

Applying *Bus* mode to the teaching of computer basics and the use of competitions in teaching

Hao Zhang, Yang Lu, Jiongzhaoyang, Guangli Xu & Zhongkui Sun

Hebei United University
Tangshan, Hebei, People's Republic of China

ABSTRACT: The Computer Fundamentals course is a basic course taught at all national universities in China. This course is one of the most important for cultivating information technology literacy among college and university students. Outlined in this article are the main problems that exist in the teaching of computer fundamentals at modern universities and colleges. The requirements for constructing an up-to-date course are presented and discussed. A recommendation is also made to adopt and promote the *Bus* teaching mode, as well as to boost the element of competition to improve the teaching.

INTRODUCTION

Many problems exist in the way that computer fundamentals teaching is carried out in providing non-professional computer students with the basic knowledge required about information technology. University majors are not flexible in their computer courses in that they do not cater for differences among students [1]. Also, the teaching content is not tailored to different fields of study and this renders the courses impracticable.

There is a serious lack of teaching resources and the practical sessions are inadequate. The examinations are unreasonable, the teaching methods too simplistic and the course content is updated too slowly. All of these factors are problems in teaching computer fundamentals. In addition, institutions ignore the continuing education of teachers, so much so that teaching quality does not improve. The institution that is in charge of teaching the computer fundamentals course within a college or university must conduct the overall planning, organisation and co-ordination of the course so as to ensure that the teaching is compatible with the various majors.

The task of higher education is to cultivate innovation and practical abilities. In order to adjust to the reforms in higher education and to encourage innovation, Qinggong College at Hebei United University focuses on developing students' abilities in self-study, logical thinking and innovative exploration. As well, the *Bus* mode of teaching has been introduced in basic computer classes.

To improve the standard of teaching, national information technology and MOS (Microsoft Office Specialist) certification have been added to the content. A number of the highest-achieving students now obtain certification and win prizes when the national information technology (IT) contests are held. In this way, students improve their knowledge of the subject and increase their employability. Also, the teaching methods used are gaining recognition.

PROBLEMS IN TEACHING BASIC COMPUTING

Students and Teachers Lack an Interest in Basic Computer Courses

Basic computer courses are well established in colleges and universities [2][3]. However, the number of freshmen enquiring about these basic computer courses indicate that students lack an interest in them. Many students believe they already have a certain mastery of IT. Therefore, students pay little attention to the computer basics classes. They are indifferent to the content and very few take the time to study the computer course after class. Not only students but also teachers are indifferent to the computer basics course. Indeed, many college professors of basic computer courses lack an interest in teaching the subject.

Teaching Content is Out-of-Date

Choosing the teaching content is one of the most important factors in determining the ultimate effectiveness of teaching. The teaching content will have a profound impact on the entire course. Not only does it help the teachers to have a unified standard curriculum, it is also essential for students' learning. However, there are still problems related to the selection of teaching content [4]. Information obtained in high school and even in primary school is still redundantly taught again in college or university. The content students learn in class is often too outdated to have any practical application. Furthermore, it is not clear which computer applications people need to be trained in. In addition, the curriculum is not precise enough.

The curriculum needs to be improved and integrated, with clear goals and personnel training objectives. Effective curricula suited to various professions need to be created. Current courses are inappropriate from the start. Students are taught the basics of computers, the use of office software and the basics of hardware, but lack mastery of the latest computer knowledge and skills. The various elements of the curriculum are disconnected. An organic whole is not formed between the practice and theory. Keeping components relatively independent from each other is not conducive to the overall optimisation of the course.

Teaching Mode Must be Varied

As a result of advocating that teachers enhance their teaching by using advanced teaching media, teachers use one PowerPoint presentation after another. But the only result of this is that the teaching content has shifted from white boards to PowerPoint [5]. The content has not changed, and teachers simply read from the PowerPoint presentation for the entire lesson, which is poor teaching. Some teachers' lack of multimedia teaching experience and over-reliance on electronic lesson plans has a negative impact on their lecture style and makes the lectures rather monotonous. The teacher-centred teaching model remains and so students are always in a passive state with initiative ignored or even repressed, all of which directly affects the teaching.

