Education Reform and Development, 2024, Volume 6, Issue 7
https://ojs.bbwpublisher.com/index.php/ERD
Online ISSN: 2652-5372
Print ISSN: 2652-5364

# Bilingual Teaching Practice and Research on Principles of Automatic Control Course

**Qingyun Yang, Xiangyu Chu***

School of Mechanical and Electrical Engineering, Zaozhuang University, Zaozhuang 277160, Shandong Province, China

***Corresponding author:** Xiangyu Chu, yqysmee@uzz.edu.cn



**Abstract:** With the accelerating process of economic globalization, China's requirements for various types of talent are also increasing. There is a demand for engineering talents to have bilingual abilities. Implementing bilingual teaching for engineering students has become a major point of teaching reform in universities and a major measure to cultivate bilingual talents in engineering. This article will focus on the course Principles of Automatic Control, explain the significance of bilingual teaching, analyze the current difficulties faced by bilingual teaching in this course and propose corresponding countermeasures. The aim is to explore relevant teaching strategies, construct high-quality bilingual teaching classrooms for this course, cultivate high-quality bilingual scientific and technological talents for the country and promote rapid economic development in China.

**Keywords:** Principles of automatic control; Bilingual teaching; Teaching practice

**Online publication:** July 29, 2024

## 1. Introduction

The principle of automatic control is an important foundational course for undergraduate majors in automation, mechanical, electrical and related fields, providing necessary analytical methods for further research in subsequent courses [1]. Constructing a bilingual teaching classroom in the course of Principles of Automatic Control, allowing students to understand professional knowledge in multiple languages, can effectively improve their bilingual expression ability, enhance their professional knowledge level, enhance their ability to cope with complex work environments and promote the comprehensive development of their overall quality.

### 1.1. The significance of bilingual teaching in the Principles of Automatic Control course

Using bilingual teaching in the Principles of Automatic Control course can provide students with new ways of thinking, allowing them to think and solve problems through different ways of thinking when encountering problems [2]. Secondly, in terms of the current international situation, bilingual teaching can improve the English proficiency of engineering students, meet the standards for talent demand at home and abroad, effectively enhance their employment competitiveness and broaden employment channels. Moreover, while

taking this course, students inevitably need to read domestic and foreign literature, especially high-level papers usually published in international journals in English. Students will encounter a large number of professional vocabulary and complex concepts, theoretical knowledge, etc. Non-engineering English talents may not accurately understand the core of the article when translating, which may lead to errors. Bilingual teaching can enable students to improve their professional abilities as well as have the ability to independently study advanced foreign journals, promoting their comprehensive development and becoming composite talents with strong professional qualities and high English proficiency [3]. Finally, bilingual teaching in this course can effectively promote discipline construction and enhance the strength of engineering majors. In the context of economic globalization, many students choose to study abroad for further education. Bilingual teaching can improve their English proficiency, help them understand cutting-edge knowledge, keep up with international higher education and quickly adapt to the teaching environment abroad.

## 2. The dilemma of bilingual teaching in the Principles of Automatic Control course

### 2.1. Weak teaching staff

Teachers play a leading role in the teaching process and have a direct impact on the learning outcomes of students. The first challenge encountered in bilingual teaching in the Principles of Automatic Control course is the problem of weak teaching staff. Bilingual teaching places higher demands on teachers' English proficiency and professional ability. Teachers not only need to have solid professional knowledge and teaching ability but also have solid English oral expression ability. During the teaching process, they should flexibly switch between two languages and explain relevant knowledge points thoroughly [4]. From the current teaching situation, as an important course in engineering majors, the principle of automatic control has many professional vocabularies, and some teachers have limited English proficiency, making it difficult to switch between Chinese and English in teaching.

