A MOOC AND A PROFESSIONAL SPOC

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ABSTRACT

Higher Vocational Education is one of the most important educational forms. But in the course of implementation of Higher Vocational Education, we find three inevitable questions: Higher Vocational Educational system's length of schooling which is only three years is too short; the differences in personality of teachers affect the teaching effects; the lower quality of the students disengaged their passion to learn. MOOC is a new teaching mode which has successful cases such as a university computer course: a Computational Thinking Perspective of Shandong University. We refer to the university MOOC - a Computational Thinking Perspective, to construct a professional SPOC teaching mode and recur to the University MOOC in the process of teaching. Seen from the evaluation and suggests of teachers and students joined the MOOC and SPOC, the teaching mode not only can stimulate the teachers' teaching enthusiasm, but also can stimulate the students' learning enthusiasm.

KEYWORDS

University MOOC; Professional SPEC; Computational Thinking Perspective.

1. INTRODUCTION

With the fast-speed development of the modern information society, the recognition to the Higher Vocational Education is increasingly high. And it has reached a situation that Higher Vocational Education even is comparable to the University Education. Such a significant form of education also shows some inevitable questions when it has been in the course of implementation:

The first question is Higher Vocational Educational system's length of schooling. We must complete all the courses including theory, practice, internship, and graduation design in three years which is too short. And we must take into account the students' employment problems but also take into account the part of the students into higher education.

The second question is the differences in personality of teachers. Most teachers in higher vocational college are university graduates who have no much practicing or teaching experience. And less number of teaches, larger number of courses, faster updating of the course contents have put forward a huge challenge to our higher vocational teachers.

The third question is the quality of the students. The Higher Vocational College students have some generalities: lower grades, poorer foundation, and less learning enthusiasm, which cause teaching and learning more difficult. We must adopt better teaching methods to stimulate their learning enthusiasm, and then they will get more useful knowledge.

Fortunately, a brand-new teaching mode called MOOC [1] (Massive Open Online Courses) provides a feasible method to solve these problems above. In this article, we construct an appropriate professional SPOC (Small Private Online Courses) in Higher Vocational Colleges after analyzing a university MOOC and recur to the university MOOC in the process of teaching of the Higher Vocational College.

2. RELATED RESEARCHES

MOOC originated in the openness of the internet based courses which can be found earlier in 2007. And in the next year, Pr. Alec Couros in University of Regina developed an open online course called "Media and Open Education (EC&I 831)". Later, a true meaning MOOC called "Connectivism and connectivity knowledge" attracted 25 students and 2300 free online participation of students [2,3]. In 2012 called the year of MOOC, three world MOOC platforms - Coursera [4], Edx [5], and Udacity [6] began to provide courses to worldwide learners [7]. The NMC Horizon Report of 2013 Higher Education Edition pointed out that massively open online courses have received their fair share in 2012, and are expected to grown in number and influence within the next year [8]. Today, we have seen that the prediction has come true.

MOOC is composed of five main elements: teachers, students, subject, learning materials and learning situations [9, 10]. Through the reasonable combination and application of the five elements, it has obtained the purpose of flipped classroom and improved efficiency, standard [11] by using MOOC. Nowadays, more and more courses are joining MOOCs and more and more learners are using MOOCs.

In china, 4000 high quality courses had been constructed between 2003 and 2010. After 2011, accompanied by the ministry of education of the implementation of the national fine-designed open courses, more than 100 resource sharing lessons had been opened to public. On May 8, 2014, the Chinese University MOOC was online which marked the arrival of the era of a new course.

3. A MOOC CALLED "UNIVERSITY COMPUTER FOUNDATION: A COMPUTATIONAL THINKING PERSPECTIVE"

3.1 The Teaching Goals

In the course of "University Computer Foundation", Pro. Hao provides three teaching goals which are: Cultivating the students' information literacy, cultivating the students' computational thinking, and teaching computing science knowledge.

3.1.1 Cultivating the Students' Information Literacy (The First Ability)

Information literacy is the application and learning information technology in the work and finally obtaining the ability to solve problems by using information technology have learned [13]. The ability also tells people when you need information and how to find, evaluate and effectively use it.

3.1.2 Cultivating the Students' Computational Thinking (The Second Ability)

Computational thinking is the ability using the basic concepts of computer science technology to solve problems, design systems, and understand human behaviors, which covering a series of thinking activity of the breadth of computer science[13]. The ability also tells people how to solve problem by using systematic thinking.

3.1.3 Teaching Computing Science Knowledge (The Third Ability)

In daily life, the computer has become an indispensable facility. Mastering relevant computing science knowledge which including computer basic knowledge, data structure, algorithm design, and program design language and so on, has become the need of the times. The ability can make us well into the society, and deal with the problems encountered.

