

Extracurricular Fragile Time-Driven Computer Programming Courses Teaching Designing Based on Mobile Internet and Big Data

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Abstract—With the development of big data and artificial intelligence technology, computer technology and soft engineering play an important role in the current social economy development. Currently, the current teaching mode of the computer education focuses on the classroom teaching effect. However, they ignore the improvement of extracurricular learning effect. This paper selects the C# programming course as the research object. Three approaches, including WeChat group interaction, pushing articles from WeChat public accounts and personalization recommendations by famous technology blog Apps, are proposed. From the test result of the teaching effect and performance, our proposed approaches can improve the effect of extracurricular learning in a fragile time.

Keywords—computer education; C# programming course; teaching mode; big data; mobile internet

I. INTRODUCTION

With the development of big data and artificial intelligence technology, computer technology and soft engineering play an important role in the current social economy development. Computer technology and soft engineering will combine with other industries to promote these industries intelligent development [1]. Therefore the computer education will provide the personnel training of the computer application from all work of life. The computer education can be classified two parts: the basic-level education and the high-level education. The basic-level computer education can only learn the usage of computers [2]. The high-level education will require learners to study the work principle of the computer [3]. Moreover, learners should study the programming language to write codes for using the computer. For university education, the computer education is the high-level education which will provide

qualified people to meet the practical needs of the country.

Programming courses play a key role in the computer education in universities. Especially, application-oriented universities pay more attention to the solution ability of the practical problem. So the programming course is a more important course in the course system of computer major. Programming courses include C programming, Python programming, C++ programming, JAVA programming and C# programming. C programming is usually an introductory programming language for the computer major. Python programming is a script language for better data processing. C++, JAVA and C# are the object-oriented programming language. As far as all programming courses in the course system of computer major, the proportions of the object-oriented programming courses are larger for more applications. The object-oriented programming courses require the learners to use the object-oriented thinking for solving practical problems [4]. Since the object-oriented programming courses need to learn the object-oriented thinking, these courses are abstract and difficult for beginners [5, 6].

This paper selects the C# programming course as the analysis course. The C# programming language, a major object-oriented programming language, is developed by Microsoft Corporation. Since the C# programming language uses the object-oriented thinking, it is hard to understand quickly and grasp flexibly the C# programming language for beginners. Currently, most universities adopt the theoretical teaching method based C# programming books. But many concepts and syntaxes are dull. Moreover it is difficult for students to understand related knowledge in class. So it is important to improve the effect of C# programming teaching by other teaching approaches.

Currently, mobile devices become more and more popular. Every university student has a mobile phone which brings a lot

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of problems. Although the mobile phone makes life convenient, it results in the learning attention problem. However, big data about education on the internet becomes abundant. The university courses can utilize big data resource to further improve the learning attention of students. Based on the above consideration, we utilize the mobile internet and big data to improve the efficiency of C# programming teaching in students' fragile time. By this way, the interesting of students for learning programming courses can be further stimulated. Moreover, it can be an important supplement of extracurricular learning.

The rest of this paper is organized as follows. In Section II, we give an analysis of the current teaching mode. Section III provides our proposed approaches based on mobile internet and big data. In Section IV, experimental effect and performance are shown. Finally, the conclusion is drawn in Section V.

II. ANALYSIS OF THE CURRENT TEACHING MODE

Currently, the current teaching mode focuses on the classroom teaching effect. For example, multimedia presentation, the flipped classroom, et.al. Although these teaching methods can obtain some teaching effects for most courses, they ignore the improvement of extracurricular learning effect. Especially, the C# programming course needs a lot of examples to enhance classroom learning. The current teaching mode for the C# programming course exists following problems. Firstly, the teaching mode is dull. Second, the contents of the C# programming course are lack of knowledge extension. Finally, the interesting of students can't be considered fully.

A. Teaching Mode

For the teaching mode, the separateness of the computer theory and experiment teaching is unsatisfactory. For most C# programming teaching designs, two lessons will be planned in a week [7]. In the first lesson of a week, the computer theory teaching will be arranged by the multimedia technology. For the second lesson, an experiment of the training will be started up. But the C# programming language, like the JAVA programming language, has many abstract and complicated object-oriented concepts [8]. Moreover, the current teaching mode adopts unidirectional teaching by the teacher in the classroom. It results in learning inefficiency for students.

B. The Contents of the C# Programming Course

For the contents of the C# programming course, knowledge points of the textbooks are inflexible. Knowledge points of the textbooks are lack emphasizing difficult knowledge points. Each part of a C# programming textbook is described fairly. Existing C# programming textbooks describe flatly knowledge points include the C# programming language survey, introduction to development integration environment, the C# programming grammar, object-oriented programming, windows application design, database access technology and Web application design.

