Switch to Language Oriented Approach of Teaching Programming Skills

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Abstract. There is a lots of original meaning of English textbook after translated into Chinese. In order to avoid the loss of original meaning, the author carries on using original English textbook for the software programming teaching. In the language choosing for specific documentation and program descriptions, the author emphasizes the chosen of the inventor's language. With causality analysis and induction method in language and thinking, the author proposed a new issue of Language Oriented Approach of Training and Programming, and give light to using AI to implement. The author makes out the main points of this approach, structure of this approach and the prerequisite for its use. In practice the author has launched teaching reform featured with choosing adaptable textbook from all language version, giving lessons in inventor's native language, concentrating the content based on the predecessor courses, demonstrating occupational operating environment in experimental scenes, and so on. The renovation have achieved good effective and efficiency.

Keywords: Language Oriented Approach of Training and Programming, Inventor's Native Language, Programming Professional Training.

1 Introduction

Since the beginning of this century, the spread of web technology has set off a new wave of learning IT technology. However, most college students majoring in Computer Science or Software in China could not get on the trace, and had difficulty in learning. The author has heard and witnessed that there are obstacles in China's computer-related or Software- related majors. More than half of them cannot work in their majors after graduation. That situation promote teachers to find ways to make effective educations.

Some teachers, including the author, said that they lacked thinking mode of computer. In 2006, Jeannette M. Wing, Dean, Department of Computer Science, Carnegie Mellon University, published an article and gave the academic concept of "computational thinking"[1], which is now given as a basic course for students majoring in

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Computer Science in many China's university. It became a significant measure to promote the learning effect of students in Computer Science and related majors.

After nearly 20 years of unremitting efforts, although the number of Computer and Software-related majors has increased significantly, the quality improvement of teaching has had little, so that in the past decade or more, the explosive growth of software design training institutions has arisen, which directly provoked government to restrict it. Experts stood up and generally blamed poor management of universities for the problem. At the end of September 2019, China's Ministry of Education announced Opinions of the Ministry of Education on Deepening the reform of undergraduate education and comprehensively Improving the quality of personnel training, As a result, wave after wave, quality evaluations in universities were presented in recent years.

However, as an ordinary teacher, the author sees the facts and thinks about the reason for the decline in teaching quality is due to the inappropriate or even incorrect in teaching methods. This is especially true in the fields of Computer Science and Software education which is the author's engagement. Many colleagues from all over the world have put forward good suggestions, such as identifying distinctly four implicit skills for novices[2], using adaptive learning system of programming tools[3], etc. And more, the author studies the problem in another way.

2 Causality Analysis in language and Thinking

The author firmly believe that the teaching process is the communication process between teachers and students. In programming teaching, the communication content is the explanation of Computer Science knowledge and Software products; and the learning effect depends on the degree and depth of communications between teachers and students, also the cognitive level of scientific knowledge and product standard. In the course of communications, language is most important tool. For Chinese, there is a language barrier to learning IT technology. Probably, so does for people from many other countries.

Behind different languages there are different modes of thinking. When the same content is expressed in different languages, in fact, the content is decomposed under different thinking modes. So the results of decomposition may not be the same. Once we translate one to another, the original would be transfer with another mode, probably there is a null of meaning in the other mode, a piece of lack generates in translation process. However, in modern technology teaching, we are used to translate the original to native language as the teaching material. This is, another statement in another mode that decoded from the original. The result may be a completely different statement than the original one. This throws the learner into a cloud of confused, obscure words, This causes the learner to miss the point of what they should get. So, for the sake of avoid the loss of meaning, we should avoid translation, we use original language textbook to teaching.

Almost all IT technology originated in Europe and the United States, where English is used. Linguistically, English and Chinese are completely different languages, one is

an combined order language and the other is a pictographic language. Even if in combined ordered language countries, developers in non-English speaking need two language processes to work with computer: first to convert the native language to English; second to feed the English based programming language to the machine for execution. In the first process, due to the functional defects of translation itself, the semantics will be distorted or some original meaning will be lost, which reduce the accuracy and efficiency of communication between developers and computers/inventors. Those cause programmers to appear imbecile or incompetent both in knowledge acquire and programming practice. To prevent those from happening, In educations for Computer Science and Technology majors and the relative majors, there is a great need for inventor's native English teaching materials, textbooks, and English speaking.

What language are the textbooks and teaching materials expressed in? This is the primary and key issue for the author's teaching reform. There are different language versions of textbooks. The author choose version by language which technology inventor's native be. In computer science and technology, most inventor come from America, England and Nordic countries, so the author chooses the editions of the textbook in order to stay consistent with the thinking of those inventors. This is key to gain the knowledge of computer and software both for students and teachers. Once the version of the textbook has been determined, the primary problem of teaching reform has been solved.