Incomplete Evaluation Method

Basic computer courses are still mostly evaluated through a combination of paper examinations and actual usage. This cannot truly reflect the actual level of the students. Some schools evaluate students' learning by using paperless examination systems, but as the examination system itself also has its own limitations, this cannot reflect the real level of the students, either. Thus, the conclusion can be drawn that the method of evaluating computer foundation courses at the present time does not really reflect the goal of fostering applied technological talents in colleges and universities. It cannot cultivate students' ability to analyse and solve problems or of self-study and innovation.

BUS MODE IN TEACHING AND COMPETITION IN EDUCATION

Bus Mode

Starting with the undergraduates in 2008, Qinggong College, in Hebei United University, has introduced the *Bus mode* for teaching basic computer courses. As it suggests, the *Bus mode* is made up of four distinct parts (Figure 1).

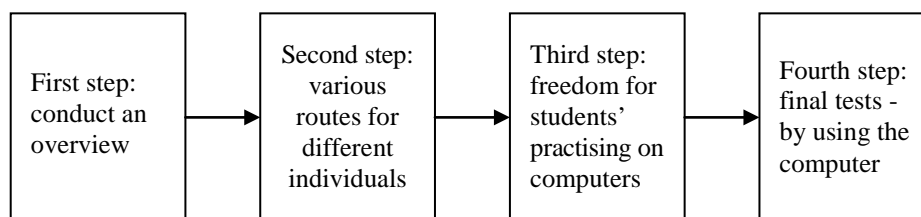


Figure 1: *Bus* teaching mode.

The first step: conduct an overview. It was essential that the basic teaching content be categorised in preparation for the next step. It is also important to determine the place and time for students' learning. This step requires an overview of the teaching syllabus.

The second step: various routes for different individuals. Due to the differences between individuals, various routes were set up according to the abilities of the students, especially, the low-achieving ones. For example, when learning the basic operation of the Windows operating system, most students grasp the points but some lag behind. It is necessary, then, to enable them to catch up with the majority through supplemental teaching. Processing an Excel form is a key part of an examination and can be difficult for students. Then, the teacher can invite an expert to present a lecture to the students, which is an efficient and effective way of helping the students to learn. Before the examinations, there are usually many students doing exercises in the computer classroom to ensure good resource utilisation.

The third step: freedom for students' practising on computers. In the college, there is no fixed time for students to practise on the computers, i.e. students can practice anytime. Also, they may choose different tutors to assist them, especially, if they feel they are weak in some aspects of the course. This can improve a student's comprehension.

The fourth step: final tests - by using the computer. There is a final test on the computer that the student must do and they must pass this computer grading examination.

Microsoft Office Specialist (MOS) International Certification

At Hebei United University, the computer foundation teaching and research section has introduced the MOS international certification into the curriculum for the first time. Students learn a computer foundation course, and some of the best students can, then, participate in the MOS international certification examination, after which they are awarded the relevant certificate. This improves students' ability and employability. The teaching content of the MOS international certification and examination has been introduced to the Computer Culture Foundation course, which is based on the traditional model of basic computer education in colleges and universities, and includes a fusion between social and computer content.

The MOS results obtained by students are equivalent to achieving a grade. Students' enthusiasm for learning the computer basics course has increased, as has their professional skills. The certification content and examinations, and other teaching content is complementary. This benefits students in seeking employment, especially with the increased leverage afforded by learning Microsoft Office.

The purpose of the MOS certification is to help supervisors, workers in enterprises, government agencies, schools and individuals to use Microsoft Office applications such as Word, Excel, PowerPoint, Access and Outlook. The Microsoft Office Specialist certification has encouraged the use of Microsoft Office in the modern workplace. The users become knowledgeable, professional and qualified. Many instances, both at home and abroad, have confirmed that participation in MOS certification training and examinations can improve the efficiency and practical skills of users, and increase the competitiveness of enterprises.

Introducing Competition in Education into the Teaching System

In order to strengthen specialty education and to encourage the development of outstanding character, Qinggong College at Hebei United University rewards students and their instructors for excellence in competitions in science and technology, which may involve other countries. These days, there is a variety of computer competitions held at home and abroad. For instance, the ACM (Association for Computing Machinery) international collegiate programming contest, the iGoogle Chinese College Students' Innovative Design Competition; the Intel Cup national computer multi-core programming contest, and so on.

