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A Stuady on the Application of Flipped Classroom in ESP Teaching: Taking English for Science and Technology as an Example

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Abstract
English for Specific Purposes (ESP) aims to cultivate students' ability to use language in a professional field, thus, it has a strong application value. However, due to the abstractness of its vocabulary, complexity and diversity of its sentence structure and the obscurity of its contents, students are intimidated and unable to achieve the intended teaching goals. Based on modern information technology, flipped classroom teaching models provide direction for ESP curriculum reforms such as English for science and technology. ESP courses, based on flipped classrooms, integrate the time inside and outside the classroom through rich teaching design before, during, and after class, thus achieving the goal of improving teaching effects of ESP courses.

Key words: ESP; Flipped classroom; English for science and technology; Teaching mode design

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With the development of economic globalization and regional economic integration, the demand for foreign language talents in professional fields is increasing day by day. In order to cultivate more application-oriented talents with an international perspective and the ability to communicate across different culture, many colleges and universities begin to offer ESP(English for Specific purposes) courses based on the teaching of English for general purposes (EGP). Compared with traditional general English learning, ESP is an English course targeted at the learners' specific needs and purposes. ESP courses pay more attention to training students to master specific professional skills and read professional literature through language learning, and then acquire the ability to communicate and work in English in their professional fields.

With the rapid development of information technology, the advent of the "Internet plus" era has brought people into a new intelligent world, and also has brought new inspirations and inspirations to ESP teaching. Flipped classroom, which is based on network data resources and technology, takes the independent learning as the main mode and integrates students' time in and out of class through reasonable classroom design, which effectively stimulates students' learning initiative and enriches the teaching concept, teaching method and teaching content of the ESP course.

1. AN OVERVIEW OF THE CURRENT TEACHING STATUS OF ESP COURSES

ESP, short for "English for specific purposes" or "Special Purpose English", refers to English related to a specific field or subject. It is an English course based on the special needs and specific goals of learners. ESP is not a course but a course system, including courses such as legal English, business English, technical English, etc. In the late 1960s, under the combined effect of socioeconomic development, the promotion of linguistic research, and the focus of educational psychology on learners and learning processes (Hutchinson & Waters, 1987: 5), ESP teaching emerged in the West. It is introduced into China by Professor Yang Huizhong in the 1970s and belongs to the category of applied linguistics. After the development

of more than half a century, the teaching and research level of ESP in Chinese colleges and universities has also been greatly improved. The research field also involves many aspects such as the origin, classification, teaching methods, evaluation and testing of ESP.

However, compared to General English Teaching (EGP), which focuses on training students' basic language skills such as listening, speaking, reading, writing, and translating, ESP focuses more on students' ability to use English to solve professional problems, such as literature reading, data retrieval, thesis writing, attending academic conferences, etc. In other words, ESP teaching does not take English language learning as the main goal, but integrates language learning with professional knowledge, improves students' professional knowledge and skills through English learning, and cultivates professionals proficient in English. Therefore, the establishment of ESP courses has higher requirements on resource allocation, which also leads to various problems in ESP teaching. Taking the technical English course as an example, these problems are mainly reflected in the following aspects.

First of all, the teaching materials are scarce. Due to the small audience of English for science and technology courses, the development of teaching materials and supporting resources is lagging behind, the available teaching materials are very poor, and the quality of existing teaching materials is often unsatisfactory. Some textbooks simply excerpt articles from foreign periodical literature, the chapters are independent of each other and lack cohesion; some textbooks are too obscure and difficult to understand, far beyond the students' vocabulary and syntactic level, which discourages the students' enthusiasm for learning; some textbooks only focus on translation training, ignoring the cultivation of English communicative competence such as reading and writing. Secondly, the faculty is limited. English for science and technology focuses on cultivating students' professional English knowledge and skills, that is, the ability to use English for professional knowledge learning and practice. This requires teachers to have not only a good language foundation, but also excellent professional knowledge of science and technology. Most English teachers can not master professional knowledge very well. A large number of unfamiliar scientific and technical vocabulary and professional theories make teachers only focus on language points, while ignore the professional knowledge, making it difficult to develop the depth of teaching. Finally, the teaching model is too traditional. English for science and technology courses in most colleges and universities still continue the traditional mode of classroom teaching, thus as a leader of the classroom, teachers should explain English vocabulary, sentence patterns, grammar, as well as technical terms, nouns and principles. Therefore, the teacher is still the center of the classroom, the teaching effect is limited by the teaching time, teaching space and teaching mode.

