# Reform of a basic computer course

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ABSTRACT: The vast majority of independent colleges in China have shortcomings in the teaching plan of professional computer courses for non-computer majors. All these courses use *Computer Fundamentals and Applications* as a compulsory text, regardless of the non-computer major. Hence, the learning content is the same. Many students from non-computer majors undertake no subsequent courses in computer applications. This results in students being not well-adapted to the information age. Therefore, 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, to progress through the teaching content. In this article, the authors endeavour to air and discuss critical issues related to this educational matter.

## INTRODUCTION

University computer basic education has developed over more than 30 years and has become an important part of higher education in China [1][2]. The goal is to train students to use computer technology, so that they have the ability to solve practical problems [3]. Hence, they become proficient in computer applications for various professional fields of expertise.

As of December 2014, the Ministry of Education statistical data show that there were 292 independent colleges in China. Independent colleges in Chinese higher education represent a new mode of running schools. Because of their relatively short history, independent college curricula development requires new points of view and ideas [4-6]. Therefore, how to set up an independent college curriculum is an urgent task that needs to be addressed and discussed.

The goal of an independent college is to cultivate multiple and practical talent. Computer teaching in the independent colleges places special emphasis on improving students' computer application skills. However, the vast majority of independent colleges have shortcomings in their teaching of non-computer major professional computer courses.

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. This means many of the college students are not well-adapted to the information age and contemporary developments.

Material should be adjusted for differing needs and be updated to reflect contemporary computer systems and computer applications. However, the current curriculum does not provide for this. It is urgent that independent colleges have a reasonable basic computer course. Otherwise the teaching quality and student learning in independent colleges will suffer badly. Hence, students will be less competitive in finding employment after graduation.

## THE PROMOTION OF BASIC COMPUTER TEACHING

Basic computer classes at colleges across China are important in that they affect college students' information literacy. A considerable number of non-computer professionals undertake no subsequent courses in computer applications.

To address the main problems in the current teaching of computer basics courses at independent colleges, a *1+X curriculum system* should be developed, i.e. the course should have a compulsory, plus other optional component. This will expand the coverage of computer courses to more computer applications.

Information technology courses for college students, train the student to analyse and solve problems. The teaching philosophy should be to guide students *by doing*. Basic computer courses should be taught using a *four-in-one* teaching mode, which embraces on-line learning, classroom and laboratory learning, internships and self-study. The implementation of the *four-in-one* teaching mode encourages college students to develop independent and self-learning skills, as well as practical ability.

In addition, with the reform of the original curriculum, many young teachers have participated in research projects and the preparation of teaching materials for textbooks or course guide books. Some have also participated in the provinces on school-reform projects.

Young teachers participate in multimedia courseware design contests and teaching competitions, which improve teaching quality. The college organises a multimedia courseware design contest every year, with participation by young teachers, who also enter provincial competitions.

## REFORM OF THE BASIC COMPUTER CURRICULUM

Today, computer and network technology is advancing very rapidly and, hence, material to be learnt is constantly and rapidly changing. This requires that computer course material be not immutable, but undergo gradual, continuous improvement to adapt to the new technologies.

### Adjustment to the Teaching Content

Due to the rapid development of computer technology, computer teaching materials often lag behind. This is unacceptable for contemporary computer courses, so it is necessary to adjust the teaching content in a timely manner to reflect the rapid development of computers and computer technology.

For example, computer software operating systems, Microsoft Windows 7 and Windows 8, were launched a long time ago, but the college classroom and examination system still uses Windows XP. As well, Microsoft Office 2003 software is still used, while graphic images are processed using Adobe CS2 (Creative Suite edition 2) or the CS3 edition.

This requires teachers to maintain classrooms with support for these older systems, but also to add newer systems in a *second* classroom, to better expand the students' up-to-date skills.

### Establishment of the Curriculum

The aim is to set up a consistent professional curriculum. Many colleges and universities use a *1+ X+ Y* computer curriculum, where *1* represents the computer public course in *Basic Computer Science*; *X* represents the computer public course in *Fundamentals of Computer Applications* covering. For example, Visual FoxPro, C language, Visual Basic, Flash, and Web development; *Y* represents computer elective courses, such as database systems, network technology, multimedia technology, hardware, software, system development tools, animation design and production.

