

Research and Practice of full English Teaching of Applied Optics in Chinese University

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Abstract: Applied Optics is one of the compulsory professional courses for the Optoelectronic Information major. In the period of internationalization, the goal of modern higher education is to cultivate high-level compound talents with independent research ability and global competitiveness. Proficiency and comprehensive use of English have become the core qualities of high-level talents for Chinese undergraduate students to participate in international cooperations. Internationalization also puts forward higher requirements for cultivation, emphasizing the deep integration of cross-cultural communication skills and professional knowledge. This paper analyzes the appropriate mode of full English teaching in applied optics, and points out some key problems in the full English teaching practice in Chinese universities. This paper introduces the experience and understanding of the full English teaching in applied optics from several aspects, hoping to be helpful for the full English teaching of science and engineering in non-native English-speaking countries.

1. Introduction

In the context of global economic integration, the internationalization of higher education has also become an inevitable trend. [1] With the deepening of opening up to the outside world, the internationalization of Chinese university education and the cultivation of "globally aware" talents have become the key goals at present. [2,3] In the 21st Century, we should soberly face the reality: due to the diversification of the society's demand for English talents, the single English major and basic skilled talents in the past can no longer meet the needs of the market economy, and compound talents combined with English and other disciplines are needed. Cultivating the compound English professionals is a requirement of the socialist market economy for English professional education. College majors must change from a single-subject "academy-style" talent training model to an applied and compound training model.[4] The internationalization of universities is based on the internationalization of curriculum construction, and the core is the internationalization of discipline construction. This can not only achieve more efficient input of educational models and methods and cutting-edge knowledge, but also promote two-way exchanges, integration and development of

international education. [5]

In order to meet the society's demand for high-level compound science and engineering talents, promote the cultivation with international standards, our university University of Shanghai for Science and Technology cooperates with several first-class German universities of applied sciences, and establishes the Sino-German College. Students are recruited by China. After completing the four-year course and the related credits, students can obtain a double bachelor's degree from the University of Shanghai for Science and Technology and the University of Germany. The teachers of the Sino-German College come from many countries around the world, mainly from English-speaking countries, supplemented by returnees, creating a diverse cultural environment for undergraduate students. As teaching the full English applied optics course for the freshmen in the college, we summarize the experience of full English teaching in science and engineering courses, by combining his own experience and comparing the similarities and differences between teaching in Chinese.

Full English courses in China refer to courses that use only English textbooks and teach in English. At present, major universities in China have gradually begun to try to use English as the language of course teaching in the original traditional majors. Because developed countries occupy a leading position in many disciplines in the fields of science and technology, English has become the language that records the most cutting-edge knowledge in these fields. The full English teaching can not only reduce the misreading and loss of information caused by translation, but also improve the timeliness of acquiring the latest knowledge. In addition, with the goal of widely disseminating information, concepts and knowledge with Chinese local characteristics, it can also improve international understanding and cross-cultural communication skills of international students.

2. Characteristics of full English course

Undergraduate courses in China generally have "Professional English". Professional English is a compulsory course that must be offered by non-English majors in universities. Professional English course supplies a transition from basic English to applied English, and its teaching purpose is to apply the language knowledge learned in the basic stage to the major. Full English teaching and professional English are two kinds of courses with completely different natures. Professional English is essentially an English course, and specialized teaching belongs to the category of language education; full English teaching is essentially performed in professional courses, and belongs to the category of professional education, with the purpose of enabling students to master certain professional knowledges. The purpose of full English teaching in professional courses is to further cultivate students' English application ability and professional information exchange ability. The core goal of professional courses in universities is to impart knowledge of the major, which is not completely compatible with the improvement of language ability. But the current full English teaching use English language as the teaching language, so the two essentially completely different kind of courses are inextricably linked.