2. THE INSPIRATION OF FLIPPED CLASSROOM FOR ESP TEACHING

Flipped classroom, also known as inverted classroom, originated in the United States. It refers to the way of teaching with the help of online resources to readjust the time inside and outside the classroom, transferring the decision-making power from teachers to students. Under this teaching mode, teachers use online resources to release preview materials and tasks in advance, and students use the time before class to preview independently. In this way, the precious time in class is transformed from the traditional teacher's teaching to students' demonstration, discussion and communication under the guidance of teachers. In the flipped classroom teaching mode, teachers no longer occupy the entire classroom time to teach information, but arrange the information in advance for students to learn independently, students can complete the preparation before class by the way of watching videos, listening to podcast lectures, learning the courseware, reading e-books, discussing with classmates through the internet, etc. In the classroom, students can focus more on solving the problems and doubts encountered during the preparation, so as to obtain a deeper understanding. Flipped classroom is a subversion of the traditional classroom teaching mode and teaching process, bringing inspiration to the reform of ESP teaching mode.

First of all, the flipped classroom teaching model helps to mobilize students' learning initiative. The release of pre-class tasks and students' independent learning are the basis for the implementation of flipped classroom. Due to the specialty and particularity of ESP courses, the release of pre-class tasks must be determined according to students' abilities and needs. Take the course of English for Science and Technology as an example. Due to the large amount of professional knowledge involved, students can not only preview words, paragraph structure and other text contents, but also understand relevant professional terms and experimental operation process through the independent learning before class, so as to actively learn and overcome the difficulties of professional knowledge, laying the foundation for in-class learning. Therefore, flipped classroom is a new teaching paradigm of "learning before teaching".Only after the students have absorbed knowledge through independent learning can they complete the internalization of knowledge in high-quality communication and interaction with teachers and classmates in the classroom. The internal inversion mechanism of flipped classroom encourages students to improve their independent learning ability.

Second, the flipped classroom teaching model helps to establish a new type of teacher-student relationship. In the traditional classroom, the teacher is the leader of the classroom, and the classroom time is mainly infused by the teacher. There is an obvious hierarchical relationship between the teacher and the student. The

students remain silent because of their subordinate status, which largely suppresses the creative thinking and hinders effective interaction between teachers and students. The classroom activities in the flipped classroom have changed from traditional one-way single lectures by teachers to two-way interactive exchanges between teachers and students. Students can not only raise their own problems encountered in the preparation process, but can also discuss with other students, creating the diverse interactive communication mechanism between teachers and students, students and students. The flipped classroom teaching model effectively promotes the formation of a harmonious relationship between teachers and students.

The above points indicate that in the context of the internet era, flipped classroom can be applied to ESP course teaching to enrich the teaching content, improve the enthusiasm and initiative of students and optimize the teaching effect.

3. ESP TEACHING DESIGN BASED ON FLIPPED CLASSROOM

The ESP teaching design under the flipped classroom concept mainly includes three steps: pre-class preview, classroom teaching and after-class evaluation. In short, in the flipped classroom teaching mode, teachers release preview tasks in advance by recording micro-lessons and sharing video resources. Students learn the main knowledge points by themselves and summarize the doubts and difficulties in the preview. In the classroom discussion, students will discuss and communicate with their classmates and teachers about the preview results through the classroom demonstration. Teachers will answer questions, fill in the gaps in the classroom and guide students to reflect and summarize. After class, students feedback the teaching effect to the teacher, consolidate and sublimate the knowledge points. Taking English for science and technology as an example, the teaching design based on flipped classroom includes the following steps.

3.1 Preparation Stage Before Class

Flipped classroom reverses the traditional process of knowledge transfer and internalization and turns the traditional "teaching before learning" into "learning before teaching". Therefore, full pre-class preparation is the basis for the implementation of flipped classroom. The preparatory stage of English for science and technology courses can be divided into two stages: task analysis and task design.

The task analysis of English for science and technology course includes two parts: learning situation analysis and teaching content analysis. The teaching object is undergraduate students majoring in science and engineering, whose English level is uneven. Also, the self-study ability is quite different between different individuals. Teachers should understand the English foundation and cognitive level of each student, the teaching tasks should be appropriately formulated according to the specific condition, the learning ability of students and the selection of teaching resources should also meet the cognitive abilities of students. Teachers need to optimize the teaching content according to the characteristics and needs of students of different majors, and combine professional knowledge learning with English learning.

English for science and technology refers to the English used in the field of natural science and engineering technology, with purpose of accurately expressing objective laws and clearly describing problems according to logical thinking. Science and technology English teaching uses specific textbooks, which are quite different from ordinary reading material, therefore, it does not have the emotional image thinking, nor does it have any emotional color. The characteristics of English for science and technology should be analyzed before the release of the pre-class task, for example, in order to reduce the subjective color and enhance the objectivity, the sentence patterns in sci-tech English are mostly in the passive voice, and there are often complex subject-subordinate compound sentences with close logical relations between sentences.