The above curriculum 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 emphasise advanced applications of office software, while another might choose database applications, and yet another might choose programming.

As indicated above, in the *1+ X+ Y* curriculum, the *1* represents the foundation computer course in *Basic Computer Science*. 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. Students need to learn this well because it will directly affect the effectiveness of the subsequent teaching.

The basic computer science courses use the *Bus* teaching mode [1]; the National IT Certification (ITAT); Microsoft International Certification (MOS); and IC3 (Internet and Communications) standard. These are implanted into the appropriate teaching modules to improve teaching quality. It is worth noting that students enrolled in this course have won several national IT game awards.

### Establishing a Dynamic Elective Course to Meet the Needs of Students

Dynamic elective courses are an essential complement to the basic computer course. Students can choose elective courses according to their needs. The independent college computer course curriculum has evolved from the original *1+ X* to *1+ X1+ X2*. In this, *1* is the *Basic Computer Science*; *X1* includes Photoshop, Access, and Web pages; *X2* covers video production, 3D modelling, information retrieval and networks. Dynamic elective and compulsory courses complement each other and have mutual benefits in releasing the full potential of the courses to develop the students' abilities. Figure 1 below depicts the structure of the computer foundation course.

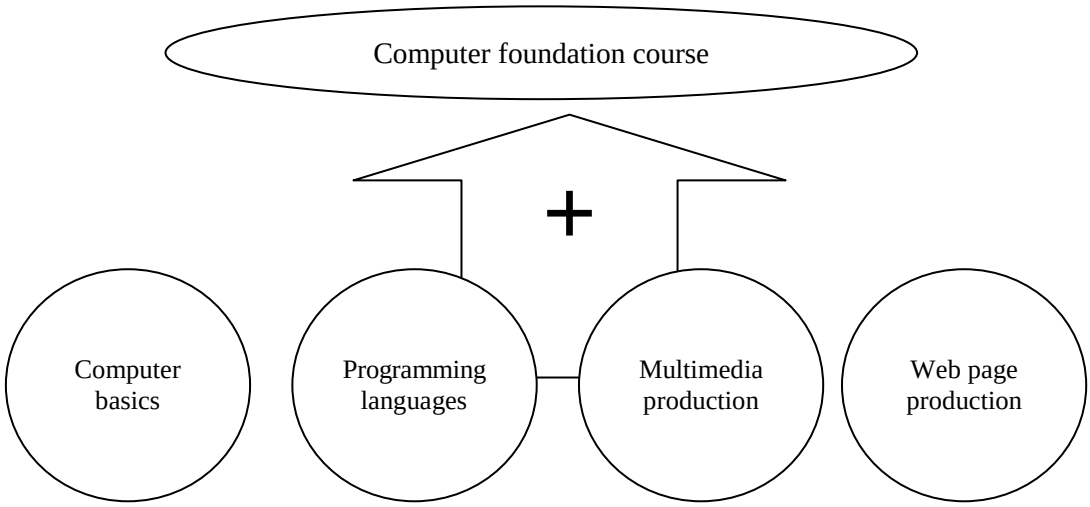


Figure 1: Computer foundation course structure.

IMPROVE TEACHING ASSESSMENT

Improvement of the assessment mechanism of teaching theory may be achieved through the following:

- *Training computer thinking:* assessment of the course focuses on critical thinking skills. Therefore, students' learning emphasises the mastery of critical thinking [7][8]. Course assessment should increase the proportion of subjective questions focusing on typical case studies. Students should solve problems using a variety of methods and develop open-ended answers. Students from a variety of professional backgrounds are encouraged to bring their various perspectives to bear to illustrate points.

- *Adjustment of question type in the assessment:* first, increase the proportion of multiple-choice type questions that can be automatically marked. Second, *fill in the blank*-type questions should emphasise the integration of knowledge to properly solve a problem. Finally, a comprehensive assessment should focus on knowledge and ways of thinking to solve professional application problems.

- *Arrangements for projects:* projects are large undertakings requiring the completion of many disparate tasks within a stipulated time. Topics are many and varied. To complete the tasks, students must review and research much information and, then, undertake relevant tasks; e.g. to create a Web site requires Web production knowledge; to develop a library management system requires database knowledge; to develop a network requires network programming knowledge.