### 2.2. Inappropriate textbook selection

Textbooks are the main basis for teacher teaching. In bilingual teaching of automatic control principles, textbooks play an important role. However, suitable textbooks and teaching materials have not yet been found for bilingual teaching of this course. Some universities advocate choosing original English textbooks from abroad. Although such textbooks have advantages such as broad content and advanced viewpoints, all English textbooks require students to have a high level of English proficiency, making it difficult to understand the content of the article and may actually "drag down" the learning of professional courses. Moreover, the knowledge division and layout of English textbooks differ greatly from domestic textbooks and the teaching objectives are different. Even if Chinese and English textbooks are used together, it is difficult to unify them.

### 2.3. Outdated teaching methods

In the teaching of Principles of Automatic Control course, some universities still adopt the traditional teaching method of cramming, with written tests as the main evaluation criterion. Students are prone to develop a sense of boredom when facing highly abstract professional knowledge, especially in bilingual teaching, which requires students to have a certain level of English proficiency. Students need to understand relevant professional knowledge on the basis of understanding English words, which indirectly increases their learning pressure. Teachers do not pay attention to interacting and communicating with students, do not understand their specific English proficiency, and it is difficult to grasp the proportion and language difficulty of Chinese and English used in the classroom. Coupled with the complexity of engineering professional knowledge,

students cannot understand the teaching content, affecting learning effectiveness and undermining their learning enthusiasm [5].

## 3. Strategies for bilingual teaching in the Principles of Automatic Control course

### 3.1. Enhancing teacher professional literacy and building a bilingual teacher team

Teachers play an important role in the entire teaching process by integrating pre-class teaching content planning, in-class teaching ideas guidance and atmosphere creation and post-class teaching effectiveness evaluation and improvement. Improving teachers' professional competence significantly impacts students' learning outcomes [6]. Teachers should strengthen the construction of the teaching team and provide teaching and training channels for teachers. Universities can arrange for teachers of this course to participate in English training classes, invite foreign language college teachers to join the training team, improve the English-speaking ability of professional course teachers and also arrange for professional course teachers to study abroad, learn professional knowledge in an English-speaking environment and improve the English-speaking level and professional English ability of teachers. The school regularly organizes seminars, symposiums, etc. to provide a platform for teachers to exchange experiences and share resources, learn excellent teaching methods from each other and improve their teaching system. Universities should improve their teaching evaluation mechanisms, establish incentive systems and provide appropriate rewards to teachers who excel in bilingual teaching to motivate them to enhance their comprehensive literacy [7]. Universities should build a supervisory team to regularly attend classes, evaluate bilingual courses of teachers and provide certain suggestions. An excellent bilingual teacher must also possess the spirit of lifelong learning. Teachers can use their leisure time to watch excellent foreign teaching videos online, practice their English teaching abilities, constantly discover their shortcomings, adjust and improve them, and provide students with better-quality bilingual courses.

### 3.2. Choose appropriate textbooks and enrich teaching resources

Any course should have suitable textbooks and abundant teaching resources as guarantees. When exploring bilingual teaching in the Principles of Automatic Control course, teachers and schools should choose appropriate textbooks based on the actual situation of students. For students who are new to bilingual teaching methods, teachers should carefully consider their psychological acceptance ability and actual language proficiency when selecting textbooks to avoid the fear of difficulties caused by language proficiency [8]. For example, in the selection of textbooks on the Principles of Automatic Control course, Farid Golnaraghi, Benjamin C. Kuo's "Automatic Control Systems (Tenth Edition)" can be chosen, which has been adopted by multiple universities in previous versions and has high teaching value. When a self-designed Chinese manual is used, the key professional terms should be listed for easy reference by students [9]. Issues such as uneven English proficiency and difficult-to-understand professional vocabulary among students should be addressed to facilitate their better mastery of new knowledge and enhance their learning initiative. In addition to textbooks, abundant teaching resources can improve teaching quality and efficiency. Through exercises, extracurricular knowledge expansion and other means, students can comprehensively and systematically master professional knowledge and enhance their professional abilities. Universities can strengthen the research and development of bilingual teaching resources or develop teaching aids on automatic control principles that are more suitable for their own schools based on their talent training programs, curriculum settings and actual student situations. Teachers can use multimedia technology to create bilingual courseware in both Chinese and English to meet bilingual teaching requirements. Teachers can also combine classroom teaching with online resources, fully utilize online resources and publish extracurricular knowledge expansion or full English teaching videos on

online communication platforms for students to watch in their spare time [10]