The purpose of task design is to guide students to understand the teaching objectives based on task analysis and then study independently with the help of resources issued by teachers. Therefore, the learning objectives, key points and difficulties of the course as well as the learning methods that can be adopted should be clearly defined in the task design. The design of sci-tech English learning needs to cover three aspects: the analysis of the difficult vocabulary and sentence patterns in the text; the structure and layout of the paragraphs and the analysis of the logical relationship between the paragraphs; the analysis of the subject content and the science and technology principles involved. With the design idea, teachers can release the designed tasks to students by publishing courseware, recording micro-lessons or short videos.

3.2 Classroom Teaching Stage

Classroom teaching is conducted on the basis of pre-class preparation, mainly including classroom demonstration, classroom discussion and classroom summary. Teachers can check the students' achievements of autonomous learning before class through group public display, which can be PPT, video, speech or scene performance, etc. After each group displays its preview results, the groups can cooperate and communicate with each other. Students can discuss the questions in the preview, and can also communicate and discuss between the groups according to the difficult problems in the public display. The teacher should walk back and forth in class and guide students on issues discussed in a timely manner.

At the end of the course, teachers should combine the teaching objectives, key and difficult points and the difficult problems of students, so as to urge students to clearly organize the teaching content, strengthen the understanding of the key points of knowledge, and help students to construct a complete and clear knowledge structure. In addition, relevant questions can be raised according to the teaching content to inspire students to reflect and sublimate what they have learned.

3.3 Evaluation Stage After Class

Due to the rich and diverse teaching contents of flipped classroom, the traditional single evaluation method cannot effectively evaluate its teaching results. Therefore, teachers should consider students' emotional attitude, learning methods, learning results and some other aspects, and adopt multiple evaluation methods for objective evaluation. The representative evaluation methods include performance evaluation, group evaluation, homework evaluation and extension evaluation.

Performance evaluation refers to the teachers' evaluation of students' learning ability and innovation ability according to their video watching, preview results, classroom participation enthusiasm and group discussion performance. Group evaluation refers to the way that group members can objectively evaluate other groups according to their performance when presenting learning results and organizing class discussion in groups according to the grouping of class tasks.

The evaluation method of homework and examination is to evaluate students according to the quality of their homework or their performance in the examination. In addition to the above intuitive evaluation methods, there are also diversified and open evaluation methods, such as the extended evaluation, which encourages students to record small videos, make mechanical models or simulate small experiments based on their understanding of the knowledge they have learned. The classroom evaluation stage is the feedback to teaching and also the test of flipped classroom teaching results, which can effectively help teachers to modify and improve the teaching design.

4. CHALLENGES PRESENTED BY FLIPPED CLASSROOM FOR ESP TEACHING

The combination of flipped classroom and ESP teaching has broken through the limitations of the traditional teaching model and is a useful attempt in the college English teaching reform. However, flipped classroom has also brought huge challenges to the teaching of ESP courses.

First of all, flipped classroom puts forward higher requirements on the comprehensive quality of ESP teachers. The implementation of flipped classroom cannot be separated from the support of network resources. Courseware making, micro-video recording and MOOC recording all require teachers to have a good ability to search and deploy network resources. However, some teachers have limited network operation ability and poor information retrieval and collection ability, which hinders the application and promotion of flipped classroom in ESP courses. Therefore, ESP course teachers should not only have solid language skills and excellent professional knowledge, but also actively learn and improve their informatization skills. Only with good comprehensive quality can they better practice the flipped classroom teaching model.

At the same time, flipped classroom puts forward higher requirements on students' ability. Since ESP is taught to non-English majors, most of the students have a weak English foundation, poor independent learning ability and limited oral expression ability. Therefore, teachers need to consider student' actual abilities when publishing pre-lesson tasks, and assign independent learning tasks of varying degrees of difficulty to students with different English foundations. Class discussion also needs certain incentives to encourage students of all levels to actively participate in and make continuous progress to mobilize students' interest and initiative in learning.

As a new teaching mode in the Internet era, flipped classroom effectively extends the classroom from inside class to outside class, breaking through the bottleneck of traditional ESP teaching, enriching teaching methods and means, mobilizing the subjective initiative of students, and promoting the optimal allocation of educational resources. ESP teachers should combine teaching theory with practice, overcome difficulties and challenges, explore more teaching methods, enrich curriculum design and serve the training of professional English talents.

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