

A Hybrid Teaching Reform on All-English Course of Programming

Na WANG^{1,a,*}, Liping Li^{1,b}

¹School of Computer and Information, Shanghai Polytechnic University, Shanghai, China

^a wangna@sspu.edu.cn, ^b liliping@sspu.edu.cn

*corresponding author

ABSTRACT. Under the background of ‘double first-class construction’ and ‘first-class undergraduate education construction’ in China's colleges, we have carried out the teaching reform on all-English course of programming. Considering the disadvantages in teaching of all-English courses, with the support of online resources, we proposed a hybrid teaching reform which can partly solve the questions during the process of teaching. The test results show that teaching reform on this course has a great advantage in teaching and learning. It can also provide some ideas for the internationalization of education.

KEYWORDS: All-english course, Hybrid, Teaching reform, Online resources, Programming

1. Introduction

Under the background of “double first-class construction” and “first-class undergraduate education construction” in China's colleges and universities, international school corporation has become one of the important development strategies of each school. So the construction of all English course project is an important means to cultivate high-quality students with international competitiveness [1]. In order to meet the needs of international education, most of the colleges and universities in China are speeding up the construction of all English courses and promote the process of internationalization of higher education [2]. In the construction of all English Majors of engineering, such as software engineering, communication engineering, etc., as a required professional basic course, programming design connects the basic course with the professional course, laying a solid foundation for students' follow-up professional courses [3]. Therefore, the construction of all-English course of programming is an indispensable basic and important part in the construction of all English engineering majors [4].

At present, the construction of all English courses is in its infancy, the fields covered are not very comprehensive, and the number of all English courses offered is limited. We are often unable to meet each others' needs in curriculum design [5]. Teachers and other aspects such as school's exchange programs are extremely limited [6]. The universities and teachers are making continuous efforts, and the proportion of teachers and courses taught in English is increasing year by year. Meanwhile, A lot of work has been done in the training of teachers, the investment of funds and the introduction of high-quality returned teachers, which provides a good foundation for the wide implementation of all English Teaching of professional courses. However, there is still improvable space [7].

In order to solve the above problems, the teaching reform is needed. In particular, the rich online resources provide convenient conditions for the construction of courses. With the help of various forms of online resources, we put forward a hybrid teaching reform of all-English course of programming.

The rest of the paper is organized as follows. Present situation of all-English course of programming is introduced in Section 2. The reform method is proposed in Section 3. And the effects of reform are given in Sections 4. The conclusions are presented in Sections 5.

2. Current Situation of All-English Course of Programming

Firstly, the objective of teaching is hard to meet. Due to the fact that the English level of undergraduates is generally poor, and the contradiction between teaching content and class hours is very common and prominent, we have to reduce the difficulty of the course, choose the easy and discard the difficult, select the shallow and remove the deep, which directly leads to the simplification of the actual teaching content. Then the course will fail to match the training objectives [8].

Secondly, the teaching effect is poor and students' satisfaction is low. The lack of teaching resources and the clear core reference materials make it difficult for those undergraduates who do not have much background knowledge to effectively grasp the teaching content of the course [8]. The teaching methods of the course are rigid and the classroom interaction is poor, however, the formation of good teacher-student interaction is not so easy. Though the students may not understand the professional knowledge, it is very difficult for teachers to answer the professional knowledge thoroughly in English. Only when the teachers speak clearly and the students understand completely, can we really realize the original intention of building an all-English course.

Thirdly, the pressure of course assessment is high. The assessment of all English teaching courses is required to be completed in English [9]. However, most of the students' English level is not enough to provide them with effective support for learning these all English teaching courses. The lack of English proficiency further weakens students' learning initiative, which leads to the overwhelming majority of students' complaints about the pressure of curriculum assessment.

Finally, all English courses have higher requirements for teachers' English level. While strengthening their professional knowledge learning, teachers also need to carry out a lot of English reading and oral training [10]. In order to achieve clear and fluent expression in English teaching, and attract students' attention to the teaching content teachers must pay more attention to the improvement on themselves. It can be seen that the opening of all English courses has higher requirements for both teachers and students' English level and teaching / listening methods.