Full English teaching uses English as the teaching medium language, providing students with more language input information, so that students can unconsciously come into contact with the professional English knowledge they should learn. In other words, full English education is not to achieve the goal of language teaching through language courses, but to help students obtain an English environment to understand professional knowledge with the help of English. Full English teaching lays a good foundation for students to understand professional knowledge more deeply, better consult original books, and conduct international exchange activities. Professional English is an inseparable part of college English teaching, the transition from basic English to applied English, and the preparatory stage for full English teaching. Full English teaching is the practical application

of college English, which is the further consolidation of professional English, and an effective measure to promote and deepen English teaching. In short, higher education should correctly handle the relationship between professional English and full English teaching. Full English teaching has become the best application and practice link of professional English courses, and finally achieve the goal of improving students' comprehensive ability.

3. Teaching methods of Applied Optics

This course is mainly taught in English, and students are also encouraged to answer in English with appropriate questions to strengthen their understanding of professional knowledge. The production of courseware is an important part of the teaching process. In the preparation of the course, it is not necessary to prepare a complete lecture script, but in order to improve the teaching effect, it is necessary to use high-quality courseware. Contents are matched with the teaching multimedia courseware to deepen students' understanding. Try to avoid using multiple paragraphs of English in the courseware, which may cause non-English-native students' boredom and reduce their enthusiasm for learning. Most of the optical definitions and principles need to be explained in a combination of pictures and texts.

In addition to adding the key words and phrases to the courseware, it is also necessary to appropriately review them for several times. This allows non-native English speakers to clearly understand the expertise. Since the optical phenomena are also commonly found in real life, the basic principles of applied optics can be appropriately cited by citing application examples in life. For example, The rearview mirror of a car helps the driver observe the vehicles behind; light transmits signals through total reflection within optical fibers; sunlight scatters through raindrops, forming a rainbow after rain. These daily life phenomena allow students to combine the knowledge learned in the classroom with life practice, directly use the theories learned in the class to solve the problems around them, help students understand the teaching content and cultivate their full English thinking, so as to achieve better teaching results.

Due to the varying English level of students, in order to enable students to understand the core content of the course, in addition to using teaching multimedia courseware, it is also necessary to explain with black board. Key and difficult points, such as proper nouns, can be explained in detail in plain English and repeatedly emphasized to deepen the impression. In this way, students can not only master professional knowledge, but also understand professional English expressions, which is conducive to improve the students' professional level and English proficiency. The exercises done in class should be closely integrated with the content of the lectures, and the knowledge points of the previous lessons should be appropriately reviewed. When conducting group exercises, we should avoid fixing group members, as this can promote communication among all students and create a lively and positive discussion atmosphere in the classroom.

Teachers should carefully read the comments given by students during the inspection, understand students' considerations, and try to meet students' demands. In addition to answering students' questions after class, they should also be encouraged to read relevant English references. On the one hand, this method enhances their English searching and reading ability, and on the other hand, deepens their understanding of key points. At the same time, it's suggested to upload courseware and exercises online for students to download and review.

The final assessment score is a combination of ordinary scores and final test score, with a ratio of 1:1. Ordinary scores mainly include attendance, performance, homework, etc. The test score is determined by the final exam result. Since we teach in English, students are required to answer in English. According to the teaching syllabus, we will submit the A and B papers of the exam (paper A is the final exam paper, paper B is supplementary exam paper). In addition to covering key

knowledge points, we also strive to diversify the question types, including five types of questions: choice, fill in the blanks, noun explanation, brief explanation of principles and calculations. Students are mainly required to express explanations and answers in English. The noun explanation questions are generally professional terms that have been emphasized in class, and the questions encourage students to answer by drawing simple diagrams. With testing their English reading comprehension and writing ability, their mastery of professional course knowledge is also evaluated. After marking, we should analyze and summarize in time to provide theoretical foundation and practical experience for improving teaching quality. Judging from the assessments, students' mastery of the curriculum has met the requirements of training, and the distribution range of test scores is normal.

4. Attentions in the full English course

Full English teaching needs to cooperate with a variety of teaching methods and methods, flexibly handle teaching content, and fully apply multimedia technology, so that students can naturally integrate into the atmosphere of full English teaching and master the learning content. At the same time, the flexible interspersion of teachers' classroom speaking, students' participation, thinking and self-learning are very important. Considering that English teaching may bring difficulties to students' language comprehension, teachers should establish a student-centered educational concept and use a variety of teaching methods.

