NCRE Based Exploration into C Language Programming Teaching on Moodle

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ABSTRACT

Regarding the problems existing in C Language teaching in Anshun College, we analyzed the current situation of NCRE and also analyzed the actual curriculum reform from course teaching, experiment, and practice by use of Moodle, in the hope of improving the actual teaching effect, exciting students’ interest in learning, cultivating students’ practical ability, and enhancing the NCRE passing rate.

INTRODUCTION

C Language Programming (hereinafter referred to as “C Language”) is a highly theoretical and practical language of introduction to programming and plays an important role in cultivating students’ programming concept, establishing a good programming style and improving students’ ability to solve actual problems. National Computer Rank Examination (hereinafter referred to as “NCRE”) is a computer proficiency exam that is held by National Education Examination Authority (NEEA) [1], and C Language is one of the examination subjects. At present, as many organizations and departments list NCRE Certificate II in the licenses for accessing to job interviews, computer related learners are not any longer satisfied with passing the final exams arranged by the university. They join in C Language level testing one after another, in order to acquire NCRE Certificate as the embodiment of their learning skills.

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From the second half of 2013, Level 2 C Language started using 2013 edition of NCRE syllabus and no-paper testing, with the exam time changed to 120 minutes, and laying emphasis on the examination of students’ practical skills. However, it is found that C Language teaching is not timely adjusted with the exam reform, and that its teaching & learning mode remains conservative. Its injection-type teaching method focuses too much on sentence and grammar teaching, short of practice. It overlooks students’ programming and debugging abilities cultivation and reveals the phenomena that students are not so interested in, or do not have much enthusiasm for, learning and that the exam passing rate is low. Therefore, in this paper, we are intended to put forward a new idea of NCRE based C Language teaching reform by means of Moodle(Modular Object-Oriented Dynamic Learning Environment).

EXISTING PROBLEMS IN C LANGUAGE PROGRAMMING TEACHING

In this paper, we analyzed C Language Programming taught in Electronics and Information Engineering School of Anshun College and summarized the following problems.

One problem is about theoretical knowledge teaching. C Language teaching adopts the method of teacher speaking combined with students listening. This teaching & learning mode is conservative, with little teacher-student interaction. The teaching content is limited to pure grammar teaching. The class is abstract and boring. Generally, after passive learning, students can neither understand the relationship of grammar with programming nor use the language rules to solve actual problems. This teaching method, which is just for coping with the final written examination, deviates from the idea of cultivating students’ ability to solve problems and loses the original intent of C Language learning. Thus, there is an urgent need to change the traditional teaching method[2].

The other is about practice. C Language is a highly practical course, and computer operation is very important to its learning. Learning without practice, like an “armchair strategy”, is inadequate. Since Anshun College is an application-type class II university whose students’ basic knowledge is generally not good enough, the arrangement of 24 experimental class hours in one semester is not enough to attract students’ attention or to produce an ideal computer operation effect. Besides, because students study independently in class as arranged by the teacher and lack teamwork and communication, they design program exactly as taught, without any changes, which is adverse to their learning effect.

CURRENT SITUATION OF NCRE-C LANGUAGE LEVEL TESTING

From the analysis of the grade database of recent computer proficiency exams in Anshun College, we can see that Level 2 candidates account for the majority of all candidates. As required by the university, a student major in Computer or
Electronics and Information Engineering is not qualified to apply for diploma or degree certificate unless he/she passes Level 2 computer proficiency exam. For this reason, about 100 students major in these two majors join in Level 2 testing of C Language every year, making up 90% of the Level 2 candidates in this college. However, every time, there are at most 20 students who pass the exam. The exam passing rate is not high. In order to improve the current situation of C Language proficiency exam, we combed all the details of proficiency examination content around teaching, applied Moodle to teaching, and strengthened systematic training to develop students’ ability.