After the advent of ChatGPT, many experts realized that ChatGPT can be applied to education as main technology. There is a rush surge in the number of recommendations to use ChatGPT for programming education. However the author doesn't think so. In fact, ChatGPT's cross-language application still has to be translated from the source language into the language of the application country. The problem of semantic loss can still occur just as same as in translation without AI.

Some people would argue, We can optimize the translating, use AI algorithms in translation software. But no matter how optimized, at the node of understanding and communicating, machine algorithms are still less accurate than the human brain. We have to admit the limitations of AI, and leave some jobs to remain by human brains, which is more cost-effective. There is a trade-off between using AI and continuing to use the human brain, and there should be a balance point, exceeding which we would be better off not using AI.

3 Contents and Significance of Curriculum Reform

Starting from the Angle of language, the author put forward the idea of using language and practices several turn of teaching which carried out the teaching reform based on the native language of the technical inventor. In the case of Engineering education, the author use English teaching materials. Just in time with the in-depth teaching reform in Chinese colleges and universities, the author has also taken active actions to reform the teaching he have engaged. This section is a brief description of his teaching reform in the use of language method[4].

3.1 Course Scope

The use of this method is limited to teaching programming. In computer related majors, skill courses require the cultivation of hands-on programming ability. Programming course is of great significance to students' employment, postgraduate entrance examination and career innovation practice. In the process of programming skills teaching, the development platform used, whether it is Studio, Eclipse or IntelliJ IDEA, almost all the software development environment is English interface, human-computer interaction language is English, and almost all the help documents of software development tools are made in English. In the process of testing and debugging software, software engineers mainly obtain software error information through English prompts. In this way, English proficiency is very important for students' study, and thus for their future employment.

3.2 Fields of Curriculum Reform

Having researched and analyzed on the reasons for graduated students to curl up home with golden diploma but not to work, though in hot need majors. The author realized that the teaching reform focus on textbook language choose is needed for computer related majors. The computer related majors mentioned in this paper refer to the majors whose code's first four digits are 0812 in the Catalogue of Undergraduate Majors of General Institutions of Higher Learning independently applied by various colleges and universities, which is according to the catalogue of professional degrees granting and talent training issued by the Academic Degrees Committee of China.

3.3 Teaching Design in Curriculum Reform

The idea of the author's teaching design was based on the need of job requirements, and the teaching agenda was sliced into aspects: Began with the requirements of the software engineering major training program; executed with the dependency characteristics of the curriculum of Software Engineering; aimed at the the students' employment and professional skills upgrading needs. The author optimized the teaching design of the course of "software testing foundation.

For that teachers assign questions in Chinese to students as exercise or homework, which is linguistically not in line with students' situational environment in professional business and programming practice. Students encounter English interface in the process of programming and testing, and rarely Chinese interface. The use of Chinese questions can not meet the requirements of situational training, and there will be a certain gap between the actual acquired skills and the objectives of the course teaching design, which will affect students' employment ability after graduation. To this end, the author used exercises in English, so that students can have the effects of working situational impression and on-site experience when doing exercises.

Record and examination of the teaching process needs to keep file, the teaching reform strictly implement the regulations on educational administration teaching management system. The author made newly the teaching outline, teaching lesson

plans, and those document in reform of language such as PPT, etc, rewrote the English syllabus, English teaching schedules, English teaching lesson plans, renewed English and Chinese bilingual teaching PPT.

The innovation project intends to change the trinity of old teaching pattern in traditional teaching method, which includes teacher explanation, blackboard writing and questions. The author adopts a new bilingual teaching method, with more than 60% of teacher explanation in English and 40% of blackboard writing in English. Demonstrate and explain important concepts, principles and keywords in English. In class, students are encouraged to ask questions in English and teachers give answers in English.

3.4 Significance of Curriculum Reform

As a course teaching reform, the author updated the teaching method of the lesson giving, and guided the students' learning preference for various contents, changed the direction toward more conducive cultivation of professional ability, promoted and motivated the formation of excellent learning methods and habits. Moreover, the reform of this course was of great significance to the teaching reform of information technology courses, which could further promote the reform of teaching mode and teaching method of Engineering courses.

Software Engineering major is currently the highest salary for graduates, but high salary requires strong vocational skills to support, so Software Testing job is a high skill needed occupation. Software Testing Foundation is the core course to train and improve the technology and skills of software engineering. By using the English textbook and material in the teaching of this course, students can consolidate their English foundation, improve their software testing skills, and improve their human-computer interaction skills in the process of programming and debugging.

4 Target Outcomes and Beneficiaries of Curriculum Reform

Using the original English teaching materials in instruction practice, can be benefit for several aspects, such as the students, the teachers and the employer enterprises. More significantly, the teaching effects of instruction reform as a whole has a leap progress, it is greatly improve the quality of teaching practice unit for professional course.

