

Reflections on Several Problems in Bilingual Teaching of Mathematics Major in Colleges and Universities

—A Case Study of Mathematics Major in Zhejiang Ocean University

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Abstract—Based on several years of practical experience of bilingual teaching, construction of an effective and feasible bilingual teaching method based on the need of bilingual teaching in the teaching of higher education has become the direction of bilingual teaching. With the representative preponderant discipline mathematics as research background, the paper specifically discussed the actual situation of bilingual teaching at undergraduate stage. After that, the paper analyzed the purpose of conducting bilingual teaching, discussed the degree of promotion of bilingual teaching, and defined the object and scope of bilingual courses. Finally, the feasible suggestions and effective methods of bilingual teaching are given.

Keywords—Colleges and Universities, Mathematics Major, Bilingual Teaching

I. INTRODUCTION

In order to speed up the training of high quality talents with international competitiveness and the reform pace of China's education, at the same time to promote the teaching work in higher education, broaden students' vision and improve their practical application ability of English, so that China's higher education can connect with international standards as soon as possible, the Ministry of Education issued Opinions on the Strengthening of Undergraduate Teaching Work in Universities and Colleges to Improve Teaching Quality (Jiaogao [2001]4) on September 21st, 2001, which specially requires colleges and universities to actively conduct research and practice of bilingual teaching in general courses and professional courses. The Ministry of Education requires all colleges and universities to promote the teaching of general courses and professional courses in foreign language such as English, and conduct bilingual teaching in majors of high-tech fields, such as biotechnology, information technology, new material technology, and professional fields urgently needed by the country, such as international finance, law. National key constructed colleges and universities need to take action first, and strive to achieve 10%~15% bilingual teaching courses in all courses in 3 years. Bilingual teaching here refers to the use of foreign language teaching materials (usually English textbooks) in the teaching of general and professional courses, and the combined use of Chinese and English in teaching, and

use of English in homework, experiment and examination. In 2004, the Ministry of Education issued "Assessment Program of Undergraduate Teaching Level of Ordinary Colleges and Universities", which gives a clear definition of bilingual teaching courses that "bilingual teaching course refers to courses which use foreign language teaching materials and the period of foreign language teaching accounts for 50% or above of the total period (except foreign language courses)". Since then, various levels of colleges and universities have conducted different levels of bilingual teaching reform and practice, even many primary and middle schools in developed areas have tried bilingual teaching exploration. It has become a trend. In recent ten years, a lot of papers about bilingual teaching can be seen on all levels of academic journals. On the basis of reviewing the experience of bilingual teaching practice, this paper makes some further thoughts on some problems and puts forward corresponding suggestions.

II. THE PURPOSE OF BILINGUAL TEACHING: CONSIDER THE NEEDS OF STUDENTS

The Ministry of Education's document clearly proposes the purpose of bilingual teaching is "to speed up the training of high quality talents with international competitiveness and the reform pace of China's education, at the same time to promote the teaching work in higher education, broaden students' vision and improve their practical application ability of English, so that China's higher education can connect with international standards as soon as possible". This is a strategic macro goal. From the current situation of bilingual teaching in China, English is mostly treated as a second language. Because people have clearly realized that in the era of globalization, the significance of mastering English has gone far beyond the general language learning, it has shouldered a certain political mission and economic responsibility. Therefore, carrying out bilingual teaching reform has its profound historical background, and it is appropriate to promote the exploration and reform of bilingual teaching.

The direct purpose of bilingual teaching is to learn English well and improve the application ability of English. And it also realizes the acquirement of knowledge with the teaching method of English. It has dual effects, namely acquiring

knowledge and language skills at the same time. Therefore, in bilingual teaching, the second language is the major means, but it is also the purpose. In the long run, it lays foundation for further studying of professional knowledge with foreign language materials to improve the level of foreign exchange. Strengthen the students' practical application ability in English, so that our higher education can reach the international standards as soon as possible, the natural science research filed of China can catch up with the world's advanced level in the 21st century, and our students are able to express their own views with scientific language that accords with English usage to allow them to have smooth academic visits and academic exchanges and have international competitiveness to win a place on future's international academic stage.

From the perspective of education and teaching, the implementation of bilingual teaching and use of foreign language original textbooks allows teachers to learn advanced foreign teaching philosophy in the bilingual teaching process, learn from the international advanced teaching methods and education methods to further improve the quality of teaching. But the exciting lofty ideal is easy to make people reach for what is beyond one's grasp. Bilingual teaching practice often dilutes a basic purpose that is to enable students to acquire at least the same knowledge and ability as teaching with Chinese. The learning and mastery of basic knowledge of the course should be the bottom line and basic purpose, and consider other goals on the basis of achieving this purpose. Bilingual teaching is only a means. It must not be seen as the first purpose of education and teaching.

