

Systematic Teaching Design of“Air Pollution Control Engineering”Based on Continuous Improvement

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Abstract: They should be optimized that the teaching activities related to Air Pollution Control Engineering under the guidance of the concept of continuous improvement.According to the achievement of the teaching results of the pre-course,the teaching contents and methods of the post-course are adjusted.And the teaching activities that connect with each other are constructed among the courses,and a systematic teaching and learning process is established,so as to integrate the classroom teaching of the course group,so as to systematize students’knowledge,reflect a better learning state,and promote independent learning and enhance the ability to identify and solve complex environmental engineering problems.

Keywords: Continuous improvement(CQI);Systematization;Engineering certification

1. Introduction

With the development of Internet,students can make more effective use of fragmented time to acquire knowledge.While increasing the convenience of acquiring information,the acquired knowledge tends to be fragmented,which is mainly manifested in learners’attention disorder and shallow learning^[1-3].Generally,the performance of individual knowledge points is OK,but the performance of the overall output is poor,especially when the task requires systematic and comprehensive knowledge,the performance is not ideal.Therefore,it is necessary to help students find the gap between knowledge and promote autonomous learning through systematic guidance and knowledge integration teaching^[4,5].

Guided by the concepts of Student Centered(SC),Outcome-based Education(OBE)and Continuous Quality Improvement(CQI),based on the achievement evaluation of course teaching results,we carry out integrated teaching construction of courses such as“Air Pollution Control Engineering”,“Air Pollution Control Engineering Curriculum Design”,“Environmental Engineering Experimental Methods and Technologies”,and“Production Practice”,and form a progressive“evaluation-feedback-improvement”mechanism between courses to help students systematically integrate knowledge and promote their ability to engage in lifelong learning and self-directed learning

2. Do a Good Job in Teaching Design Based on Continuous Improvement

The purpose of continuous improvement is to find the deficiencies of teaching links,timely implement the adjustment of teaching,and achieve continuous quality improvement.The Certification Standard for Engineering Education(T/CEEAA 001-2022) requires that“curriculum system setting and curriculum quality evaluation are carried out regularly.”An evaluation mechanism for the achievement of graduation requirements should be established to regularly carry out evaluation of the achievement of graduation requirements.However,the evaluation system of curriculum achievement may have some defects due to various reasons^[6].Graduation requirement achievement evaluation is carried out once every four years,and course quality evaluation is carried out once a year,that is,for a certain course,the continuous improvement implementation of the current learning outcome analysis results can only be implemented in the next round of courses and the beneficiaries of continuous improvement of the course is not the students evaluated,but the next students.

The environmental engineering major of our university has the courses of“Air Pollution Control Engineering”(referred to as“*Atmosphere*”),“Air Pollution Control Engineering Curriculum Design”(referred to as“*Design*”),“Environmental Engineering Experiment Technology and Method 2”(referred to as“*Experiment*”),and“Production Practice”(referred to as“*Practice*”).They are with

strong content correlation, especially the first three courses, their content is interlinked, and the knowledge structure is consistent, the teaching time has continuity, which form a pre order and post order relationship. The teaching results of "Atmosphere" will affect students' performance in "Design", "Experiment" and "Practice". However, according to the achievement evaluation mechanism, the continuous improvement measures taken by the achievement evaluation results of "Atmosphere" only affect the teaching activities of the next "Atmosphere", and do not affect the teaching activities of the current "Design" and "Experiment". If the evaluation results of the teaching results can be applied to the teaching improvement of the subsequent courses, the achievement degree of the subsequent courses of current students can be improved through the achievement degree evaluation, so as to improve the achievement degree of graduation requirements.

Through the research on the index system of course content, training objectives and graduation requirements, based on the certification objectives of students' own learning ability and lifelong learning ability cultivation, we divide knowledge points into details after the assessment of the pre-course, analyze the course content corresponding to the index with low achievement degree, locate specific teaching links and knowledge points, and identify the key points that need to be strengthened in the post-course. It can also locate students who have a low degree of achievement in a certain link and pay special attention to them in the subsequent course. By assigning different tasks, teachers can consciously guide students to self-learning and self-improvement.

3. Take Students as the Center and Adjust Teaching Activities in a Timely Manner

According to the teaching plan, after the completion of the "Atmosphere" course, the course of "Design" and "Practice" will be set up, and the three courses will be offered in the same semester. Through the output analysis of "Atmosphere" course, the reasonable teaching and implementation mode of "Design" course is designed. "Design" requires students to apply the theories of "Atmosphere" and other advanced courses in combination with practical processes to analyze and solve complex air pollution control engineering problems. Obviously, the output of the pre-course "Atmosphere" can affect the output of the course "Design" and "Internship". Through the course evaluation of "Atmosphere", we find out the links with low degree of achievement of the course, design and strengthen modules, so that students can take the initiative to sort out the fragmented knowledge in "Design" and "Practice" courses, and consolidate and systemize the knowledge through the application of practice. If someone has a low level of achievement in certain knowledge points, in the "Design" course, teachers assign special learning tasks, use online courses, reading expansion, individual tutoring and other ways to urge students to use fragments of time to improve themselves and enable students to fully appreciate the fruits of systematic knowledge, realize that the end of a course does not mean the end of learning, further acquire knowledge through continuous learning, and fully understand the importance of lifelong learning. Similarly, the evaluation results of "Design" and "Practice" can be used in the teaching activities of "Experiment".

The continuous improvement of a course is implemented within the course group through this course teaching correlation, and the beneficiaries are no longer just the next grade students who learn the same course, but the same learning group being evaluated. According to the "evaluation-feedback-improvement" cycle, the evaluation results and continuous improvement measures are applied to subsequent courses, the evaluation cycle of course achievement is shortened, and the beneficiaries of continuous improvement are extended from "benefits for the next grade of students" to "benefits at the grade", which is the full embodiment of "student-centered".

4. Reasonably Utilize Network Resources to Design Systematic Teaching Links

Students are more inclined to accept network information, so it is an important part of teaching to help students systematically integrate fragmented knowledge by using information tools^[7]. In the teaching of "Atmosphere" and its related courses, we make full use of the interactive function of smart classroom, design teaching links according to students' interest points, and promote students to organically connect knowledge points, lines and areas to form a systematic knowledge network. "Atmosphere" course adopts mixed mode teaching, "Experiment" course sets online simulation experiment, "Practice" link introduces online cloud class, etc. In the in-class discussion, the first designated group is required to provide a rough solution, explain it to all students and accept questions. The second group must systematically improve the first group's plan and explain and question it in the same class, recurring in sequence. When each group has completed the explanation and questioning process, all groups then submit a complete solution. Through such a circular discussion process, students can imperceptibly penetrate theory, application, analysis, and design into their brains.

5. Conclusion

Continuous improvement is not only the concept of engineering education certification, but also the purpose of engineering education certification, and the guarantee of "student-centered" and "output-oriented education". Under the background of constant changes in the ways and approaches of students' knowledge acquisition, the "evaluation-feedback-improvement" mechanism is established among related course groups. And the teaching strategy of the post-sequence course is adjusted timely through the

evaluate” on the pre-sequence course, and the results of course quality evaluation are applied to the same grade of students to improve the overall achievement of the training goal.

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