**NCRE-BASED MEASURES TO REFORM C LANGUAGE TEACHING ON MOODLE**

Moodle is a curriculum management system developed by Martin Dougimas, an Australian teacher[3]. Designers can set the interface in an individualized way by increasing or decreasing modules according to their own need. Through this system, they can exchange with teachers or other students on an equal footing, and build their own knowledge. In this paper, specific to C Language characteristics and shortcomings in its learning, we studied and reformed each teaching link by use of Moodle, in the hope of improving the teaching quality.

**Environment and Installation of Moodle**

Moodle is a kind of open-source free software, which can be immediately downloaded from the official website for installation. However, there is technical premise that web server software Apache, app server scripting language PHP, and database software MySQL should be installed first. Since the two majors in School of Electronics and Information Engineering have not more than 40 students, we built a local network in the computer room and installed Moodle with xampp integrated package, which can create a PHP environment quickly and finish the installation of apache, php, mysql, phpmyadmin through one click, saving time more than individual installation.

**Optimal Reform of Course Content**

Course content is students’ learning object and the core of learning platform. According to the teaching syllabus, teachers prepared word, ppt, video & audio, and other types of teaching documents based on the students’ knowledge level and learning need and uploaded the documents to the teaching platform in an organized way, for learning reference. In order to help the learners who need inquire an external website for problems, they also added several unified resource locators (URL) for external linkage, making students’ accessing easier[4]. Teaching was designed as follows:
The Course of C Language was added to the teaching platform as a form of chapters. The theme of teaching involved basic knowledge and some design and comprehensive problems broadening students’ vision. The content of computer proficiency exam was taught in the form of expanded exercise at the end of course. The course was taught in a specific logic: First, the teacher taught the basic knowledge of C Language according to the electronic PPT on Moodle, taking the problems in life and work as application-type programming cases, weakening the contents that are hard to understand, and reinforcing the key parts. For example, the conditional statement is a key point of C Language and also a difficulty in NCRE. Generally, students cannot use it properly even though they spend much time on it. Specific to this, the teacher took the question that an enterprise allocates the bonus according to profit-sharing for example, and taught students how to divide the profit lesser than or equal to RMB 100,000, the profit greater than RMB 100,000 but lesser than RMB 200,000, and the profit greater than RMB 200,000 using the number axis, how to set the bonus, and how to calculate the total amount of bonus granted [5]. By means of this sample question, many students who do not understand the performance of “if”, several “else if”, and “else” were proficient in the application of conditional statement to problem solving. Their ability to apply knowledge to solving actual problems was improved.

Since autonomous learning regresses to learners themselves and takes the responsibility of arousing learners’ potential, students logged in the C Language course platform and reviewed the knowledge system of this chapter under the direction of headline and in combination with the teacher’s explanation of course, according to learning goal. After finishing the course review, learners selected diversified exam questions, including multiple choice question, completion, programming question, etc. for learning according to their knowledge reserve and skill preparation. These questions should be provided with answers and examine students’ comprehensive competence and grasp of professional knowledge with the minimized routine. Moreover, the cases should be so vivid as to give students a refreshing shock and constantly improve students’ interest in learning. For example, when learning the definition of pointer, many students cannot understand the types of pointer, types of objects which a pointer points to, pointer value, and memory area a pointer occupies. If pure theoretical explanation is too abstract for students to understand, then the teacher should organize 20 students to make a circle in an order, let them number themselves with cycled numbers 1–4, and let every student who counts off with 4 out of the circle. Then, students should look at the remaining serial numbers, and think about how to solve this question with a pointer. Inspired by the teacher, students kept checking and correcting the program and finally grasped the pointer learning. This teaching method contains the explanation of new knowledge and changes the traditional classroom cramming method. Students were quite interested in it and their learning effect was greatly improved.

