

Exploration of Bilingual Teaching in the "Modern Control Theory"

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Abstract

Based on the characteristics of the "Modern Control Theory" course and the knowledge structure of automation majors in application-oriented undergraduate institutions, this paper explores the teaching issues of this course under the requirement of bilingual instruction. Through educational reform and course development, several effective measures have been summarized, including the adoption of flexible bilingual teaching methods, the selection and adjustment of English textbooks, and the development of multimedia courseware in a bilingual teaching environment.

Keywords

Modern Control Theory, Bilingual Education, Educational Reform.

1. Introduction

"Modern Control Theory" has always been a core course in the talent training program for automation majors, focusing on the establishment of system state-space representations and performance analysis. It emphasizes cultivating automation students' abilities in analyzing and calculating control theory, as well as applying control theory to solve practical engineering problems. To enhance the professional English proficiency of automation students and promote their ability to read foreign literature in the field of automation, the talent training program has revised the original "Modern Control Theory" course into a bilingual course titled "Modern Control Theory (in English)". Alternatively, it can be named directly as "Modern control theory" (bilingual course) to indicate its bilingual nature.

The implementation of bilingual teaching aims to actively utilize high-quality curriculum resources from both domestic and international sources ^[1], stay informed of technological innovation achievements and new trends in disciplinary development both at home and abroad, cultivate students' ability to consult foreign language literature and engage in professional academic exchanges directly in a foreign language, and promote open education practices.

2. Content of Bilingual Education Construction

2.1. Course development

In view of the actual situation where students' English comprehension ability is relatively weak, a pre-class group learning method is adopted, that is, students are organized into learning groups for study and discussion outside the classroom ^[2], to cultivate their active learning ability and English comprehension ability. During the class, multimedia teaching is the main method, with courseware designed to be simple, clear, and illustrated with both text and images. At the same time, blackboard teaching is used to write down key points, difficulties, and complex sentences on the blackboard, which are gradually reinforced to prolong students' visual retention and enhance memory ^[3]. After class, an online teaching platform is used to release extracurricular reading materials, course assignments, etc., to facilitate knowledge

internalization and mastery, with a focus on improving difficult points. Teachers can provide targeted guidance based on students' feedback.

2.2. Textbook development

The first challenge in implementing bilingual teaching is the lack of readily available bilingual textbooks in China. We have introduced a series of original foreign language textbooks and teaching reference books, but there are significant differences in content, format, class scheduling, and traditional teaching philosophies compared to the actual teaching situation in China^[4]. Coupled with the limited conditions of the students themselves, using original textbooks exclusively makes it difficult for students to accept and grasp the material. Therefore, we will intensify efforts to develop teaching materials for this course and create supplementary textbooks with Chinese-English comparisons.

2.3. Development of teaching resources

Establish a course website for this course, and develop a comprehensive resource library that includes the syllabus, teaching plans, teaching materials, and test questions. Utilize high-quality course resources from open educational platforms, self-built resources by the school, the school's online teaching platform, and smart teaching tools to implement flipped classroom teaching and improve educational quality.

This course will fully utilize both online and offline resources for teaching. In addition to following the school's schedule, students can also engage in online learning based on their own situation and receive instant online answers to their questions, which will enhance their learning outcomes. In response to issues and problems that arise during the development stages of the course, members of the course team will adjust the syllabus, teaching plan, teaching content, and teaching methods accordingly based on the actual teaching effects. At the same time, they will further strengthen the construction of the teaching staff and improve students' interest in learning. Members of the course team also continuously exchange teaching experiences with each other to improve teaching effectiveness^[5].

3. Summary

3.1. Significance of course development

Setting this course as bilingual instruction has several significances: Firstly, it is difficult for students to be exposed to specialized academic vocabulary in English learning, let alone common sentence patterns used in specific disciplines. In actual bilingual teaching, students can develop English thinking within the scope of disciplinary knowledge, the ability to consult foreign language literature, and the skill to engage in professional academic exchanges directly in a foreign language. Moreover, bilingual textbooks are closely linked to the latest international scientific developments, allowing students to more directly absorb the latest viewpoints, concepts, theories, and ideas, enabling them to better occupy the forefront of science and integrate into the international community more quickly. Secondly, in the process of bilingual teaching, teachers not only acquire the ability to teach in two languages but also become familiar with two different cultures through the use of these languages. As the saying goes, "Stones from other hills can be used to polish jade," which greatly benefits the renewal of teachers' teaching philosophies and the improvement of their teaching abilities. Thirdly, the development of bilingual courses aligns with the requirements of professional evaluation and the construction of basic education and basic skills as stipulated by the Ministry of Education. Fourthly, implementing bilingual instruction in schools helps strengthen quality education, promotes educational reform, and achieves open education.