In addition, higher education is not compulsory education. It mainly provides resources for people with higher education requirements. Especially as a Chinese, he has the right to learn with Chinese. We can offer bilingual or total foreign language teaching, but we can't deny the Chinese the right to learn with Chinese. When conducting pilot bilingual programs, a number of undergraduate colleges would choose a teacher and a course for bilingual teaching, and students have no choice to choose. As a result, many students have been in a state of confusion in class. In the end, not only their English has not been improved, their professional knowledge is also not well understood. Bilingual teaching puts the cart before a horse. One survey showed that 75 percent of students believe that bilingual courses are "less informative than Chinese courses" [1].

A survey shows that for students who are willing to choose the bilingual teaching, their first employment intention is to work in foreign trade enterprises, followed by studying abroad, working in government departments, pursuing graduate study and working in research institutions. It can be seen that besides 22 percent of the students who want to work in government departments, other employment intentions all have high requirement for English[1]. Therefore, students have clear intention to choose bilingual teaching. Bilingual teaching is to provide choices for students with such need.

III. THE DEGREE OF PROMOTION OF BILINGUAL TEACHING: CONSIDER THE ACTUAL SITUATION OF COLLEGES AND UNIVERSITIES

English and Chinese are two entirely different language systems, and there is also no English language environment in China and not enough bilingual students of both English and Chinese, giving bilingual teaching unique specificity in China. Since it is not favorable factor for bilingual teaching, its unique specificity can also be called special difficulty of China's bilingual teaching. Due to the influence of traditional foreign language teaching methods and test requirements in China, although Chinese college students have studied foreign languages for many years, the language ability is generally not high. Research shows that more than 90% of sophomores are basically not able to read even the most simple English version middle school mathematics materials independently in their second semester[2]. Not to mention the English course they learn is college English, which still has a gap from professional English. Many terminologies require for further study. Students don't have relevant needs, and there are a lot of obstacles in implementation. Therefore, it is questionable to promote the bilingual teaching in colleges and universities blindly. For example, some colleges plan to "(1) take the teaching of agricultural specialties as pilot, and gradually realize the bilingual teaching of the advanced mathematics course of all majors in colleges; (2) let over 75 percent of teachers become qualified to teach bilingual courses through introduction and in-service training; (3) do a good job in the introduction, digestion and absorption of excellent foreign original textbooks, and compile English version advanced three-dimensional mathematics textbooks that adapt to the bilingual teaching needs of agricultural colleges, which are very worrying[3].

Of course, it is not completely opposed to conduct reform and exploration of carrying out bilingual teaching in colleges and universities. It is recommended to consider the student needs, their degree of acceptance, and teacher resources and other factors before doing. It cannot be enforced as a task, or as a fashion or an achievement project. Therefore, the Ministry of Education hasn't set the task and deadline for colleges and universities, but only requires them to "actively carry out the research and practice of bilingual teaching in general and specialized courses".

IV. SUITABLE OBJECTS AND SCOPE OF BILINGUAL COURSES: CONSIDER PROFESSIONAL NEEDS

The Ministry of Education requires colleges and universities all over the country to actively promote the use of foreign language such as English in the teaching of general and specialized courses, and to conduct bilingual teaching especially in specialties of advanced technique field such as biotechnology, information technology, new materials technology and other professional fields that are urgently needed in the development of country, such as international finance, law. Why we need to offer bilingual teaching in advanced technique field and some natural science courses? That's because our country is still relatively backward in these fields, we need to learn from the west, understand the relevant information of foreign studies, and refer to the advanced achievements of foreign studies. It is the university's

responsibility to give students the opportunity to choose bilingual learning. And for those students who don't have such needs, university should provide Chinese teaching. For those students who first choose bilingual teaching courses and then want to quit for learning difficulties, universities should also provide Chinese teaching. The training goal of specialties such as international economics and trade, international finance, international law is to develop foreign workers, so original teaching materials are provided in the professional course of these specialties to conduct bilingual teaching. Promote the innovation of teaching content through the connection and contrast of English and Chinese and their culture. Besides teaching professional knowledge, help students to improve their English listening, speaking, reading and writing abilities, laying a solid foundation for training of foreign professional talents. It's just the opposite if we don't consider professional needs, optionally open bilingual courses and blindly expand its scope.

