

# Practice and Exploration on the Reform of Computer General Education

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## ABSTRACT

The cultivation of compound innovative talents is the basic demand of talent cultivation in universities. In the new era, it is very important to cultivate students' Computational Thinking and problem-solving ability. Combined with the practice of computer general education in our university, through the establishment of hierarchical curriculum, the construction of three-level competition system, the adoption of mixed learning mode, and the integration of Ideological and political elements in the curriculum, the problems existing in the computer general education and teaching in Shanghai Polytechnic University have been solved, and series of reform results have been achieved, which provides experience for the reform of computer general education and teaching in similar universities.

**Keywords:** *computer general education; Blended learning; Curriculum system; Curriculum ideological and Political Education*

## 1. INTRODUCTION

In the 21st century, especially in recent years, with the rapid development of modern information technology represented by the Internet, big data, cloud computing and artificial intelligence, the process of social digitization is accelerating, and human beings are marching towards the era of intelligence. In the era of intelligence, computing technology has become an important means to promote the development of science and technology. The combination of various disciplines and computing is more and more extensive and in-depth, and the status and importance of computer knowledge in talent training is constantly improving. As an important part of personnel training in various disciplines, computer general education must constantly reform the curriculum content to meet the needs of social development in the new era. Therefore, in-depth study of the needs of various disciplines, the design of scientific, practical and forward-looking computer general education curriculum system and teaching content is of great significance to cultivate high-level compound innovative talents to meet the development needs of the new era.[1]

Computer general course is an indispensable part of Cultivating College Students' comprehensive quality and innovation ability, and an important part of cultivating compound innovative talents. Computer general course is multi-disciplinary, focusing on the characteristics of application, and combining the characteristics and needs of the major, so as to lay the foundation for the future application of the basic knowledge of information technology and basic computer application ability to solve the practical problems of the major. In order to meet the

needs of the reform and development of higher education, our university has carried out the teaching reform and exploration of computer general courses from four aspects: the establishment of a hierarchical curriculum system, the construction of a three-level competition system, the implementation of online and offline hybrid learning mode, and the integration of Ideological and political elements into the curriculum, which has effectively promoted the cultivation of students' computer application ability. It improves students' information literacy and achieves good teaching effect.[2]

## 2. ESTABLISHING A HIERARCHICAL CURRICULUM

Computer general course is a skill course for junior students. It is an important course to cultivate students' Computational Thinking, information literacy and innovation ability. The teaching object involves all the students of non-computing major. The construction of curriculum system should be guided by the professional needs and the cultivation of students' ability, and the goal of curriculum is to maximize students' learning achievements. Learning outcomes are not only knowledge outcomes, but also ability outcomes, that is, the transformation from knowledge to ability.

Combined with the orientation of the university, in order to better enhance the professional ability of college students, especially the ability of computer application and professional integration, it is necessary to build multi-level and multi module computer general courses, and build a large number of general courses related to computer and information technology application, so as to lay a solid foundation for the integration of computer application and

professional. Over the years, in the teaching practice, we have been paying close attention to the adjustment of the needs of professional development and ability training, paying close attention to the latest developments in discipline development, insisting on the continuous updating of curriculum contents and structure, ensuring the timeliness and advanced nature of teaching contents. The current curriculum setting is shown in Table 1.

**Table 1.** Hierarchical curriculum

Basic course	Fundamentals of university computer
Applied courses	Multimedia technology(Flash, Photoshop), High level language programming(Java, Python, VC)
Project courses	Design and production of micro lesson, Digital media technology(Premiere, After Effects)

The hierarchical curriculum system is divided into basic curriculum, application curriculum and project curriculum. The basic course is open to all students, covering basic computer knowledge, office automation, digital media technology, etc. the goal is for students to master basic concepts and technologies, and cultivate students' Computational Thinking, image thinking and information literacy. Application courses are opened for students with good foundation. In the selection and examination before course selection, students with excellent results take such courses. The course content is closer to the major, and the goal is to improve the application ability of information technology. Innovative courses, which students can take after completing the basic courses or application courses of the first year. The innovation course is designed according to the project, the course content is designed according to the production process of the competition project, and the teaching is organized. The course content focuses on practicality and application, and the selection of cases is close to reality. Through the practical training of students in the project creativity, design and production, team cooperation and other aspects of the comprehensive quality, and finally complete the reorganization of knowledge and ability transformation.