4.1 Outcome and Accumulation of Teaching Reform

The teaching reform of using original English textbooks will accumulate some teaching resources, which can be used repeatedly in future teaching rounds. The continuous accumulation of these teaching resources will greatly promote the improvement of the teaching quality of professional courses, and also optimize the strategic planning of the school's professional construction. The author designed teaching archives as follows: A set of English teaching syllabus, including theoretical courses and experimental courses; An English teaching plan for teachers to use in teaching; An English teaching

PPT for teaching use. Additionally a new compiled word list for each chapter and paraphrase for students to use when reading English textbooks, and a English written exercise sets, including judgment, single choice, multiple choice, filling in the blank, etc. for students to exercise after class or review at the end of the semester.

In the process of writing teaching documents, the teacher not only need to meet the requirements for students' use, but also obey the requirements of school educational administration. The latter requirement is often the focus of the work. The work of teachers must up to the level of educational administration requirements. It is the responsibility of every teacher to comply with the standards and norms formulated by the educational administration department, but this often brings about double workload for teachers. However, once the accumulation of teaching resources reaches a certain scale, it will get twice the result with half the effort.

4.2 Benefit to Students Abilities Enhancement

Using the original English materials to practice teaching can improve students' program code writing ability, so as to improve students' vocational skills. After the implementation of the curriculum reform, It will encourage students to study hard and promote their studies. Excellent students can be selected in this process. At the same time, teaching team can obtain test task templates or use cases from the projects, even products of cooperative enterprises, and over, returns them to promotion station. In next turn they will be used as experimental materials for future teaching, thus enriches the teaching resources.

4.3 Beneficiaries of Educational Reform Radiation Effect

Zooming out the programming, we can see Software Engineering, an integration of software programming technology, software development technology and software testing technology. In Software Engineering teaching, we can use the same method. The most beneficial subject of this teaching reform of the using original English textbooks is the students who was receiving education in school. Their professional ability have improved rapidly.

Based on the teaching promotion facilitation, the teaching experience of the using original English teaching materials has extended to the whole specialty, the whole department, and the whole school. And every teacher who is willing to adopt the original English teaching materials and bilingual teaching methods are all the beneficiaries.

At present, the global talent market have a great transformation owing to change of talent structure and knowledge structure. With the rapid development of digital technology and software industry, software design talents have become the urgent resources of the society, software technology become the key factor of industries. There are great springs of software engineering education in colleges and universities in recent years. A large number of training institutions have opportunities to raise up. The administration of education in colleges and universities is now generally a auto optimization system. The teaching approach of using original language have brought good

extension effects. These institutions will benefit from radiation of this approach, and promote the further improvement of software personnel training gradually.

5 Conclusion

The author has devoted himself to the study of the teaching effects for 10 years. he have found the language factor is significant, and tried to keep practicing forward. It is another way that solve the problem of students' entry barrier to professional learning. The author strive up for new instructional design, which is described in above sections. The author uses technology inventor's language to teach programming, puts the learning based on the scenery that run on the invented tools or software. It can greatly improve students' learning efficiency.

The main designs in teaching innovation include: Selecting textbook from all language version, choosing one suitable, English is always; Using problem sets in chosen language; Executing bilingual or chosen language teaching; Giving lessons in inventor's native language; Demonstrating professional operating environment in experimental scenes; Etc.

Inventors' saying implies what inventor thinks, we can known it with inventor's language. What students should do in learning is catching inventors' thinking. So we switch to new approach for better learning effective and efficiency.

However, since this method has a clear background, it is not suitable for any educational teaching. The preconditions of this approach can be expressed in brief. This method is recommended if the following three conditions are met: 1.The language used is not the language reside in language-teaching. It is engineer teaching, not language teaching. 2.The language of the technology inventor is quite different from the native language of the students. 3.The language is required in the course of using the technology. 4.The language is human languages we should used in language oriented approach, unlike the previous technical term, referred to programming languages[5][6].

In fact, the author explores a new approach for technology teaching to improve learning efficiency. If this approach is spreading, more students will easily acquire the skills needed in employment. And on the other hand, this efforts will promote intellectual property protection and respect for originality. This is the further meaning of the author's teaching reform. What is more, this teaching reform promotes the establishment of language oriented teaching institutions, the spreading influence of curriculum reform arisen.

The scope of using this method is very large. Class teaching reform can be extended to the whole school. Today, Computer and Software are pervasive used, language differences occur all over the world, so every non-English speaking country can take this approach.

However, limited by time and energy, the theoretical system on the Language Oriented Approach of Teaching issue has not been developed. Leave it to interested colleagues. It must promise. More themes need to be explored, such as the extension of use of this approach, solution of the problem employing AI technology if needed, etc. And

the proposal in this paper is limited to technical education, whether the approach can be used in social science education? etc.

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