These games help to build students' programming and innovative ability. The practice of teaching has proved that these types of game are effective in improving the ability of students who major in computer science. However, it is unreasonable, in this way, to train large numbers of students who are not computer majors.

Computer technology competitions are used to motivate non-computing majors to study computer technology. On completion of the basic course in computing, the best students are chosen to participate in a national tournament. The College selects ten or so students as a team to take part in the Information Technology Contest of College Students. A relevant instructors' team is sent by the College to guide and direct the students.

Since the College joined the contest in 2010, their team has been awarded the first prize once; the second prize twice, and a third prize. Students personally have won two first prizes, six second prizes and several third prizes. They inform their lower-achieving schoolmates about their experience, which increases student interest in the course and motivates them to study computing. Surveys are conducted on their employment status so as to identify the effect computer skills have on their jobs. The teaching design is adjusted as a consequence of the surveys, which forms a closed-loop type spiral and improves teaching.

There are many benefits as a result of competitions. For example, it encourages students to absorb knowledge about computing and to actively master the basic skills. At a college level, it also provides a reference to international standards in computer education. This also supports teaching by providing case studies for academic learning platforms. Hence, it improves the teacher's ability to teach.

Encouraging Contests to Take Place

Encourage the Students

Through communication with academics, students who win awards can obtain extracurricular grades for training skills and practice credits for innovation. They also can gain some material incentive. The contest notice is issued by the

college or school and explained to students by teachers. The teachers should motivate students to participate in the contest to ensure there are many students who join in the competition. It will lay the foundation for achieving the teaching goals.

Encourage the Teachers

At first, the College mobilised all the teachers who teach basic skills in computing and formed a working group for the contest. Seminars were organised regularly and a survey conducted of the form and content of the competition. Next, the division of labour to set up the game was decided. The quality and efficiency of teaching was found to improve. Lessons in verbal presentation for lecturers were organised with experienced professors introducing to young teachers the key points and difficulties of the teaching content and methods. After that, a teachers' discussion took place, pointing out the advantages and disadvantages of the procedures.

Through these activities, all of the College teachers take part in the contest. This enhances communication about teaching among the teachers and improves their teaching skills. Especially, young teachers are helped to develop their teaching skills rapidly.

Computing Competition Promotes the Reform of Teaching Material

Teaching material is the media of teaching communication and is essential to disseminating knowledge, both to the students and to the teachers. Well-developed teaching material plays an important role in best practice teaching and studying. At present, most computing material on the market is aimed at computer major students and, as a result, there are too many theoretical concepts for the non-computer major students.

These students primarily require practical skills in understanding and using software applications on the computer. What is required is material that promotes the production of quality systems for specified software environments and tools. This is counter to the traditional material. There should be an emphasis on the project-driven nature of IT. A number of high-quality and suitable textbooks could be suggested along these lines.

Well-being is most important for building a sense of achievement and ability. Almost all of the computing competitions encourage participation, while focusing on training students to develop all-round skills. It has been found that most students believe competitions increase their sense and spirit of participation and psychological aptitude. In fact, vocational students realise the importance of psychology in developing participation. There is reason to believe students will develop the right personality traits while gradually forming a more complete sense of themselves. This will lead to an understanding of themselves and an ability to evaluate themselves objectively. This psychological quality is the premise and foundation of coping with various challenges.

NETWORK MODEL OF TEACHING TO IMPROVE SELF-STUDY

This teaching mode of the course is made up of traditional textbooks, network courseware and Internet resources. This networking course is combined with classroom teaching and emphasises self-study. It seeks to optimise teaching and to cultivate learning in the students by improving the quality of teaching. As well, it aims to improve the computer skills of college students.

Great use is made of email; the College Platform of Network Teaching, Institute of Educational Management system and chatting software, as well as other interactive information platforms. Teachers can communicate with students at any time and any place, hence, solving the problem of student access to teachers. This also sustains development of teaching, as it turns teachers into a type of *friend* to students.

Vivid animation technology is used, with multimedia courseware that is suitable for teachers and students. Some videos contain a certain amount of interpretation work in which difficult and easy-to-make mistakes are shown and dealt with so that students are enabled to do self-study and to take advantage of the campus network; for example, by using an FTP server platform and sharing teaching materials such as courseware, which is loaded on to the service.