However, C# programming textbooks are almost same with other programming textbooks. In fact, the C# programming language has its characteristics. For example, the program

generation of the C# language is simpler than the C/C++ language, more flexible than the JAVA language. The C# language has no separate head file. Moreover, it should not declare methods and types. But these characteristics of our existing C# programming textbooks usually have only brushed lightly in the beginning. When students finish all computer programming courses, it is hard for them to distinguish the respective characteristics of each programming language.

Since knowledge points are described by the same structural arrangement, the content of structural arrangement is unreasonable. It results in the poor logic of the C# programming course.

C. The Interesting of Students

In the interesting aspect of the C# programming course, we select 42 undergraduate students as the experimental samples for analysis of the current teaching mode. These students majoring in software engineering are from two administration classes. Our interesting experiment includes two parts: the selection of the interesting teaching mode and the selection of the interesting content. In the selection of the interesting teaching mode, we attempt to find the interesting teaching lesson between existing traditional lessons. In the selection of the interesting content, we attempt to find the interesting contents for students.

Fig.1 shows that 6 students select the theory lesson as the interesting teaching mode while 36 students select the experiment lesson as an interesting teaching mode. From Fig.1, we can see that most students are more interested in the experiment lesson.

Fig.2 shows that 31 students select the example teaching content as the interesting content while 11 students select the textbook teaching contest as an interesting contest. From Fig.2, we can see that example content is more attractive.

Besides, we find that students are interesting in future employment planning and project development experience share in our interesting experiment. Half of students hope that they can obtain more information about IT positions. It is because the current employment courses for students mainly focus on the regular job search process. But these courses are lack of IT related information. It leads to the confused state of professional job search for students.

From our interesting experiment, the requirement of students is very diverse. Therefore our course design should consider the interests of students. On the hand, our course should enhance the experiment lesson by introducing new approaches to meet the requirement of students. On the other hand, our course should expand the teaching content by adding more IT related information.

When we consider fully the interesting characteristic of student, the effect of teaching will be improved dramatically.

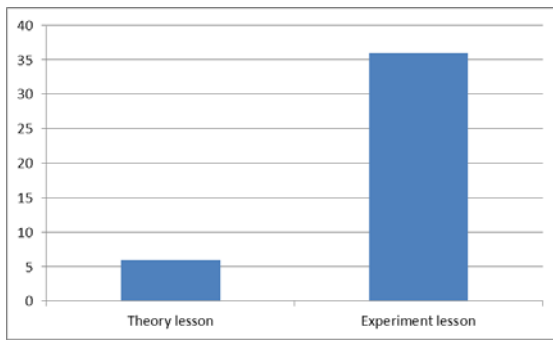


Fig.1. The selection of the teaching mode

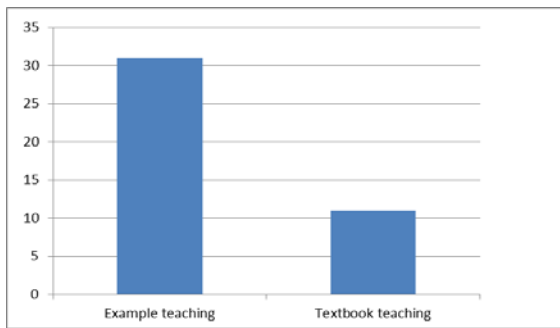


Fig.2. The selection of the content

In all, the classroom teaching effect of the current teaching mode should be improved to arouse students' interesting. Therefore, some new approaches should be introduced into the current teaching mode.

III. IMPROVED APPROACHES

Since the current teaching mode has been fixed, classroom time is very limit. However, students hope that they can obtain more experimental training and knowledge extension opportunity [9]. Therefore, this paper proposes some approaches to improve the current teaching mode. Our proposed approaches focus on big data about C# programming resources from mobile devices in a fragile time. Three approaches, include WeChat group interaction, pushing articles from WeChat public accounts and personalization recommendations by famous technology blog Apps, are being proposed.

A. WeChat Group Interaction Approach

WeChat group interaction approach can improve extracurricular experimental training process. WeChat launched by Tencent Corporation can provide instant messaging services for smart mobile devices. WeChat supports cross-communication operators and cross-operating system platforms to quickly send free voice messages, videos, pictures and texts over the network. At the same time, it can also use social plug-ins "shake", "drift bottle", "circle of friends", "public platform", "voice NOTEPAD" and so on through sharing streaming media content and location-based social plug-ins. WeChat has covered more than 90% of smart phones in China, with monthly active users reaching 806 million, users covering more than 200 countries and more than 20 languages.

Based on the popularity of WeChat, students can use their WeChat group to discuss some problems in their fragile time. Also, they can send experimental result pictures to WeChat group for problem discussion. This can further stimulate students to solve C# programming problems.