### **3. CONSTRUCTION OF THREE LEVEL COMPETITION SYSTEM**

The science & technology competition refers to the practical teaching activities that students use the spare time, take the interest of individual learning as the guide, solve the actual problems as the starting point, and with the help of the organization and guidance of the school and the guidance of teachers, and take students to study independently. Science and technology competition is an effective means to cultivate college students' practical ability and innovative spirit, and plays an important role in the growth and development of college students. In the process of participating in the competition, through their

own hard study, hard work, unity and cooperation, they can cultivate their ability to find, analyze and solve problems, fully mobilize the enthusiasm, initiative and creativity of students, stimulate students' innovative thinking and innovation consciousness, and improve their innovative practical ability.[3]

The first is the computer application ability contest in our university. In view of the problems of poor enthusiasm, single teaching content and less practical opportunities in traditional computer general education, the computer basic teaching and research office carries out the exploration and research on the reform of computer public course teaching, which is integrated into computer competition, and holds the computer application ability contest of college students regularly every year. The scope of the selected items of the entries is unlimited, and the topics used by computer technology in other specialties are encouraged. The submitted works shall fully demonstrate the students' computer application ability. The entries are classified into the following five categories: (1) database application system (including big data application)(2) Web site design (3) Multimedia production (including virtual experiment and micro course)(4) Programming application (including mobile application)(5) Artificial intelligence application. Up to now, the competition has been held for 13 years. It can not only encourage students to participate in professional competitions, but also provide help for the innovation and entrepreneurship projects, strengthen the communication between teachers and students, students and students, so as to achieve better teaching effect for computer general education.

The second is the computer application ability competition in Shanghai. In order to stimulate the enthusiasm of Shanghai college students in learning computer knowledge and skills, improve their comprehensive ability to solve practical problems by using information technology, cultivate their innovative ability and team spirit, and constantly enrich their extracurricular innovative practice education system, Shanghai Municipal Education Commission regularly holds Shanghai college students' computer application ability competition every year. The purpose of holding school level competition is to let students prepare in advance, improve the quality of entries, and select excellent teams to participate in the competition. In recent years, more than 10 works of our school have entered the finals of Shanghai University Students' computer application ability competition every year, and won the second and third prizes.

The third is the computer design competition for Chinese college students. China University computer design competition is a national university student science and technology innovation competition sponsored by the university computer curriculum Steering Committee of the Ministry of education“ "Competition" is held once a year, facing the national undergraduate college students“ The "competition" is carried out in the form of three-level competition, the preliminary competition at school level, the provincial (municipal) level, and the final competition at national level. All the winning works in the city competition are eligible to participate in the China

University computer design competition, but because the number of works in each category cannot exceed three, some winning works cannot participate in the national competition. Nevertheless, about 7 works of our school each year won the second and third prizes of the National Games.

It has been proved by practice that carrying out computer competition activities for college students can stimulate and improve students' interest in learning computer knowledge, mobilize students' initiative, enthusiasm and creativity in learning, exercise and improve their ability to analyze and solve practical problems by using computer knowledge and technology, which is an important way to cultivate college students' practical ability and innovative consciousness, It has a positive and far-reaching impact on promoting the reform of computer general education and improving the quality of teaching.

#### **4. ADOPTING BLENDED LEARNING MODE**

In recent years, with the rapid development of mobile communication technology and mobile Internet technology, people's learning time and space have been greatly expanded. With the combination of information technology and traditional classroom teaching, the development of higher education in our country has been strongly supported. Educational informatization is one of the research hotspots and important development directions of teaching reform in Colleges and universities. Blended learning is a learning method that students use online learning platform and traditional classroom face-to-face learning to complete learning tasks under the guidance of teachers. It includes both traditional classroom learning and students' online learning. It organically combines traditional classroom learning and digital online learning. There are many problems in computer general courses, such as more teaching content, less teaching hours, more students and less interaction between teachers and students. Modern college students have stronger desire and faster adaptability to instant messaging technology, mobile terminal learning and online learning environment. The emergence of blended learning provides new possibilities for solving these problems.[4]

##### **4.1. Flexible Learning Style**

In order to strengthen the reform of information education and teaching, and to improve the education and teaching level of the school and the quality of high skilled applied talents training, the school will set up and support about 20 online curriculum construction projects every year *The online course construction project of computer application foundation* has been established for two consecutive years in 2018 and 2019. After two years of construction, the online course of computer application foundation has been on the superstar teaching platform

(<https://mooc1-1.chaoxing.com/course/202268893.html>). Go online and use. In addition, in 2020, because of COVID-19, other computer literacy courses also built rich online teaching resources, including knowledge point teaching videos, rich classroom exercises, various forms of multimedia courseware and examination questions bank. At present, all courses adopt a combination of online and offline teaching methods. Students can watch the teaching video of knowledge points before class by mobile phones or on PC. During the viewing process, they can operate on the computer. This flexible learning method effectively expands the time and space of learning, making learning become everywhere and everywhere. In class learning, the key and difficult problems in the pre-study are discussed, then the students complete the chapter test task and submit the homework, the teacher answers questions and tutors, and the learning process takes the task as the main line, so that the students can improve their practical operation ability and test and consolidate the knowledge they have learned.

##### **4.2. Comprehensive Assessment and Evaluation**

Blended learning includes online and offline learning styles. The diversity of learning styles requires students to be evaluated from different dimensions. We should not only pay attention to the learning results, but also pay attention to the learning process. There should be both process evaluation and result evaluation. Therefore, the course evaluates students from online learning, offline learning and academic performance. Online learning is evaluated from the following aspects: the completion rate of watching teaching videos, the number of visits to the platform, the interaction between teachers and students, and online test scores; Offline learning is evaluated from the aspects of attendance check-in, group communication and computer operation; Academic achievement refers to the final examination results of the course. The final examination of the course focuses on the evaluation of students' practical ability, focusing on the evaluation of students' computer application level.