Since there are so many questions in this course, we need propose a new method that can get more effective teaching innovation and avoid their disadvantages.

3. Teaching Reform on All-English Course of Programming

In order to construct the all English teaching curriculum for undergraduates more effectively and give full play to its role in the “double first class construction” and “first-class undergraduate education construction”, it is necessary to optimize the strategy of all English teaching curriculum construction.

3.1 Reform on Teaching Material

teaching material preparation is the first step in the construction of teaching process. Teaching materials, courseware, exercises and other teaching resources are the main carriers of knowledge imparting and acquisition. The authoritativeness, advanced nature and logical rigour of explanation are the fundamental requirements for data selection and preparation. At present, all English teaching materials in China are still in its infancy. The selection of classic and authoritative foreign textbooks recognized by experts and scholars at home and abroad is conducive to the smooth and efficient development of all English teaching. At the same time, the construction of English teaching quality standards and courseware, the formation of a perfect English curriculum quality standards, optimize the teaching content, the preparation and production of English teaching materials and courseware. We have made teaching slides, exercises and question bank on the course's website building on ChaoXing platform.

3.2 Reform on Curriculum Interactive Design

We use flipped classroom to cultivate students' language ability and understanding. One of the teaching purposes of the all English course is to enable students not only to acquire professional technical knowledge, but also to improve their English communication and expression ability. However, most students are not willing to speak actively because of their limited English level. In view of this situation, small class teaching is adopted in this course, group discussion is interspersed in the class, and group representatives are invited to make speeches. In the discussion section, teachers lead students to sort out the algorithm ideas, guide students to think in multiple directions, and inspire students' logical thinking. Practice shows that the introduction of group discussion in classroom teaching can improve students' learning efficiency, cultivate their sense of cooperation and team spirit, and fully exercise their English expression ability.

Meanwhile, the algorithm application scenarios in daily life are abstracted into actual cases, and students are guided to think deeply by analyzing the implementation process of the algorithm, so as to cultivate students' logical thinking ability. In order to make students better understand the teaching content, we also use Internet technology to intuitively show the operation process of the algorithm, and turn the abstract algorithm into an image process display through animation demonstration.

3.3 Reform on Curriculum Contents Design

Curriculum design is crucial in every chapter because a reasonable design will become a practical teaching link related to each chapter. For example, after the explanation of function, students may be required to design and implement an application about recursion. In this process, students have to consider how to use the concept and method to recognize the call by the function itself. So, the students can combine the design principle with the practical application, solve the practical problems encountered in the program design by using the theoretical knowledge, and consolidate the theoretical knowledge of this chapter through the course design. In this way, students not only have a complete and clear understanding of the basic concepts, principles and methods, but also improve their ability of independent thinking and exploration. The process of reform on curriculum design is shown in Figure 1.

The teaching contents can be generally summarized into three progressive levels: theoretical basis, principle algorithm and implementation. The theoretical basis is the principle relying on programming. The principle algorithm is the useful method that are applied in the introduction of basic knowledge. The implementation is the technology and means used in the realization of the principle and method. The included contents of them are shown in Table 1.

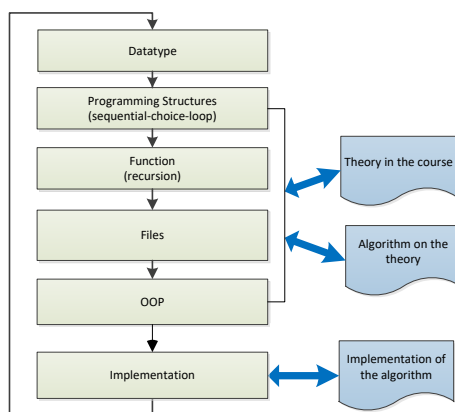


Fig.1 The Curriculum Design Reform on the Course.