### 3.3. Innovative teaching methods and optimizing teaching process

In the process of bilingual teaching, it is necessary to comprehensively consider the differences in English among students, flexibly adjust teaching strategies according to their actual situations, innovate teaching methods, optimize the teaching process and promote the mutual improvement of students' English ability and professional knowledge. Firstly, teachers can start with professional vocabulary when conducting concept teaching in the bilingual teaching classroom of Principles of Automatic Control. Professional terms in English are usually composed of corresponding root affixes, with a focus on explaining the composition and meaning of root affixes. By combining the origin of root words, students can further deepen their impression of professional knowledge and learn and memorize professional vocabulary more effectively [11]. Secondly, online teaching platforms can also be utilized for online teaching, breaking the time and space limitations of traditional offline teaching and becoming an effective supplement to offline teaching, achieving an integrated teaching mode of "pre-class, in-class, and post-class". Teachers release preview assignments on online platforms, allowing students to learn relevant knowledge and form a preliminary understanding of theoretical knowledge. In offline bilingual teaching classes, the focus is placed on English teaching and explaining key and difficult points, appropriately reducing learning pressure and achieving a close combination of online learning of theoretical knowledge and offline learning of English ability [12]. Finally, classroom interaction is enhanced through teaching methods such as group cooperation and collaborative exploration, changing the traditional indoctrination teaching model and incorporating heuristic teaching into bilingual teaching. Knowledge transmission is transformed into problem exploration, encouraging students to actively answer questions and improving their English communication skills during the exploration process. In addition, instead of emphasizing exams in the assessment, teachers also optimize the assessment mechanism by setting developmental evaluation standards such as classroom performance and project plans, reducing the difficulty of assessment, and mobilizing students' enthusiasm for learning [13].

### 3.4. Optimizing course offerings to enhance students' English proficiency

When constructing the bilingual Principles of Automatic Control course, English proficiency should be regarded as an important goal for cultivating engineering talents, optimizing course settings, promoting the comprehensive and balanced development of students' English listening, speaking, reading and writing skills, and laying a solid language foundation for bilingual teaching. Firstly, from the perspective of students, they need to change their thinking, fully recognize the importance of English learning for future work, improve their autonomy in English learning, actively learn English, address personal weaknesses, enhance their English listening and speaking abilities, strengthen their oral communication skills and enhance their English literacy, thereby improving the efficiency of bilingual learning in professional courses and enhancing their competitiveness in employment. Secondly, when universities formulate professional training programs, they should design an overall coherent bilingual teaching curriculum system [14]. Based on the cultivation of international perspectives for engineering students in universities and strengthening the emphasis on English listening and speaking skills in basic courses such as English and audio-visual speaking, universities should also set up corresponding English courses for professional subject teaching. Taking the Principles of Automatic Control course as an example, in addition to strengthening the cultivation of students' English listening and speaking abilities in general education courses, universities also need to set up professional English courses for students to read and translate cutting-edge academic journals on automatic control principles. During the

process of learning English literature, students learn professional vocabularies not involved in daily English teaching, which not only ensures their basic literature reading and writing abilities but also strengthens their understanding and mastery of automatic control principles, cultivates their professional thinking, and improves their professional level. By gradually improving their professional English level and enhancing their international perspective, students can gradually adapt to the bilingual teaching process [15].