B. Pushing articles from WeChat Public Accounts

Pushing articles from WeChat public accounts can expand knowledge points for all students. Currently, there are many WeChat public accounts in mobile internets. The total number of WeChat public accounts has exceeded 8 million. Some famous programming WeChat public accounts include weixin51CTO, CodePush, bigdatadigest, et.al.. These public accounts can provide programmers with the best blog, the most exciting discussion and the most practical development resources. Also, they can provide the latest and complete programming learning materials: PHP, Objective-C, Java, swift, C/C++ function library, .Net framework class library, J2SE API, etc.

Taking weixin51CTO as an example, we can obtain the latest programming materials. The weixin51CTO public account includes technology articles pushing, online learning, 51CTO School. Especially, it has four modules: micro position, video course, enterprise edition and education edition. These modules cover four fields of employment training, knowledge payment, enterprise e-learning, and university MOOC. It can help technicians and college students learn freely and efficiently on the mobile platform, realizing employment, transfer and skill improvement. At present, the platform has a total number of learners of more than 6 million, more than 3000 lecturers, more than 13000 courses, more than 260000 videos, more than 130000 class hours, and more than 100 million learning times. It provides online learning services for more than 1200 vocational colleges and more than 150 enterprises. It is a leading online education and practical training platform in the field of IT technology in China, with the number of expert lecturers, courses and learners.

So substantial content articles are be pushed from these WeChat public accounts every day. These articles include many pictures and examples which can further meet students' requirement of knowledge expansion in their fragile time.

C. Personalization Recommendation

Personalization recommendation by famous technology blog Apps is another useful approach which can meet students' requirement of personalization learning for the separate student in the fragile time. Since the leaning ability of every student exits difference, technology blog App, like CSDN App, can further solve personalization leaning for the C# programming course in the fragile time.

CSDN is an enormous Chinese IT community with 27 million registered members and 28 million technical articles. Such enormous learning resources will effectively push to technology development. CSDN App is a mobile soft for mobile learning. In this App, we can obtain massive blog technical articles that can read them anytime and anywhere by mobile devices. Students can use fully the fragile time when they are lined up in the canteen. Besides, CSDN App develops

a new feature, called Blink, which can provide interaction with technical experts. Currently, technical experts of CSND App can provide technical answers. Usually, technical experts are from famous IT corporations. So they can share their experience, for example, employment planning experience and project development experience.

Utilizing the above approaches, teachers can guide students to improve the effect of extracurricular learning in a fragile time. Moreover, students will be more interested in the C# programming course.

IV. TEACHING EFFECT AND PERFORMANCE

To verify the teaching effect and performance of proposed approaches, we select 10 students from prior student samples as test students. The test time span is from midterm to the final exam. Three proposed approaches are adopted to improve the current teaching mode. All students use their fragile time for WeChat group interaction. By using WeChat group interaction, some students can learn other students' programming thinking to broaden their mind. WeChat public accounts and technology blog Apps can improve problem-solving skills.

Students can strengthen exchanges with teachers by WeChat group interaction. In traditional teaching mode, teachers are lack of exchanges with students for the university teaching characteristic. In most cases, students can meet their teachers for two times each week. So many learning problems are unable to be solved immediately. We utilize the WeChat soft to quickly send free voice messages, videos, pictures and texts over the network. In our teaching experiment, we build a WeChat group with 10 students and 1 teacher. When the teacher arranges a programming task, teacher can trace the progress. At the same time, students can send the screen shot of debug and result. By utilizing WeChat group interaction, students are more interesting in C# programming.

In the beginning time, the teacher recommends 6 WeChat public accounts to these experimental students. These 6 WeChat public accounts include IT information, technology experience share, job search, et.al.. Each WeChat public account pushes about 8 articles every day. The teacher asks students to read these articles in their fragile time. After finishing these articles, students need like their articles and write the reaction to articles in the message zone. Besides, the teacher pushes small amount of articles from other public accounts. For half-term, the response of students is that broaden their range of knowledge and get a deeper understanding of knowledge points.

Technology blog Apps can make students exchange with professional experts and discuss their problems. At the beginning stage, the teacher firstly searches famous professional experts for students and then recommends these professional experts to students. When students have added

these experts in their App, they can exchange with their favorite experts. By obtaining experts' experiences, students say that their problem-solving skills have been improved dramatically.

Our experiment further verifies the teaching effect and performance of proposed approaches for the C# programming course. In fact, our approaches can promote other computer programming courses to improve the teaching effect.

V. CONCLUSION

The current teaching mode of computer education focuses on the classroom teaching effect. However, extracurricular learning is ignored. This paper proposes three learning and teaching approaches in the fragile time, including WeChat group interaction, pushing articles from WeChat public accounts and personalization recommendation by famous technology blog Apps. From the test result of the teaching effect and performance, our proposed approaches can further improve the effect of extracurricular learning in the fragile time.

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