##### **4.3. Good Teaching Effect**

Students are enthusiastic about learning, and there is a good interaction between teachers and students. In addition to the systematic learning of computer knowledge, compared with the traditional single classroom learning, students' active learning increases and their participation in the course increases. The statistics of teaching platform show that student actively participate in online learning and often communicate and interact with each other. Students have changed their learning habits. The final examination results also show that students' mastery of basic computer knowledge and computer application level has been improved significantly, and the teaching effect of

computer general education has been improved significantly. The blended learning mode has realized the transformation of teaching methods from "teaching" centered to "learning" centered, and teaching objectives from "knowledge imparting" to "ability training", effectively stimulated students' learning enthusiasm and interest, fully mobilized students' subjective initiative and enthusiasm, and turned students into the main body of learning, It really realizes students' personalized learning and improves the teaching quality and effect of computer general course.

## **5. INTEGRATING IDEOLOGICAL AND POLITICAL EDUCATION INTO CURRICULUM**

Colleges and universities undertake the fundamental task of Building Morality and cultivating talents, and shoulder the important mission of training qualified builders and reliable successors of the cause of socialism with Chinese characteristics. The ideological and political education of computer course is not equal to the "Ideological and political education of the course", nor is it the extension and convergence of the ideological and political education after the end of the course or classroom. Instead, it should "moisten the ideological and political education" silently and naturally. Combining with the characteristics of computer science, teachers make the best use of the situation, and integrate the course learning process into the elements of Ideological and political education. Insisting on the professional standard of computer science, we only need to further explore its inner philosophy and value in teaching, so as to achieve the goal of Ideological and political education. Through strict requirements for students' preciseness and logicity in the course teaching, we can gradually cultivate students' scientific attitude of adhering to the truth, being meticulous and seeking truth from facts, and the concept of honesty and noble sentiment of abiding by rules and disciplines.[5]

As a new position of Ideological and political education, curriculum ideological and political education undertakes the task of Recessive Ideological and political education, emphasizing the subtle teaching. In the process of imparting professional knowledge, ideological and political education content is interspersed without trace, affecting and infecting students. According to the school's education focus and students' learning characteristics, fully tap the ideological and political education resources contained in the computer course, and introduce patriotism, moral cultivation, craftsmanship spirit and the concept of rule of law into the classroom, so as to achieve the purpose of imperceptibly guiding students' learning.[6]

The first is patriotism. In the course of computer general knowledge, the introduction of computer development in China, the development of Chinese chips and the leading level of Chinese giant machines in the world are added to let students know that under the leadership of the Communist Party of China, Chinese scientists have been

diligent in research, fearing difficulties, breaking through the barriers at the level and constantly obtaining new scientific research highlands. This hard-working scientific research spirit, it can make students have great learning significance and reference value, make students confident in Chinese science and technology culture and make them confident in China's development.

The second is moral cultivation. In the computer room class is different from the classroom, the class binding is small, and the students' consciousness has decreased. Eat in the machine room, and discard the plastic bags, meal boxes, peel and other sundries on the table or hidden place; some students play games and do not listen to the class, and other bad behaviors happen. Therefore, I take the following measures in the classroom: first, I fix the seats and organize teaching in groups, constantly remind students to play the role of the host and group, and praise the well-done groups and individuals in time. Secondly, after class, students should check in time, take turns on duty. Third, pay attention to the students' clean computer room before each class, and see that the computer is in good condition to ensure the smooth progress of teaching activities.

The third is craftsmanship spirit. In the course teaching, we take the typical characters of "great craftsmen" as the material to mix the text and text in word and design and produce ppt. These positive and positive contents appear frequently in class, which will inevitably wipe out new sparks with students' thoughts. In the course of students' practical training, we require students to be meticulous and improve, and to promote the spirit of craftsman, to establish a dedicated spirit and improve their professional quality.

The fourth is the concept of rule of law. In the teaching of computer courses, the relevant knowledge of "national network publicity week" is integrated into the network chapters, thus extending the contents of civilized Internet access, abiding by law and rule of law in China. When teaching software copyright, let students understand the harm of using pirated software, make students understand the significance of intellectual property protection, do not use pirated software, cultivate students' concept and consciousness of intellectual property protection, help students clarify the concept boundary between plagiarism and innovation, avoid infringement and be a young man who abides by law.

## **6. CONCLUSION**

The continuous emergence of new generation information technologies such as mobile Internet, Internet of things, cloud computing, big data and artificial intelligence has brought disruptive changes to the whole social progress and human life. The integration of various fields and information technology has produced great integration effect and development space, which puts forward new requirements for computer general education in Colleges and universities. In order to meet the new requirements of the new era and information society for talent cultivation,

our school has effectively promoted the cultivation of students' computer application ability, improved students' information literacy and achieved a series of reform results by establishing a hierarchical curriculum, constructing a three-level competition system, adopting a mixed learning mode and Integrating Ideological and political elements into the curriculum; It provides experience for the reform of computer general education in similar colleges.

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