In a summary, although repeated explanation in classroom is critical to improving the understanding of knowledge, the immutable teaching method and
examination questions does nothing but aggravate students’ inertial thinking and trap them in the bottleneck of inertia. Thereby, we optimized the course design and broke the fixed teaching method, making the teaching method alive through students’ autonomous understanding and knowledge application. In addition, the teacher combed NCRE details by use of Moodle, analyzed the frequency of learning module testing, laid emphasis on key and difficult points, and added questions to extend students’ creativity, which not only solves the problem of insufficient knowledge taught in finite class time but also offers students learning choices, avoiding learning the already-grasped knowledge for more than one times under the teacher’s instructions.

Experimental and Practical Method Reform Aimed at NCRE

During implementation of C Language, a high-quality experiment is to accomplish the learning task and to acquire NCRE Certificate. We did a survey of the recent 3 years’ C Language teaching in Anshun College. According to the result of statistical analysis, 85% of the students hold that their learning of C Language took classroom teaching as the principal, short of experimental training, and computer operating experience. In ordinary training, they exercised on paper. Once operating on computer, they had no way to solve the programming questions. They remembered the program structure but were unable to accomplish testing or debugging on their own. Specific to this case, we constituted appropriate learning groups on Moodle forum, blog, E-mail, chatting room, etc[5]. According to the constructivism learning theory to build a cooperative learning environment where teachers and students are equal, in order that students can accomplish experimental training smoothly. We designed the experimental learning process taking the expression-type learning of loop statement as example: theme design and discussion, experimental task assignment, autonomous learning, teacher evaluation.

THEME DESIGN AND DISCUSSION

Discussion can help students to deepen their understanding of knowledge, to experience the variety of algorithm, and to solve the puzzles they have in classroom learning. As a difficulty in C Language, the most widely-used design structure, and a key point in NERC, the loop structure can help in solving many problems in life. This structure mainly includes three kinds of loop statements “for”, “while” and “do-while”. Among them, “for” statement is various, and it can not only be used in the case where the number of loops is given but also used in the case where the loop termination condition instead of number of loops is given. “While” statement and “do-while” statement are similar in structure but different in performance. [6] Discussing the designed theme makes students deepen their understanding of loop conditions, loop structure controlling the number of loops, way to realize loop structure, and purpose of loop structure, as shown in Figure 1.
EXPERIMENTAL TASK ASSIGNMENT

At the end of discussion, the teacher uses WIKI to assign the experimental task on Moodle. After learning, students think about the question, as shown in Figure 2. According to their design thinking, they can publish their design framework maps on the platform and lean from others.

Figure 2. Experimental Task Designed on WIKI.
AUTONOMOUS LEARNING

Based on the designed algorithm, students did editing, compiling, linkage, and performance on Microsoft visual c++ editor. Through constant attempts, they found problems and corrected them, and finally they designed the correct program. A learner can write the program he designed in WIKI, as shown in Figure 3. Clicking the tag “correct”, another student can correct the programming of the former student.

Figure 3. Program Presented on WIKI.

TEACHER EVALUATION

Evaluation plays a very important role in experimental learning. This course is also inseparable from design of the evaluation link. The teacher should seize the evaluation timing, and do specific evaluation according to the actual conditions. Especially when a student accomplishes the task very well, the teacher should give an evaluation for affirmation and encouragement. Besides, students can evaluate each other, in order for mutual promotion.
As a section of experimental course, loop design is not hard. However, it is uneasy and remains faced with many challenges to achieve the ideal effect if each section of C Language course need be designed. To improve the experimental training of C Language, the only way is constantly updating the platform and reforming the teaching mode, so as to the improve the experimental learning effect and vitalize students’ potential.

CONCLUSION

Through constant attempts for teaching, the NCRE based revolutionary exploration into C Language Programming on Moodle has got a certain result. NCRE passing rate has been greatly improved. Since teaching is a complicated design process, we will constantly explore into the reform of C Language Programming to further improve the teaching quality. When the teaching method gets mature, we hope it can be popularized in other courses.

REFERENCES