Building a bilingual teaching classroom for automatic control principles is a necessary path for new engineering disciplines and a necessary requirement for social and economic development. However, there are still problems with weak teaching staff, inappropriate textbook selection, outdated teaching methods and uneven English proficiency among students in the principle of automatic control. Therefore, universities and teachers should take targeted measures to improve their English teaching ability, build a bilingual teaching team, choose appropriate textbooks, enrich teaching resources, innovate teaching methods, optimize the teaching process and course offerings to enhance students' English proficiency and cultivate bilingual engineering talents for society.

## Funding

Bilingual Course Project of Zaozhuang College (Project No.: YSY21001); The Ministry of Education's Collaborative Education Program on Industry and Education "Teaching Research on the Course of Automatic Control Principles for New Engineering Majors" (Project No.: 202002029010)

## Disclosure statement

The authors declare no conflict of interest.

## References

[1] Shao K, Zhao X, 2024, Exploration and Practice of Teaching Reform in the Course of Automatic Control Principles Based on the Combination of Virtual and Real. Vocational Journal, 2024(4): 16–18.

[2] Su Y, 2020, Research and Exploration of Bilingual Teaching in Engineering Majors in Universities. Overseas English, 2020(10): 3–5.

[3] Li Y, Li X, Qian J, 2020, The Selection and Challenges of Bilingual Teaching in Undergraduate Education in Domestic Universities under the Background of New Engineering. Cultural and Educational Materials, 2020(26): 211–213.

[4] Li Y, 2024, Exploration of Bilingual Teaching Practice in Biochemistry for Engineering Majors. Organic Silicon Materials, 38(1): 97–98.

[5] Ge T, Li Y, 2020, Research on Quality Assurance Measures for Bilingual Teaching of Transportation Engineering in Local Universities. Education Modernization, 7(46): 104–106.

[6] Song W, Wang Y, 2021, Problems and Countermeasures of Bilingual Courses in New Engineering from the Perspective of Students in Universities. Cultural and Educational Materials, 2021(7): 204–206.

[7] Hui Z, Chunsheng G, Yamin Z, et al., 2023, Research and Practice on Bilingual Teaching for Engineering Majors in Universities: Taking the Course of Electronic Materials and Devices as an Example. Journal of Qiqihar Higher Normal College, 2023(5): 132–134.

[8] Lin Y, Ren J, Xu S, 2022, Exploration of Bilingual Teaching Curriculum Practice in the Context of New Engineering: Taking the Course of Automatic Control Principles as an Example. Research and Practice of Innovation and Entrepreneurship Theory, 5(3): 44–46.

[9] Yang G, Lv J, Peng A, et al., 2019, Exploration of Bilingual Teaching of Automatic Control Principles with the Characteristics of Medical and Industrial Integration. Education and Teaching Forum, 2019(33): 182–183.

[10] Liu J, Ye M, Lin R, et al., 2023, Practice and Innovation of Bilingual Teaching of "Physical Chemistry" in Local Engineering Colleges. Anhui Chemical Industry, 49(04): 160–162 + 166.

[11] Pei P, 2021, Exploration and Practice of Bilingual Teaching in Engineering Majors. Education and Teaching Forum, 2021(36): 121–124.

[12] Gao Y, Zhao H, Ding Y, et al., 2023, Reform and Practice of Bilingual Teaching Model for New Engineering Subjects: A Case Study of Biomedical Non-woven Materials Course. Science and Education Guide, 2023(15): 42–44.

[13] Yang S, Zhang G, Wang B, 2021, Research on Full English Curriculum Teaching in the Context of New Engineering. Journal of Higher Education, 7(S1): 88–91.

[14] Yang J, Wang H, Huang W, et al., 2023, Exploration of Bilingual Curriculum Reform in Engineering Majors under the Background of Education Internationalization. Science and Education Wenhui, 2023(8): 91–94.

[15] Han Y, Fu D, Duan A, et al., 2020, Exploration of English Teaching Models for Chemical Engineering Majors in the Context of New Engineering Disciplines. Shandong Chemical Industry, 49(8): 220–221.