First of all, teachers should use easy-to-understand vocabulary, refined sentence syntax and clear English instructions to communicate with students, so that students can naturally integrate into the English atmosphere. Secondly, in addition to simple English annotations, the optical professional vocabularies that appear in the subject content can be further explained in the native language to facilitate students' understanding and mastery. Thirdly, the diagram method, object demonstration method, example method, etc. are used to concretize and visualize the abstract concepts in optical knowledge, and guide students to understand theoretical knowledge and solve professional problems. At the same time, the development of a variety of auxiliary teaching activities such as classroom discussions, team work, case analysis, role-playing, and practical research can better help students consolidate their knowledge and improve their professional skills.

The progress of modern information technology has made teaching methods better meet the needs of students and teachers. All English teachers use modern teaching resources and facilities such as the Internet and multimedia to create situational and functional language scenes and practical environments with a large number of audio-visual auxiliary teaching methods, which can greatly help students eliminate language barriers and understand professional knowledge. In the teaching of applied optics courses, the combination of physical assistance can significantly enhance students' understanding of abstract concepts. For example, teachers can visualize the refraction, reflection, diffraction, and interference of light by displaying actual optical components, such as lenses and prisms. In our class, students use lens to observe object magnification, and they also find that if they place the lens in front of the flashlight from the mobile phone, there will be a speckle. Through this experiment, students not only understood the laws of convex lens imaging, but also realized the gap between ideal imaging and actual imaging. These teaching methods can not only help students better understand optical theory, but also stimulate their interest in learning.

In addition, the combination of artificial intelligence (AI) technology can further enhance teaching effectiveness. For example, teachers can use AI simulation software to dynamically demonstrate the propagation path of light in complex optical systems, demonstrating the impact of different parameter changes on the performance of optical systems. Through the virtual experimental platform, students can design, optimize, and analyze optical systems with the

assistance of AI, thereby deepening their grasp of theoretical knowledge in practice. For example, AI can adjust parameters (such as the wavelength of light, incident Angle, etc.) according to students' needs and dynamically display optical phenomena under different conditions.

At the same time, AI can also be used for personalized learning support. Through intelligent learning platforms, students can receive customized learning suggestions and practice questions based on their own learning progress and comprehension ability. AI technology can also analyze students' learning data in real time, helping teachers promptly identify problems students encounter during the learning process and provide targeted guidance. This teaching method that combines physical objects with AI technology not only helps students master the core knowledge of applied optics but also cultivates their ability to solve practical problems, laying a solid foundation for future scientific research and engineering applications.

5. Conclusions

This paper mainly introduces some of the author's practice and experience in teaching applied optics courses at the Sino-German College, and makes a more detailed explanation from the aspects of textbook selection, teaching methods and course assessment. After a long period of exploration, our university has made progress in teaching mode and teaching methods. The outstanding advantage of the full English teaching is to provide an environment for learning English and applying English thinking, so that students can combine English learning and application, which can promote the great improvement of students' English proficiency. On the other hand, it enables students to not only master college English vocabulary, but also involve most of the professional vocabulary, and also brings pressure and motivation to Chinese teachers to continuously improve their English proficiency, promoting the improvement of teachers' own public English and professional English proficiency. However, while promoting the English teaching model, we must also take into account the difficulties the method may encounter in piloting in traditional university education. From the perspective of teaching effects, teachers who have not received professional training in English or have studied in English-speaking countries may encounter certain difficulties in expressing professional knowledge in English. From the perspective of students, to make English teaching be successful, students' English proficiency must also be able to keep up with the progress of teaching, which involves the question of whether it is necessary to carry out full English teaching for freshmen and sophomores in China. At the same time, for undergraduate courses originally taught in Chinese, if the full English teaching mode is adopted, whether it is necessary to increase the teaching hours to ensure students' understanding is also a question that needs to be considered. As front-line teachers, we also need to continue to explore in the teaching process, analyze deficiencies in time, sum up experience, and pay attention to the flexible application of specific teaching methods, so as to continuously improve teaching to meet the needs of international standards to cultivate modern compound talents.

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