Table 1 Contents of Three Progressive Levels.

Chapter	Content	Theoretical basis points	principle method	implementation
1	Introduction	Knowledge review	NULL	NULL
2	Data types	Basic data types	NULL	small cases
3	Structures	Sequential Choice loop	Compare Sort String match Search	Case study for the above structures
4	Files	Open and Close Seek Read And write	Operate Structured data in files	Score statistics Sports meeting
5	OOP	Class Objects Exception	Abstract Inherit Polymorphic	Case study for the above points

3.4 Reform on Teaching Mode

The reform of the teaching mode by using the network teaching platform requires the university education to be “student-centered”. Therefore, the original teacher-centered teaching mode, which only relies on PPT and textbooks, is not enough to meet the teaching needs. The hybrid teaching mode is adopted to give full play to the advantages of the network teaching platform which is shown in Figure 2.

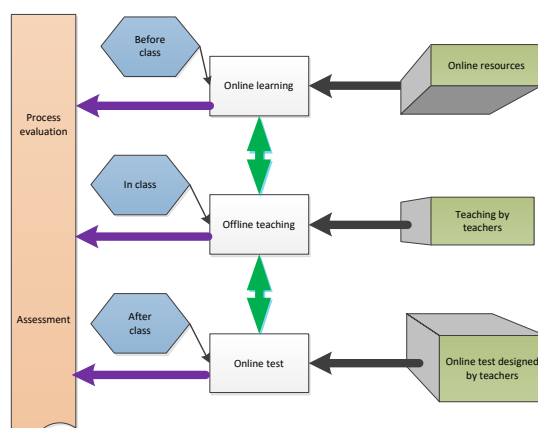


Fig.2 The Hybrid Teaching Method.

Use online resources to organize student preview. Before the course, the teachers list a preview content based on online video resources. At the same time, the teachers upload the course syllabus, teaching slides and teaching plan on the course website. Then, students may have a preliminary understanding of the content of the course in advance. The questions they have faced in preview will stimulate their interest that make them question in class. The use of network teaching platform improves the ability of students' autonomous learning, and makes the learning of courses more flexible.

In class, students can take part in Flipped Classroom. Teachers do not explain all the knowledge points but the main ones. The questions they faced in the preview can be discussed with others. Through the form of discussion, students can understand the theory deeply.

After class, online Q & A discussion enables continuous interaction between teachers and students. It makes the one-way knowledge flow of traditional classroom become the two-way flow. At the same time, the teachers homework and small unit tests so that students can find the lack of learning and enhance the motivation of learning in time. With the feedback, teachers can get students' puzzles so as to adjust the process and make targeted teaching.

3.5 Reform on Evaluation

We should strengthen the assessment of homework and Q & A. We can try to set up a database of test questions or papers suitable for all English teaching. The improvement of the assessment method is a comprehensive evaluation including the factors such as usual performance, practice score, test result and final test result. And it is also a comprehensive evaluation on students' whole process of learning and all-round ability. The proportion and weight of each assessment factor should be determined according to the professional training requirements and the characteristics of the course itself. For students majoring in software engineering, their usual scores are given according to their participation in the flipped classroom and online homework, accounting for 30% of the total score; the test results are the average scores of five online random tests, accounting for 20%; and the final paper test scores account for 50%. The final evaluation is no longer just a one-time assessment of students' grades. It is more objective. What's more, the whole process assessment method is helpful to cultivate students' consistent attitude towards learning and also can relieve the pressure caused by the language barrier in the final examination. We distribute the weights of various assessments as in Table 2.

Table 2 Contents of Three Progressive Levels.

Final examination	flipped classroom	online homework	online tests
50%	10%	20%	20%

4. Effects of Reform Method

New method makes learning more flexible. Online resources provide students more chances to choose what, where and how to learn. For teachers, online tests can save time in correcting homework since the choice and blank questions can be corrected automatically on the platform.

