Study on Bilingual Teaching of Computer Programming in Chinese University

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Abstract: Bilingual education became popular in Chinese universities considered as an important aspect of connotative development. In this paper, we take computer programming as an example to analyze the situation and problems along bilingual education. According to the feedback of teaching, we propose some strategies to improve the result. First, organize teaching material by teachers instead of following some textbooks. Second, increase the proportion of heuristic teaching and self-learning. Besides, keep watching the feedbacks of student and adjust the pace in time.

Introduction

Bilingual Teaching involves teaching academic content in two languages, one of which is the native language, with varying amounts of each language used in accordance with the program model [1]. The western countries such as United States, Canada, Singapore, have a relatively long history of bilingual education and many literature research on this subject. Bilingual teaching is not as simple as one language plus one language but to train a comprehensive ability to use second language to understand, think and further resolve problem independently[2,3]. In western countries, bilingual language involves English and another language which is also a Latin such as Spanish. This is much easier to acquire. But this is total different situation in China [4].

In China, a policy statement entitled "The Ministry of Education Guidelines for Starting Teaching Quality and Teaching Reform Project and Model Courses Development among Colleges and Universities" was issued on April 8, 2003 (Ministry of Education, 2003)[5]. The Chinese Ministry of Education has emphasized the importance of bilingual education and asked the universities to adopt bilingual education to undergraduates and the courses of bilingual education should achieve 5-10% of the total courses taken for undergraduates in higher education institutes in China. Since then, bilingual model becomes more and more popular in Chinese university on almost all fields [6,7]. They use Chinese and English combination to teach professional knowledge and on the other hand they are trying to transfer distinct thoughts and resolving of problem. Although the bilingual teaching has put into practice for decades, there are still lots of difficulties to get the expected effect.

Computer programming (often shortened to programming) is a process that leads from an original formulation of a computing problem to executable computer programs. Many popular programming languages are taught in computer science school as an obligatory course [7,8,9,10]. Also, they often practice as bilingual education. However, these kinds of course barely reach expected effect because of its technical feature and logistical difficulty.

As we know, teaching programming languages is very difficult to novice programmer, which is more obvious in bilingual teaching and there are lots of researches on that. In this paper, we will list the related works and analyze the problems in this subject and give some useful strategies.

Computer Programming Course

Almost all computer science school have computer-programming course such as Java, C++. No matter what they teach specifically, the content is similar. For every student in IT field, at least one programming language must be mastered when they graduate. In general, they study the first programming course on first term to open the gate of a professional world. In order to widen the
vision and get connection with other countries, this kind of significant course became the first choice to practice bilingual education.

Bilingual teaching has advantages in computer science subjects because the computer science began from western countries [11]. All the conceptions, terminologies and theories are uniform and standard in literature. Then they are translated to Chinese. The contents in most textbooks are similar. Therefore, Chinese students can comprehend computer subjects in English easily without misunderstanding especially when they already learned some introductory course in Chinese. On the other hand, the latest technology is written mostly in English. Bilingual teaching makes the students to adapt to the internationalization process. After the training, students are expected to read official document in English and to describe problem and ask famous western websites for help. This will greatly improve the ability to analyze and solve problems. However, in fact there are some shortcomings when we implement bilingual education. Figure 1 shows the comparison of final test between native teaching and bilingual teaching. We discover that the proportion of failed students arises 3 times after bilingual education. Meanwhile, the proportion of student got 60 to 70 becomes higher and the proportion of 70 to 80 gets lower. It turns out that the mean score declines a lot. We also notice that the most students think bilingual teaching increase the difficulty of computer programming.

![Figure 1. Comparison of scores between native teaching and bilingual teaching.](image)

Textbooks and teaching material for bilingual education

A lot of textbooks about computer programming are written about different languages, different motivation, or different versions. To choose a proper textbook is the most important beginning for this kind of course. It depends on the timing to teach and foundation of students.

If it is the first time to introduce a new technology, the beginner level textbook is suggested to choose. We prefer a textbook with step-by-step progress, more examples and more charts. So some classic books are not acceptable as textbooks but reference books because of its high level. When the course is in senior grade, more than one textbook can be assigned to broaden their horizons.

For bilingual education, textbooks in English, which are written by native English speaker, always are chosen. But they are hard to be digested by Chinese because of the different framework and different way of depiction. Some researches suggest reordering the content to get similar with Chinese textbooks and filtering the content to reduce the trivia to get a clearer and compact version. But the whole textbooks might be cut into plenty of fragments and the contents turn to discrete which lack of relatively connections. This is obviously improper as textbooks. Other researches suggest combining few textbooks by interweaving among them. This method can link up the advantages of different books. But similarly, contents are not consequent and redundant. Sometime, details are inconsistent in different books. Many preferred textbooks would make student spend too much time especially for that student with poor English comprehension. Being exhausted in catching up would ware down their interest.
In our opinion, it is suggested to write or organize teaching material according to students’ base for bilingual education. The original English versions are mostly improper for Chinese students. And the computer programming course need much more practices than other courses not mention to the difficulty level itself. To reorganize textbooks can refer the following.

A) More accepted structure. Every structure of textbooks is distinct. For example, textbooks of Java language always include object-oriented programming part, such as classes, inheritance, and polymorphism. But the order of content is different greatly particularly some details of keywords. For this situation, a fluent structure is important for good teaching affection.

B) Latest content. IT field develops rapidly. Every developing circle will bring some new features. New technology would eliminate old one. To keep step with latest news is the significant issues for bilingual education.

C) More reality practices. Lots of practice is necessary for computer programming course. But not all practices from English textbooks are suitable for students. A good practice is understandable without more explanations. So reality problem can be easier to immerse into by students.

Teaching Reform

A precondition of bilingual education is that students’ English language proficiency already matches the need of learning. But the most universities in China neither test English ability of students nor divide to groups according different level. However, English language proficiency does affect the result of bilingual teaching.

The distinction between basic interpersonal communicative skills (BICS) and cognitive academic language proficiency (CALP) was introduced by Cummins in order to draw educators’ attention to the timelines and challenges that second language learners encounter as they attempt to catch up to their peers in academic aspects of the school language[12]. Here, BICS refers to conversational fluency in a language while CALP refers to students’ ability to understand and express, in both oral and written modes, concepts and ideas that are relevant to success in school. Based on this theory, students must attain the basic threshold of BICS and CALP to learn bilingual course. According to the proficiency, teachers carry out few different performances, all English or half English. The proportion of English can increase step by step and teachers keep watching feedbacks to adjust content and pace.

Compared to normal course, bilingual courses take more time of student to learn. Generally, preparation before class is necessary for student to know what will learn. Meanwhile, figure out what contents are more difficult to understand then pay more attention to them. Some exercise could be assigned to test the preparation. On class time, first ask students to list all questions they confuse in preparation period. Then, along with teaching interact with students frequently and solve the questions one by one. Take reality examples to explain conceptions. Also, invite students to give examples using English or Chinese.

Summary

In this paper, we analyze the situation of bilingual education of computer programming in Chinese university. Bilingual education is considered as an important aspect of connotative development but there are lots problems to implement. Besides the difficulty of computer programming course, English makes it more complicate to understand and study. Concerned the fact of situation, we suggest two aspects to improve the teaching result. First, it is suggested to write or organize teaching material according to students’ foundation to get a more concise structure compared to original English textbooks. Meanwhile, increase reality practices into the teaching materials to make it more easier to understand and learn. Second, require students to spent more time on self-learning and increase the interaction on class then keep watching feedback in time. We will work on further strategies of bilingual education to get a better result.
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References


