The Direction Guide of C-Language for the Major in Engineering and Science

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ABSTRACT: For the students of major in science and engineering in China, the C-language is a very important basic course. According to the current situation of the 90s generation, we discussed how to design the direction guide in the first lesson of C-language in order to attract the freshmen. There are three issues the college students most pay close attention to, the postgraduate entrance examination, the jobs and success. In the direction guide, these issues are combined with the C-language that presented detailed in this paper.

1 INTRODUCTION

With the massive expansion accomplished by most of the universities in China after 1997, the undergraduates’ role has changed from the outstanding intellectual to ordinary ones. After suffering from the painful college entrance examination of China, they get into university with confusion and powerlessness. The students born after 1990 which called the 90s generation often shows three features, the self-hesitation in subconsciousness, the aimless situation after going through the college entrance examination and unable to understand the fundamental reason for engaging in advanced education after sticking in our 12-year’s testing education. These negative emotions affect students' learning very much. For the major in science and engineering, the C-language is basic and important course. Only a few students of 90s generation will learn C-language course as an applicable and useful language tool in their future profession life that worth time digging into. Most of them just only aim to pass the finally exam. With the economic development, the students of 90s generation had changed greatly than before.

For teachers, it is important to lead students finding the value of learning, paying attention to choice made by them, like why to learn, what to learn and how to learn. Therefore, it is meaningful to design the direction guide in the lessons of C-language. In the contents of direction guide, the knowledge of the course should relate to the postgraduate entrance examination, the jobs and the success.

2 CONTENTS OF DIRECTION GUIDE

According to the features of 90s generation and the current social situation, the content of direction guide is including three topics, which involved scientific research, advanced study and employment. Every topic has different example.

2.1 Learning for scientific research

In high middle school of China, students study hard for college entrance examination. When they entered university, many students will lose their target. Therefore, the content of direction guide will point out that the students' learning goals, for example, learning for scientific research which is a very useful target for advanced study. We take the point from the job done in the period of author’s postgraduate and show a video on repose of collapse. The screenshot is shown in figure 1. [1]

The research of granular collapse is beneficial to understand some physical phenomena such as avalanche, landslides and breaking of retaining walls etc. Here we utilize DEM simulation to study the gravity driven collisions of a granular pile composed of multidiameter particles by solution of the Newtonian equations of particles motion and the
program is developed to compare the performance of the two neighbor list algorithms. For simplicity we restrict our study to two dimensions, all forces lie in x-y plane, and angular velocities and torques are taken positive for anticlockwise rotations. The simplest model of contacting grains exhibiting finite compressibility is the linear spring model for normal forces of contact. And for tangential forces of contact the Coulomb friction model is employed. To pursue the movement of each grain, the Runge-Kutta method of order 4 is employed to perform the time integration of the dynamic equations with an initial state. The detail can refer to the reference 1. By means of the example, student will see the power of programming language to simulate the process of repose of collapse through this video. And they could find the simulation of repose of collapse can apply to many aspects, landslide, snow-slide, grain accumulation etc. For scientific research, programming language is a very important tool and C-language is worth to study attentively.

2.2 Learning for mobile application

Nowadays every student has the smartphone. And the mobile application programming has also become a popular profession. The C-language course is the basis of programming. For college students, entered the university means a new beginning not the end. However many students seldom look for their own future actively. It is too easy to be muddle along without any aim. Therefore, we should introduce students a target, which is related to the personalized course, and let the students find the study direction of this course. Learning for mobile application programming is a very useful target for job.

Wechat is a popular APP in smartphone especially for young people. We chose an application by Wechat to show how the C-language applied to mobile application. The author presented an mobile application named as i-rollcall shown in figure 2. For teachers, the time for roll call is reduced to seconds by using the i-rollcall, which greatly reduced the burden of teacher. At the same time, it is more difficult to truant for students. The function of i-rollcall will be verified on the spot.

Figure 1. The screenshots of collapse simulation video.
On the one hand, C-language is an important course can be proved again. On the other hand, it is easy to understand for students how the mobile application made. And we encourage students to design their own application which can be their homework or product. Some of previous works of students also will be showed in order to encourage everyone.

Rollcall is familiar for students. By means of the introduction of i-rollcall, the most important contents in C-language are also introduced to students that are the sequence, pointer, file and the concept of structure.

2.3 Learning to solve practical problem

In university, learning is not only for the exam but also for employment. However, the majority of students are used to exam oriented education still. They always care about scores, and they like the standard answer rather than solve practical problem. As teacher, it is necessary to change the thinking of students that it is for the practical usage no matter teaching or learning[2-3]. The application is the final purpose. Therefore we introduced a real case to show how to use C-language to solve practical problems.

In Xiasha District of Hangzhou city, the operation range of taxi is limited within the Xiasha District, as shown in figure 3 which marks with the black circle. So, how to solve the practical problem using C-language? There is no standard answer. There has different solution for this problem. Considering C-language, the concept function has been introduced here. We assumed the centre point of the black circle in map of figure 3. Then a distance function will be defined as the difference of GPS value between the taxi and the assumed centre point. If the distance function is larger than the radius value of the black circle, the taxi will be judged as exceeded the range, and vice versa. By means of this real case, it is easy to understand how to use C-language to solve practical problem. At the same time, we encouraged students put forward their own solutions.

3 CONCLUSION

C-language is a very important basic course for the students majored in engineering and science. Aimed to 90s generation, the direction guide of C-language has been carefully designed which involved scientific research, advanced study and employment. The most important knowledge point of C-language, such as function, sequence, pointer, file and the concept of structure, are all be introduced in and combine with different examples. By means of the direction guide of C-language, we hope the students will find out the interesting of learning, the purpose of learning, the usage of learning, not only just for C-language. Although the paper is discussed with C-language, it is also valuable for other course of engineering and science.

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