Through a semester of study, students will have a deep understanding of programming and master relative algorithms that can be applied in solving problems. Diversified teaching mode has been influenced by students. Less students' thoughts are not concentrated in class. Students have gradually adapted to all English teaching. They dare speak and participate in classroom interaction actively. At the same time, students' English writing and expression are improved. Their ability has been fully exercised. Students' participation of online learning is higher. It improves the students' ability and enthusiasm of autonomous learning. Overall, the teaching reform on all English course of programming is successful.

We compare the effect between traditional class and reform method class after test in one semester, and the ratio in different score segment of test of both classed is shown in table 3. The excellent grade ratio of students in reform method is higher than traditional one. And the fail ratio is much lower than before. Obviously, new assessments bring new sights on students, and the comprehensive assessment gives them more fair judgments.

Table 3 Score Distribution.

ratio in different score segment	≥ 90	80~89	70~79	60~69	<60
Traditional class	6.5%	18.2%	31.8%	33.6%	9.9%
New class	10.2%	26.3%	42.7%	15.5%	5.3%

5. Conclusions

As a highly internationalized discipline, information science is developing rapidly. Programming course is an important part of cultivating students' logical thinking. The purpose of this course is to train students to use English To understand the latest scientific progress and research trends of the subject, so that students can be proficient in reading English materials and research papers of the subject. And can cultivate students' logical thinking, innovation and practice ability. In the trend of the rapid development of Informatics, teachers need to constantly update teaching contents, actively explore a variety of effective teaching methods, training students' ability to analyze and solve practical problems in English.

The practical results show that teaching reform has a great advantage in the course teaching. Online resource can make up for the shortage of normal teaching. Through the reasonable reform of teaching methods, the members of the course group achieved remarkable result. It will improve the teaching quality of English major courses for the follow-up all English courses. The reform has explored a method that can provide some ideas for the internationalization of education.

6. Acknowledgments

This work is supported by Key Disciplines of Computer Science and Technology of Shanghai Polytechnic University under Grant No. XXKZD1604 and Construction of Key Courses in Shanghai under Grant No. A01GY20G013. The authors would like to thank the referees for their invaluable comments and suggestions.

References

- [1] Hui, S. Problems and strategies in the construction of all English teaching courses for Undergraduates. Heilongjiang Education, No. 6, pp. 44-45, 2020.
- [2] Xia, X., Jiangtao, R., Jingzhong, X. On the construction of all English course for international students in China. Advances in Education, No. 6, pp.750-754, 2019.
- [3] Li, Y. The Target Mode and Path of Full English Curriculum Construction in the Context of Internationalization of Higher Education. Journal of Heilongjiang Teachers Development College, No.5, pp.145-147, 2020.
- [4] Liu, Z. English Curriculum Construction in the Context of Internationalization of Higher Education. Education and Teaching Forum, No. 9, pp. 212-214, 2020.
- [5] Hu, M., Dong, S., Chen, T., Huang, Y. An Analysis of the Construction of All-English Curriculum Resources Based

on the Internet. Education. Education and Teaching Forum, No. 3, pp. 187-188, 2020.

- [6] Wang, N., Ye, J., Zhu, Y. A Brief Study on the Building of English Course of Program Design and Algorithm Analysis. Chemical Engineering Higher Education, No. 6, 2018.
- [7] Zhang, X. Research on Teaching Reform of “China Overview” Course with English. Science and education, No. 6, 2020.
- [8] Yin, J., Chen, B., Sun, J. Construction of English Courses Promoted by SPOC Teaching in Local Universities. Modern agricultural science and technology, No. 4, 2019.
- [9] Wang, R., Wan, Q. The Current Situation and Thinking of Full-English Teaching in Undergraduate Specialty Course-Take Engineering Specialty Course as an Example. Education. Education and Teaching Forum, No. 1, 2019.
- [10] Ning, G. How to Improve the Students' Understanding Level in the All-English Course. Education. Education and Teaching Forum, No. 30, 2019.