Application of Individualized Teaching Model for Basic Computer Science at Vocational Colleges

Zhou Zili, Feng Hanrong
Computer engineering Department
Zhejiang Institute of Mechanical & Electrical Engineering
Hangzhou, China
zhouzili88@163.com

***Abstract*—As the teaching reform of basic computer science grows, the course requirements have become increasingly higher. This paper analyzes the necessity for implementing individualized teaching models and introduces the process of carrying out the individualized teaching of basic computer in the past two years. We have explored and experimented with a three-scaled individualized teaching model from the respects of teaching syllabi, teaching methods, practical training and assessments. After doing so, we have achieved some desired results, and provided some references for the teaching reform of basic computer science in vocational colleges.**

***Index Terms*— basic computer science, indivitualized teaching, exploration, practice**

I. INTRODUCTION

Basic computer science is a compulsory course for all majors at various vocational colleges. It aims to cultivate students' computer skills, laying a foundation for upcoming comprehensive and systematic learning in all majors. The development of computer skills plays an important role in students' major studies, and determines whether they can meet the actual requirements of jobs after their graduation. Mastery of the basic computer science and skills, and the ability to use computer information rationally are the basic requirements for students' development. These skills have been highly valued by on-campus students and professionals at all levels. As the teaching reform of basic computer science grows, the teaching methods called "theoretical teaching approach" or "first-phase teaching" cannot keep the pace with the new social development. The reform towards individualized teaching approach is inevitable because it is more intense, more comprehensive and integrates various courses.

II. THE NECESSITY FOR INDIVIDUALIZED TEACHING

A. Different freshmen's levelsl of computer knowledge

In the past four years, ZIME has enrolled students from increasingly larger area. The gap between computer levels of students from different areas is becoming more prominent. Generally, the computer skills of the students from the West are not as good, in fact, some of them have never used computer at all. Even within Zhejiang Province, students from different towns and cities have very different levels. One or two students have got First Level Certificate in Computer Proficiency while some even have got the Second Level. Students with different levels study in the same class, so it can be imagined how hard it is to make every one happy with the teaching.

B. The alloted teaching hours for the course are getting fewer

Vocational colleges, which aim at cultivating highly skilled talents, usually attach more importance to the teaching of specialized knowledge and professional skills. Compared with specialized courses, basic computer science is relatively regarded as less important. In recent years, the allotted teaching hours for the course has decreased for some non-computer majors. Furthermore computer majors have completely given up the course "Basic Computer Science" since 2008. So exploring individualized teaching is the most effective way to solve the problem of students of different level being able to attain the same teaching target in fewer class hours.

C. There is change in social requirements

According to the survey titled Social Requirements for Teaching Contents and Curriculum of Basic Computer Science for Non- Computer Majors, which was conducted in 2009 by "Social Requirements Survey Group" in Zhejiang Higher Education Guiding Committee of Computer Science and Technology Teaching, 58% of the investigated 1596 employers think the basic computer applications are the most important, such as word processing, spreadsheet, windows operating system and inputting Chinese. They should be the first priority in teaching contents. Inputting Chinese was usually ignored in the past teaching. Teaching the ability to use the internet has become the new concern of employers. 15% of the employers think the ability to use the internet is the second most important of all abilities. Almost all the investigated industries rank the ability to use the internet as the second most important. However, the National Computer Level Test, which is always highly emphasized in the classroom, is regarded as unimportant (see table 1). So, the advanced application of office software should be highlighted in teaching; computer internet should be added to the teaching contents, and the National Computer Level Test should get more publicity.

TABLE I. THE HIGHEST SIX SOCIAL REQUIREMENTS

rank	Requirement	percentage
1	The application of basic computer skills	58%
2	The application of computer internet	15%
3	The development of application system	8%
4	The application of data base	7%
5	National Computer Level Test	6%
6	programming	6%

III. APPLICATION OF INDIVIDUALIZED TEACHING

In response to the above-mentioned reality, in line with the situation and teaching conditions of ZIME, the researcher organized various teaching activities targeted at different students, sticking to student- oriented teaching principles. In this way, we have achieved the change in basic teaching from teaching different students in the same way to individualized teaching.

A. Brief introduction to the implementation of individualized teaching

Education psychology suggests that there are differences in students' capabilities and personalities, and while compiling text books and syllabi or writing teaching plans, we should take those differences into account so as to improve the quality in student's learning [2-4]. During the period between their arrival at the college and the time they began their class, all the non-computer majors were asked to take a placement test to test their computer skills. Based on the result of the test, the freshmen were divided into three grades—high, average and low grade. The freshmen with excellent test results were enrolled into advanced classes after they gave their consent. The number of freshmen in advanced classes accounted for about 5% of the total. The freshmen with bad test results were enrolled into beginners classes after they gave their consent, the number of which accounted for about 10% of the total. And the rest of the freshmen just stayed at their original regular class, studying as a regular class. The students from the beginner's classes were required to take one session a week in that beginner's class in addition to the lesson for the regular class which they were originally in. Whereas students in advanced classes were required only to take one session a week for the advanced classes, and they could apply to be exempted from the basic computer course. The class time for the advanced classes generally were at the same time as that for regular classes which they were originally in. For example, basic computer science for 10 freshmen's classes was scheduled at Tuesdays afternoon's four periods. Then, the advanced students from the 10 classes don't have to study at their respective regular class, and just study at the advanced classes.

B. The Implementation process of individualized teaching model

In the process of implementing the proposed individualized teaching model, based on the students' current computer literacy and their expectation, adjustments were made in teaching syllabus, teaching plan, teaching methods, practical training and assessment, so as to meet different learning targets for advanced, average and low level students.