After the teaching mode reforms were introduced, students frequently enhanced their knowledge by asking teachers many questions above and beyond their standard textbook, for example, how to produce special effects in PowerPoint, and this means teachers must expand their knowledge to meet new challenges.

EFFECTS OF *BUS* TEACHING MODEL REFORM

Improvement of Students' Basic Skills in Using Computers - through the teaching reforms, the pass rate in the computer grade examination in Qinggong College at Hebei United University, based in the Hebei Province, has improved year by year, as shown in Figure 2. As can be seen from the figure, a one-time pass rate stabilised at 92% in 2008-2009, increasing 10-15% between 2006 and 2007. It was in 2008 that the College began the reformed teaching model.

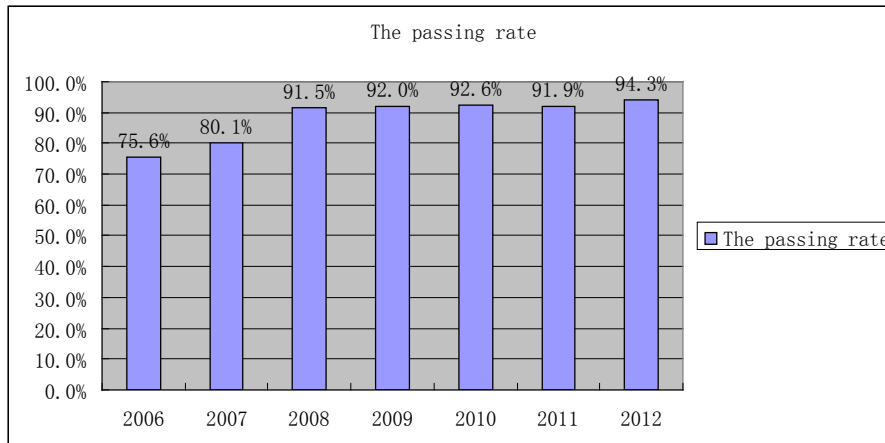


Figure 2: Pass rate of Hebei United University in the computer grade examination.

Increasing Room Utilisation - after the reforms, the original model for offering computer use to students was changed. The computer centre now offers five rooms to students studying the computer cultural foundation course, which benefits them by offering choice and, thus, improving utilisation of the computer room resources.

Improvement of Creativity - also, it has been found that strengthening training in research techniques, leads to an improvement in students' creativity.

CONCLUSIONS

China is undertaking important reforms of the teaching of higher education, which emphasises interaction between teacher and student in classroom teaching and learning. This is to cultivate students' sense of studying independently and co-operatively. Computing teachers were often dismayed that students did not use their initiative when studying and did not show much active thinking. Through taking part in all sorts of games, students' professional skills and psychological approach can be developed, along with a true sense of participation. Those games can help students display their respective expertise and to improve their practical abilities. Teachers should develop more games to engage students, thus, combining classroom teaching with extra-curricular contests.

Through this type of research, and by introducing and promoting the *Bus* teaching mode, it was found that these reforms have strengthened study methods so as to achieve the aim of improving students' creativity. Hence, it allows students reach greater heights of technical expertise, while experiencing a sense of power in their knowledge; thus, changing their thoughts, attitudes and outlook.

PROJECT FINANCING

This study was financed by the Education Department in Heibei Province (z2012084).

REFERENCES

1. Song, L., Reform practice on the university computer fundamental teaching. *Computer Knowledge and Technol.*, 14, 9, 3340-3341 (2013).
2. Dou, Y. and Shi, Q.Z., Research and discussion on computer fundamental teaching for non-computer majors. *Teaching Research*, 32, 1, 67-70 (2009).
3. Zhang, H., Wang, H.H., Huang, H.D. and Zheng, J.Y., Development for distance education platform. *Advances in Intelligent and Soft Computing*, 117, 2, 291-296 (2012).
4. Churchill, E., Bowser, A. and Preece, J., Teaching and learning human-computer interaction: past, present, and future. *Interactions*, 20, 2, 44-53 (2013).
5. Rajlich, V., Teaching developer skills in the first software engineering course. *Proc. 2013 Inter. Conf. on Software Engng.*, 1109-1116 (2013).