Multi-dimensional Teaching Reform on Basic Courses of College Computer Targeted at Cultivating Computation Thinking

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Abstract: In this paper, we present the Multi-dimensional teaching mode on Basic Courses of College Computer with the aim of cultivating Computational thinking ability. We reform it from course contents(plan as a whole contents of two computer base courses), teaching mode(IM teaching method), course assessment system(procedure-oriented to multi-evaluation mechanism), make computer thinking innovation implemented effectively, the computer thinking and problem solved capability was raised.

Introduction

All the time, there is one concept in university computer base course teaching: theory is overview of computer science technology, all had been covered, but there is no any outstanding theme; but emphasis on software operation in practical training, so many people think that the base courses teaching is only for computer tool and its application. The student only master the usage of several software, there is no any innovation thinking. Apart from quality-oriented education. Can not meet the requirements of university student’ capability of information society, so introduced the computer thinking education in computer base course teaching by high education department. Its strategic importance to cultivate innovation and inter-disciplinary talent. It’s attached importance and forwarded in domestic, and build new course assessment and teaching mode, to cultivate the computer thinking capability is the new course and first task for current university.

Computer Thinking Current Situation of Cultivation

The word of ‘Computer thinking’ came from Professor Jeannette M. Wing of U.S Carnegie. Mellon University in 2006. It’s a part of mankind thinking, the computer thinking, identification thinking and logic thinking are three base thinking characteristic [1]. Many scientists and education worker are focusing on computer thinking in China current. It’s requested in the 6th university computer base course forum and raised first time by Chen Guoliang academician, pushed forward the propose of computer thinking capability cultivation as computer base course innovation in November 2010. Feng Boqing researched deeply for computer thinking capability cultivation in education in the course of<computer thinking capability cultivation implemented problem research> in 2012[2]; Wang Huan requested the combination teaching scheme of university computer base courses and program design base courses in<take computer thinking as guideline as university computer course teaching> in 2016[3], part of Program design content will be push ahead to university computer base course, develop some applications in spare time out of program design, will raise the innovation and operation capability of students, but limited result to some students, who study laggard and poor capability for self study. Its focused in Computer thinking in education base course in domestic, but still in researched phase current, we have not any fully science teaching mode.
Innovation of University Computer Base Course Teaching

It can’t be solved by one course, but one series of engineering according to computer thinking, each course should be plan as a whole and linkage innovation, in order to implement it, we adopting following teaching scheme.

Plan As a Whole for Two Computer Base Courses and Establish New Course System

Current, both “university computer base” and “advanced language program design” are independent course in our university, and start in different time and different semester, and by different teacher. There is no any linkage between the two course and the teachers, they did not know the course emphasis for the other course, its not benefit to student’s study, not good to cultivate the computer thinking. In facts, computer thinking cultivation is one system engineering, it’s consist of computer thinking consciousness, method and capability. We add it into the two courses during teaching. Make student cultivate students to understand the computer on “university computer base”, students will have some computer thinking consciousness; for “advanced language program design”, is to train student’s computer language problem solved capability and train student’s practice capability, help student deeply understand computer thinking consciousness, master computer thinking consciousness method and have computer thinking capability. As following:

To manage and optimize the original knowledge of “university computer base”, implement the computer thinking base, program design and primary arithmetic teaching in the course of “university computer base” while not conflict to base knowledge, practice capability cultivation. Some contents of “advanced language program design” will be moved ahead to “university computer base”, students can develop some synthesizing type application in spare time, raise the quality level of teaching. Required that student can finish one comprehensiveness project after studying it, combine all knowledge and introduce computer thinking to solve some problem, master the capability of problem solved from up to down, to promote the computer thinking consciousness and capability cultivation.

Computer base course and computer thinking consciousness figure as following:

Positive Research, Constructing the Teaching Mode Based On Instant Communication Tool (Im)

In the past few years, instant communication tool is familiar internet product, all university students are using QQ and WeChat. IM can support chat timely, document transferred, group, interactive,
voice and video, IM software with open, virtuality and multifarious [4], provide great support to cooperation study, discussion study and research study. Also can meet the requirements of video and audio study.

There is one main conflict between teaching contents and class time, in order to highlight computer thinking in the new teaching system, this conflict going to another new stage, to solve the conflict, we must raise the teaching efficiency, research multi-teaching mode, structure based on IM assistant teaching mode, assistant by IM in spare time, also can enhance communication between teacher and student, make up the defects which missing between teacher and student. When one student request one question, both teacher and student can join it. Discuss and communicate deeply, student also can report the project progress to teacher by IM timely, it’s convenient to teacher to master the situation of study, raise the student study efficiency and computer thinking consciousness.

**Multi-Way Practice Capability Training Cultivation**

Computer practice is the most important step in teaching, which is the fastest way to train and cultivate students’ capability, so give emphasis on computer practice, as following:

①Design two course linkage experimental scheme, selected experimental cases, focus on problem solved thinking and train computer thinking method.

②Practice capability cultivation is consist of class & outside class, experiment need to restrict experiment item, fixed experiment computer and limited experiment time, manage the it according the procedure, ensure to all students to join it and experiment efficiency. In post-class, students can organize sub-group to research it and select the leader of sub-group, and select the synthesizing type program from the within scope. Each sub-group leader report the development progress to teacher and submit the job within time.

**Multi-Evaluation Mechanism of Procedure-Oriented**

Course assessment is one important part of teaching design and teaching activities, assessment is not only focus on student’s performance, but also on multi-capability development, focus on student’s study procedure, it’s helpful to student. So we need to change assessment only focus on examination paper, promote the positivity of study as we can. Take the synthesize capability and personality development as important part, take development of student as main task and establish multi-assessment mechanism, focus on student’s knowledge, capability and quality development. Course assessment main focus as following: on duty, class interactive, group study, group communication and personal performance. Assessment emphasis on procedure and result, to introduce student’s positivity and join teaching activities. Can embody student’s knowledge, technique and computer thinking consciousness capability.

**Conclusions**

To cultivate the student’s computer thinking consciousness is goal for all advanced education schools current, but it’s difficult to implement it, still in researching phase. From training student point in this text, provided multi-linkage teaching mode, reform it from course contents( plan as a whole contents of two computer base courses),teaching mode(IM teaching method), course assessment system(procedure-oriented to multi-evaluation mechanism), establish pre-class, class and post-class circulation teaching link, form class teaching, practice teaching and post-class study by itself mode, and to cultivate students’ computer thinking consciousness , method and capability.

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