(1) Adjustment in teaching syllabus and teaching plan

Based on students' scores on the placement test, their actual learning capacity, and their individual demands, we provided different teaching contents and designed different teaching syllabus. Students of the beginner's class had to start from the ABCs, such as learning how to type in Chinese characters, getting familiar with the functions of the keyboard, and learning to basically use such office software as Word, Excel, and Powerpoint. Students of the regular classes were required to master the advanced application of such office software as Word, Excel, Powerpoint, Frontpage and Access. They also had to learn about certain basic skills using computer network. Students of the advanced level, contrary to students of the other two levels, on the premise of mastery of the advanced application of the office software, were required to learn some practical system operation knowledge, advanced operation of popular software and practical software to improve their capacity of finding solutions to practical problems. In line with different teaching syllabi, different teaching plans were made accordingly.

(2) Adjustment in teaching methods

Individualized teaching models calls for different teaching methods for students of varying levels to achieve the goal of cultivating students in accordance with their aptitude. Important and difficult learning materials as specified in the syllabus were carefully explained to students of average and beginner levels, and the teaching methods combined theory learning and operating practice in the computer lab. For students of advanced levels, the teacher may elaborate or skip certain learning contents according to students' actual proficiency, and strengthen teacher-student interaction. The former teaching model, which regarded the teacher as the actor and the students as the audience, should be modified. For the practical and operational content, students were asked to come to the platform to explain and illustrate how to operate or they were assigned to fulfill a given task and give a presentation before the class within a given time. Consequently, students of varying levels are all motivated to learn, and the learning atmosphere became livelier.

With the improved teaching facilities, all teaching activities can be carried out in the computer lab, where the multi-media can be used as a teaching aid to improve classroom teaching efficiency and to timely point out and explain the operational mistakes that student made. The teaching PPT slides prepared by the teacher, which students can download or read online, show varying requirements for students of different classes, emphasize the overlap and

complementation between different levels, and therefore can encourage students to learn everything by themselves in accordance with their own interests, and motivate the individualized cultivation of students.

(3) Adjustment in practical training

For some majors, there is no required basic computer course, but these majors are scheduled to have practical training for one week in the computer lab. Since these students are enrolled for pre-assigned specific posts or areas, their knowledge in computer science is far from satisfactory. Before the individualized teaching model was used, the practical training mainly focused on the National Computer Test Level One. The teacher would elaborate on the former tests, having only satisfied the students' needs of passing such a test. After implementing the individualized teaching model, the contents of the practical for these non-computer majors can be adjusted in accordance with the social requirement for their computer skills, these requirements includes programs in rapid typing in Chinese characters, online searching skills, and the skills of using the office software, while only the last day of the practical training is used for the computer test. In this way, we both developed students' basic computer skills and also satisfied their need for better preparation for the computer test.

(4) Adjustment in course assessment

After taking the computer course, the students of the beginner level were assessed in the same way as those of the average level. The assessment model for students of average level consisted of three parts: learning process assessment accounts for 10%, practical operation of computer accounts for 40%, and the final test for 50%. The assessment model for students of the advanced level also consisted of three parts: learning process assessment accounts for 20%, practical operation of computer accounts for 60%, and the final test for 20%. The assessment of the advanced classes highlighted the importance of operating practice and fulfilling tasks on their own after class and the cultivation of students' practical capability of doing things. The learning process score was based on students' attendance and classroom participation. The practical operation score was based on the quality of their exercise submitted to the teacher after each session of practical training. The final test covered a wide range of teaching contents, predominantly students' operating skills on computer. After the adjustment, the assessing method that stressed the quality of exercises after each practical operational session replaced the assessment that was just based on mid-term and final exams. The assessment changed from formal paper tests to practical operations. Students could get the maximum benefit from individualized teaching and be the most favorable beneficiary of the new teaching model.

C. Effects of the individualized teaching model

For two years since the individualized teaching model has been applied, students have been showing more active participation in the basic computer course, and not infrequently, there are students who ask to stay longer for more practice after the scheduled time. Improvement can be found in the classroom learning atmosphere and teaching quality, which can be observed in students' mid-term feedback meeting and students' evaluation of teaching quality. Moreover, students further used their computer skills when they practiced in the summer vacation and became more confident. Their computer operation capacity has been improved considerably, and the degree of satisfaction from their employers has been improved steadily. In addition, as freshmen finish the course, the one-time passing percentage of Zhejiang provincial computer level test has been steadily improved, as shown in the following.

TABLE II. FRESHMEN CLASSES TAKING ZHEJIANG PROVINCIAL COMPUTER TEST (GRADE ONE)

Term	Total number	Number of students passing the test	Passing rate
Spring term, Year 2009	1056	855	81%
Autumn term, Year 2009	812	697	85.8%
Spring term, Year 2010	1396	1257	90%
Autumn term, Year 2010	730	675	92.5%

IV. CONCLUSION

The practice of individualized teaching of basic computer science acknowledges the differences in students' foundations, respects their individual differences, follows the general teaching rules, and focuses on teaching students in accordance with different student levels. The new teaching model motivates students' learning and also stimulates teachers' teaching. It satisfies different teaching requirements for students of varying levels, leads students to their right development direction to maximize their merits, and therefore comprehensively improve their practical operational skills.

ACKNOWLEDGMENT

This paper has been financially sponsored by the computer science major teaching supervision committee project fund of technical and vocational college under Ministry of Education (jzw590111105).

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