Exploring Level-Based Teaching Model in Public Computer Course

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Abstract. The vast majority of universities in China have shortcomings in the teaching plan of public computer courses for non-computer majors. All these courses use the same compulsory learning content regardless of the non-computer major. The traditional teaching mode is not beneficial in enhancing individual students’ potential because it regards them as a group. Students are individuals and, therefore, are different from each other, so the course should be adjusted and updated. The course should be divided into different levels by teaching content, and reflect the principle of a gradual and orderly schedule, the level-based teaching model embodies a student-oriented educational approach. This teaching model was tested by using experimental and control groups of students majoring in geography. Results indicate that under the level-based teaching model, performance of the students in the experimental group was superior to that of students in the control group with regard to various evaluation indices.

1. Introduction

University computer public education has developed over more than 30 years and has become an important part of higher education in China\cite{1,2}. The goal is to train students to use computer technology, so that they have the ability to solve practical problems\cite{3}. Hence, they become proficient in computer applications for various professional fields of expertise. However, the vast majority of universities have shortcomings in their teaching of non-computer majors. All non-computer major professionals use the compulsory text, Computer Fundamentals and Applications, no matter what their non-computer professional course is. A considerable number of non-computer professionals undertake no subsequent courses on computer applications. The range of differences between students is rarely taken into consideration in the traditional teaching model; this situation, eventually, generates the phenomenon of polarization\cite{4,5}. The individual potential of students is neither taken into account nor cultivated. Furthermore, the learning interest and passion of the students themselves may be inhibited; thus, hindering their positive and healthy development. A favourable learning effect may, therefore, be lost with low teaching efficiency even with the contribution of abundant teaching strength\cite{6}. Therefore, the level-based teaching model is needed as it may resolve these issues.

2. The promotion of public basic computer teaching

Public computer course at university are important in that they affect college students’ information literacy. It is important in the current teaching of computer basics courses at university, a 1+ X+ Y (or 1+N) curriculum system should be developed, i.e. the course should have a public compulsory, plus other Confined Elective curriculum. This will expand the coverage of computer courses to more information technology applications.
3. Establishment of the Curriculum

Many universities use a 1+ X+ Y (or 1+N) computer curriculum, where 1 represents the computer public compulsory course in Basic Computer Science; X represents the computer public course in Fundamentals of Computer Applications. For example, C language, C++, Visual C++, Visual Basic, JAVA; Y represents computer elective courses, such as access, Visual Foxpro, SQL, database, network, multimedia, hardware, software. The above course allows students to tailor a computer course to the needs of their chosen profession, allowing for courses that are very different although covered by the one curriculum. For example, one student might emphasize applications of database, while another might choose Visual C++ development, and yet another might choose Embedded programming. In other words, in the 1+ X+ Y curriculum, the 1 represents the foundation computer course in Basic Computer Science. It may help promote awareness of the individual development of each student. This is the course in the core curriculum that forms the necessary basis for the subsequent teaching, i.e. the X and Y parts of the curriculum. These courses can help students to develop independent and self-learning skills, as well as practical ability. Students need to learn this well because it will directly affect the effectiveness of the subsequent teaching.

4. Construction of the level-based teaching model

The construction of the level-based teaching model consists of the following aspects:

(1) implementation of scientific and rational system for recognizing credit;
(2) setting of a scientific and rational teaching curriculum;
(3) taking full advantage of existing school resources.

Research on the advantages and roles of this teaching model with respect to the traditional teaching model has been conducted. On the basis of multiple studies on computer hardware, software, programming and network, the computer curriculum levels model has been created. The computer curriculum level-based model can be classified into three types: an elementary course of hardware, software and network, programming course and application course. The elementary course is responsible for improving students’ basic knowledge. The primary purposes of the course are to help the students transit their computer knowledge from middle school to college, stimulate and cultivate the students’ interest in computer and develop some basic computer skills. The practical course focuses on cultivating students’ specific skills and concepts of computer. The curriculum in different levels should be set up according to the individual differences of students to adapt to the learning degree of students at different levels. This curriculum mainly cultivates the basic skills and strategy awareness relating to each exercise. Skills training courses can promote students’ skills.
improvement and habits cultivation. The main purpose of such a level-based course is to create an educational platform for self-improvement and to inculcate the concept of computer for students.

5. Increased Emphasis on Practical Teaching

One of the teaching targets of the Laboratory teaching is to develop a student’s ability to solve actual problems using computer. However, the phenomenon that theory is valued but practice neglected is a common feature of non-computer majors. Most teachers in public computer education spent the time on projects and the practices is inadequate. They attach importance to theory over practice. The course syllabus specifies three teaching method. Table 1 shows an example of the relative weighting of theory and practice for 2015, from the undergraduate training programme of the geography major at Yunnan Normal University.

![Table 1. Timetable for the theoretical and practical coursework in each semester.]

<table>
<thead>
<tr>
<th></th>
<th>First semester</th>
<th>Second semester</th>
<th>Third semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom teaching</td>
<td>Centralised practice</td>
<td>Review test</td>
<td>Classroom teaching</td>
</tr>
<tr>
<td>14 weeks</td>
<td>3</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>Fourth semester</td>
<td>Centralised practice</td>
<td>Review test</td>
<td>Classroom teaching</td>
</tr>
<tr>
<td>17 weeks</td>
<td>1</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>Seventh semester</td>
<td>Centralised practice</td>
<td>Review test</td>
<td>Classroom teaching</td>
</tr>
<tr>
<td>10 weeks</td>
<td>12</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

6. Teaching Method in the Control Group

Dominated by experimental grouping in the learning organization, the teacher guides them in developing their skills, the students continuously discover and can raise questions under the direction of teachers, and enhance their learning and knowledge-seeking. These steps are conducted to further deepen the application ability of computer.

For the students in the control group, the uniform teaching model can be adopted. This model requires that each student learns the foundation of computer science in this teaching method, including the study of theoretical knowledge, to applies the same evaluation examination and the same actions in the examination.

7. Experimental result and effect appraisal

Experimental Results

After finishing the one-semester learning course, statistical analysis was conducted for the learning condition of the students’ computer skills in the experimental and control groups. The groups had considerably different performance levels, thus indicating that the performance of the experimental group that employed the based-level teaching model was obviously better than that of the control group, which used the traditional teaching model (p < 0.05). The results are shown in Table 1.
Table 2: Comparison table of basic computer scores after the experiment between experimental and control groups.

<table>
<thead>
<tr>
<th>Group</th>
<th>No. of people</th>
<th>Reached standard of computer software</th>
<th>Skill appraisal of computer software</th>
<th>Reached standard of computer network</th>
<th>Skill appraisal of computer network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental class</td>
<td>80</td>
<td>41.15 ± 1.67</td>
<td>23.59 ± 0.32</td>
<td>41.87 ± 1.76</td>
<td>23.30 ± 0.33</td>
</tr>
<tr>
<td>Control class</td>
<td>80</td>
<td>23.11 ± 0.391</td>
<td>17.96 ± 3.21</td>
<td>23.89 ± 5.46</td>
<td>17.77 ± 2.78</td>
</tr>
</tbody>
</table>

8. Summary

Table 2 showed that, the scores of the level-based experimental group have improved with notable differences (p < 0.05) in the aspect of reaching the standard for computer software, skill appraisal of computer software, reaching the standard for computer network and skill appraisal of computer network. Therefore, adopting the level-based teaching mode yields superior results.

The framework for a level-based teaching model was outlined in this article, and the major methods were presented and discussed. Experience has shown that this system improves students' innovative ability and quality.

References