3.2. Features of course development

- (1) Emphasizing the integration of traditional classroom teaching and modern teaching methods to construct a comprehensive and multi-perspective teaching mode: Fully utilizing modern educational tools, multimedia technology is employed to assist in explaining dynamic knowledge points and expanding perspectives, combining traditional teaching with multimedia teaching to enhance teaching effectiveness.
- (2) In order for students to truly grasp the essence of original English materials and to enable them to master professional English for future application in practical work, additional original English materials are collected for students to choose and use voluntarily, beyond the textbook.
- (3) Strengthening classroom interaction and flipping the classroom to stimulate students' curiosity about theoretical knowledge, while encouraging students to participate in classroom discussions in English, creating a bilingual teaching atmosphere.

3.3. Deficiencies in curriculum development

The bilingual curriculum development has achieved remarkable results in practice, but there are also some defects and deficiencies, which may affect the teaching effectiveness of the course and the learning experience of students. The following is a detailed analysis of the defects in bilingual curriculum development.

- ① Inadequate teaching staff: Bilingual teaching places high demands on teachers, who not only need to have solid professional knowledge but also good foreign language proficiency and teaching skills. However, in reality, teachers with such comprehensive qualities are rare, leading to a relatively weak teaching staff. Some teachers may have deficiencies in foreign language expression and find it difficult to conduct classroom teaching in fluent foreign language, which affects students' learning outcomes.
- ② Mismatch between teaching content and language difficulty: The content of bilingual courses often involves in-depth professional knowledge, while students with high proficiency in a foreign language may not fully possess the corresponding professional background, leading to a mismatch between language difficulty and professional knowledge difficulty. The teaching content may be overly biased towards one aspect, such as emphasizing language teaching too much while neglecting the imparting of professional knowledge, or vice versa.
- ③ Single teaching method: Bilingual teaching should adopt diversified teaching methods to stimulate students' interest and enthusiasm. However, in actual teaching, some teachers may still use traditional lecture-based teaching methods, lacking interactivity and practicality. There is a lack of teaching methods and strategies tailored to the characteristics of bilingual teaching, such as how to effectively combine language teaching with professional knowledge teaching, and how to improve students' language proficiency.
- ④ The evaluation system is inadequate: The evaluation system for bilingual courses should take into account both students' language proficiency and their mastery of professional knowledge. However, in practice, the evaluation system may be overly focused on one aspect, such as only assessing students' language proficiency or only examining their grasp of professional knowledge. There is a lack of an effective formative assessment mechanism, making it difficult to provide timely feedback on students' learning progress and effectiveness, and to adjust teaching plans accordingly.
- ⑤ Differences in student adaptability: There are variations in students' language proficiency and professional abilities, and some students may struggle to adapt to the pace and difficulty of bilingual instruction. The lack of personalized teaching plans and support measures, such as tutoring and remedial classes, results in some students falling behind in the teaching progress.
- ⑥ Lack of textbooks and resources: The selection and compilation of bilingual textbooks present a challenge, as there are not many textbooks suitable for bilingual instruction available

on the market. The lack of abundant teaching resources and supplementary materials, such as multimedia teaching materials and practical cases, affects the teaching effectiveness.

Although the course development has not been long, we are adept at and diligent in learning, absorbing, and drawing inspiration from advanced and modern educational concepts and technologies. The course team has made beneficial attempts and accumulated valuable experience in the practice of educational reform. The networking of the course includes resources such as course introductions, teaching archives, teaching content, exercises and simulated practices, electronic lesson plans, teaching videos, as well as online Q&A. It integrates traditional teaching with modern educational technology and gradually achieves an organic and perfect combination of the two in the teaching process.

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