  Students can work independently or co-operate in small groups to accomplish the tasks. Projects should draw on various knowledge points to solve problems. The operational requirements should reflect the needs of the various professions. It was found in teaching practice that projects increase students' extracurricular activities and improve student co-operative abilities.

Establishment of a Diversified Evaluation System

Student learning is a dynamic process of continuous development. A final examination alone is not an accurate reflection of the student learning outcomes. Therefore, the evaluation should be changed to a summative evaluation that will be diagnostic and an evaluation of the teaching process.

The evaluation system should measure classroom attendance, classroom performance, test scores and innovative thinking. The proportion of the final score allocated to the different assessment components should undergo continuous improvement to perfect the comprehensive evaluation system.

In addition, the teaching itself should be part of the evaluation system. Students can evaluate the supervision and teaching. Young teachers can observe lessons and lectures by senior colleagues to improve the quality of their own teaching.

Increased Emphasis on Practical Teaching

Laboratory teaching highlights students' ability by focusing on students' learning in the process of performing experiments. Students need a positive approach to participating in, and contributing to, the work. The course management system can be used to track students' progress, and may require them to provide progress reports, so as to facilitate real-time guidance by teachers and to check the progress of students.

Operating procedures for the practical classes should break down the activities into phases and be available via a computer-based training (CBT) system. Practical learning represents a break with traditional rote learning to deal with examinations. It promotes independent thinking, as well as skills in practice and operations; hence, training students in scientific thinking and practical ability. The purpose of an experiment is to evaluate the process and quality of a student's work against the teaching objectives of the experiment in order to improve a student's practical and innovative ability.

The computer forms the basis of practical teaching, with an emphasis on both the process and the results. Therefore, the evaluation needs to reflect this dichotomy. The evaluation contains four components: evaluation of the experiment, final resultant system, laboratory work, and research and innovation. Usually, the focus is on the performance of the system that has been produced, as well as attendance. The CBT places an emphasis on the students' basic skills, which support paperless examinations.

Practical work provides a measure of a student's self-study ability, as well as their overall, comprehensive ability and their innovative ability. Students choose subjects guided by their professional orientation and are free to form a team. They carry out independent design and implementation of solutions, based on appropriate procedures.

Students submit test reports and provide a live demonstration of the results. The assessment encourages students to actively participate in various forms of research activities and computer contests. The practical work trains students to explore scientific, practical and innovative thinking. The evaluation system of the practical teaching should give full consideration to all aspects of the teaching process, so as to provide a comprehensive, objective and accurate assessment of the practical teaching.

## EXPECTED RESULTS AND BENEFITS OF THE PROJECT

College teachers obtain certificates, e.g. MOS and IC3, and have access to Microsoft teaching qualifications, while students voluntarily obtain the relevant certification. Outstanding students are selected to participate in the provincial-level competitions, which improves their future employment prospects. The new college teaching basic computer course text reflects the requirements of independent colleges, while the follow-on course text is designed to satisfy the needs resulting from the textbooks used in different majors.

The curriculum group has established extensive resources hosted on a network teaching platform for teachers to manage the teaching and to provide students with access to learning material. The teaching platform includes course descriptions, syllabus, electronic courseware, instructional videos and assignments.

Students learn to solve problems in a timely manner, with real-time notification of completion of work; students also can ask questions at any time and discuss mutual problems on-line. This deepens a student's understanding of the content of the curriculum and solves the problem of an insufficient number of hours. The relevant published papers of the reform provide a basis to promote the results.

## CONCLUSIONS

The Computer Basic Course, based on a $1+X+Y$ curriculum, should reflect the characteristics of independent college students. The course content provides student with the opportunity to participate in international standards certification, such as IC3. This enhances the motivation to learn, as well as enhancing the student's professional competence. It is important that the basic courses promote professional competence and information literacy.

Fundamental shortcomings of the existing teaching can be addressed by developing a curriculum group to reform the teaching. This aims to improve students' learning motivation and practical abilities. Teaching content that is tailored for the students lays a good foundation for student employment. Of course, teaching reform is a systematic project and cannot be completed overnight. It is necessary for teachers actually engaged in teaching to continue to explore improvements.

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