V. COURSE SETTING MODEL AND TEACHING MODE: CONSTRUCT HARMONIOUS SYSTEM

From the setting model of bilingual courses, most colleges choose to develop bilingual courses for students to choose on the basis of original training plan, and allow students to apply willingly, showing a very cautious attitude. Specifically include: 1. Select teachers with certain bilingual teaching ability to set up their own course as bilingual teaching form to carry out practice. Most colleges with poor teacher resources and weak knowledge base of students have adopted this model. 2. Divide general course into Chinese teaching class and bilingual teaching class based on the English level of students. Such as "we have opened a mathematics bilingual teaching class in arts and science university based on students' voluntary registration" [4]. 3. Some courses must be taught in bilingual courses, such as International Trade. In this case, the bilingual teaching course is isolated from the whole curriculum system and not integrated into it. Therefore, it should strengthen the coordination function of teaching plan on the content, structure and mode arrangement of bilingual course. Fully include bilingual teaching courses into the knowledge construction of professional course system as soon as possible, increase the internal logic between different courses. Try to avoid repeat and fracture of knowledge points, letting bilingual course form coordinated system with other courses.

From the perspective of teaching mode, the "transitional" teaching mode is most commonly used[5]. That is to gradually transit from teaching with the assistance of Chinese to teaching only in English in the teaching of discipline knowledge, or when students' English hasn't reached certain degree, the transition is conducted from teaching mainly in Chinese to bilingual teaching to teaching mainly in English, and eventually to teaching only in English. For example, "in the early stage of the course, arrange to learn some English mathematical words and common English expressions of mathematics, and mainly use Chinese in teaching, and gradually increase the proportion of English after students gradually adapting to the learning of university mathematics. After a month, teaching with English for about 20% of the time,

and by the end of the semester, English teaching reaches 50% of the time[4].

Someone has summed up the pattern of "three Chinese and three English": the expression of definition and theorem is in English, the explanation of them in Chinese, analysis of example in Chinese, solution in English; mathematical formula expression in English, explanation of it in Chinese, and blackboard-writing in English. Before teaching, the teacher actively communicates with the students, understands students' English foundation, professional background and learning attitude, and introduces teaching method and the matters needing attention.

Even so, a survey reflected the poor performance of bilingual teaching, because 72 percent of students thought "there's no bilingual teaching environment and information condition" [1]. How to achieve good language environment and information condition for bilingual teaching, and organically embed bilingual teaching mode into the original curriculum structure and teaching environment to form harmonious cultivation system, still needs careful study and exploration.

VI. TEACHING MATERIALS AND TEACHER RESOURCES: A HUGE SYSTEMATIC PROJECT

English teaching materials must be required in Chinese-English bilingual teaching, as well as the English auxiliary materials. Expensive original English textbooks are too expensive for students. When running the bilingual teaching pilot class of mathematics, college of science and technology, Xi'an Jiaotong University bought textbooks of "Calculus" from Hong Kong and rented them to students for one year. It was widely welcomed by the students, who thought the content of the textbook was new and good, and some students even wanted to buy it but were unable to do that because of school's rule of lease. In view of this, the school should adopt a flexible method of "renting and selling" in parallel to meet the requirements of different students[6]. This method is flexible and applicable. However, the knowledge system of foreign original textbooks is not in line with the curriculum knowledge system in China. The introduction of the original textbook not only bring the contradiction between course objectives and students' actual language ability, but also, to some extent, bring contradiction and conflict between foreign culture and native culture. The translation of domestic textbooks into English teaching materials also needs to concern the idiomaticity and life feature of foreign language. Therefore, compiling a set of subject materials that can integrate foreign culture and China's requirements requires a lot of diligent exploration and effort of many people on the basis of long-term bilingual teaching experience.

From teacher resources, the teacher conducting bilingual teaching not only needs to have rich subject knowledge and high teaching process control techniques, but also needs to have good English reading, speaking, listening, writing abilities. The teacher not only needs to have the ability to grasp the key points of the subject and keep to teaching programme, but also needs to have fluent and flexible English expression and ability to use English even English thinking in class. This is obviously very, very high demand. Generally speaking, only foreign

teachers or professional teacher of the specialty with standard English pronunciation and many years' experience of studying abroad can do this job. For colleges and universities, there are few teachers who can meet such requirements. A few teachers may be able to meet the requirements through specialized training and learning. But this is still not enough for the goal of a wide range of bilingual teaching practices. Therefore, in colleges and universities, the appropriate training of bilingual teachers is a huge systematic project. It can't be solved in the short term.

VII. CONCLUSION: A NEW SUBJECT

The English-Chinese bilingual teaching has been advocated for more than ten years in China's colleges and universities. The education workers engaged in bilingual teaching have conducted a great deal of research and practice exploration, and summarized a lot of experience. However, there are still many deep problems in the promotion of bilingual teaching in colleges and universities. In order to effectively improve the bilingual teaching effect, many systematic researches are needed to form a complete set of theories in the aspects of different course teaching theory. Such as the purpose of bilingual teaching, process, principle and method of bilingual teaching, its organization form, bilingual teaching evaluation and so on, which is the call for the establishment of a new subject *English-Chinese Bilingual Teaching Theory*.

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