teaching content cannot keep pace with The Times. The section on advanced oxidation technology simply describes some typical treatment methods without in-depth research and comparison. Teachers should supplement the classroom with the latest or deeper knowledge about it to help them continue learning later in their careers.

4.3. Create innovative experimental classrooms

The traditional experimental teaching method is very old-fashioned. The teacher will only teach them how to do the experiment and let them do it according to their own ideas, instead of understanding their experimental objectives. They just do some simple experiments, and cannot fully exert their creativity and initiative. Therefore, on the basis of the curriculum outline, we put forward an alternative plan: select representative engineering experiments, which are selected by students according to their hobbies, and are organized by students of the same experiment spontaneously. Each person will submit a set of experimental designs, and under the guidance of teachers, select the best experimental plan to carry out, and the students of the best plan will usually get extra points, So as to enhance their competitive awareness and stimulate their initiative and independent thinking ability. For example, in the chapter "Biofilm Law", an experimental course can be set up to introduce wastewater and biological carriers of various water quality, and students can write corresponding experimental plans in groups, modify them under the guidance of teachers, and then carry out biofilm treatment by themselves, so that they can personally experience the role of biofilm. This will greatly increase the workload of teachers, but it can give students practical exercise, so that their independent thinking and problem solving ability has been greatly improved. At the same time, students should also be encouraged to actively participate in the creative experiments of college students, to choose the theme, expand the thinking and develop the individual potential.

4.4. Advance basic theory and practice

The theoretical knowledge that students learn must be able to guide practice in order to achieve the ultimate goal of teaching. Learning without practice is empty talk and empty talk. Generally, after all the courses, the school will arrange students to visit and practice in the sewage treatment plant. However, because the content of the course is too complex and abstract, it is difficult for students to organically combine their knowledge with the on-site technology and equipment. During the visit, they are often careless and cannot really integrate into the actual project. In fact, the field investigation of the sewage treatment plant should be carried out in advance. The university provides graduation practice for college students in order to better integrate them into the society and adapt to the enterprise. However, there are also some students who treat internship as a job without active thinking. Through scoring the practice process, strengthen the practice assessment system; The school has established an off-campus practice base based on a nearby sewage treatment plant. The wastewater treatment technology is studied in depth. At the same time, working closely with environmental protection companies, students are able to get involved in the operation and commissioning of sewage treatment systems and gain basic work experience on the front line. Using the above methods, students can form a straight line of "basic principle knowledge -- application situation -- question raising -- problem solving" in their mind, so that students can establish a complete set of engineering logic and have certain engineering practice ability.

4.5. The transformation of examination methods in the new era

At present, the undergraduate purpose examination is conducted in the form of written examination, supplemented by the usual scores. When the examination is closed, it is more based on memory than used to test questions. Moreover, most college students are cramming for the time being. They don't take classes seriously. The exam is just to cope with the exam, which clearly violates the purpose of the university. I can only cope with the exam and have no practical ability. It will take some time to

integrate into the society. Therefore, schools should improve the evaluation system of the curriculum; through the phased evaluation of students' learning objectives, learning tasks and learning achievements, the whole process of students' learning can be comprehensively evaluated.

5. Conclusion

Our country has now entered the stage of industrialization, the scale of industry is also growing. In order to achieve the purpose of saving energy, saving resources and protecting the environment, we need to change the traditional extensive development mode, and adopt new energy-saving technology and new materials, so as to achieve the purpose of saving energy, saving resources, protecting the environment, promoting the harmonious development of economy and ecology. The quality of college students is an important part of college education, when facing the severe challenges of the "water pollution control project" of all colleges and universities in the whole country, the author based on his own years of teaching experience and understanding of the "water pollution control Project", from several aspects to improve, hope our similar colleges and universities in the practical application to provide some reference. So as to achieve better teaching effect. Developing low-carbon economy is an inevitable choice for a country to achieve sustainable development and an important means to promote social, economic and ecological civilization to a higher level.

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