Following these three progressive targets to cultivate the learners' ability, then they will well adapt to social work and learn etc.

3.2 The Design of the Course

The design of the course determines the life of the course.

3.2.1 Problem Exiting in Current Course

"University Computer Foundation" is a required course to non-computer major in college and has the characteristics of large quantity and extent. Although has experienced several reforms, the teaching mode based on computer operation skill is still a serious challenge in the course offered. Around 2010, computational thinking for the reform of computer basis teaching had been widely recognized in domestic and foreign universities. And the teaching design also is welcomed by the students and the colleges.

3.2.2 The MOOC Course Structure Design

The course structure design facing to the real work environment comes from the following train of thought:
- Information society needs information literacy,
- Information literacy comes from computational thinking,
- Computational thinking comes from computer knowledge.

Figure 1 shows the three layer model of demand of the course structure design.
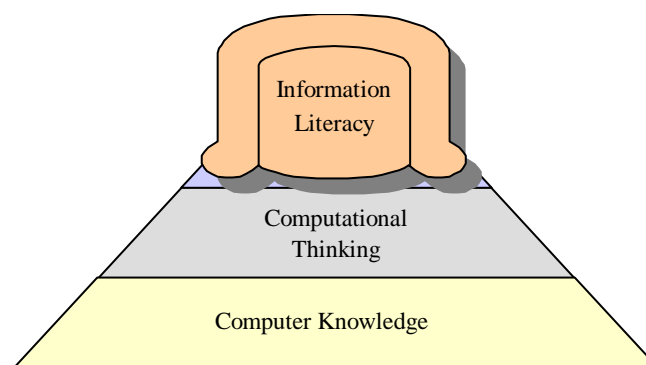

Figure 1. The three layer model of demand of the course

3.2.3 The MOOC Knowledge Module Design

Closely around the three layer model of demand, we put forward the following basic process of calculating by computer.
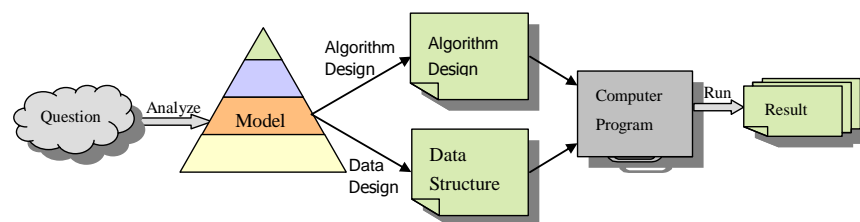

Figure 2. The basic process of calculating by computer

Referring to Figure 2, solving the problem of the conceptual model as the main line of computer, the course includes seven knowledge modules:
(1) Introduction,
(2) Compute and Computer,
(3) Problem Solving and Algorithm,
(4) Data and Data Structure,
(5) Computer Program,
(6) Computer Network,
(7) Computational Science Frontier.

In the process of knowledge module design, a number of knowledge points [14, 15] and knowledge unites [14, 15] are extracted to support the modules and courses.

4. A PROFESSIONAL SPOC CALLED "HIGHER VOCATIONAL COMPUTER PROFESSIONAL DESIGN: A COMPUTATIONAL THINKING PERSPECTIVE"

4.1 Educational System

The length of schooling of Higher Vocational Colleges is not enough long, why? In a Higher Vocational Colleges we have only four semesters to finish all professional courses and practice courses teaching, then the rest two semesters are internship, and graduation design. In the process of teaching, we must take into account the students' employment problems but also take into account the part of the students into higher education. The best way to satisfy this requirement is fusing a few door edge professional courses to meet the length of schooling. The MOOC in section 3 can finish the task. So we draw support from the MOOC's thought.

4.2 The Differences in Personality of Teachers

As everyone knows, teachers in University have doctor's degree that have strong ability of research and exploration including teaching and science technology, and the main goal of university is to culture talents with high level and knowledge. While teachers in Higher Vocational Colleges have master's degree that have lesser ability of research and exploration and lesser practical experience, and the main goal of Higher Vocational Colleges is to train skilled talents. So in Higher Vocational Colleges, we pay much attention to enhance teachers' practical ability and the same time we have less time to do scientific researches. So we can draw support from MOOC's thought which launched by university professors.

4.3 The Quality of the Students

Lower grades, poorer foundation, and less learning enthusiasm are the main characters of the Higher Vocational Colleges students. How to stimulate their learning enthusiasm is one of the most important problems. And how to explain the learning content is also important. The organization of the courses content and the proper teaching methods play an important role in the courses of teaching. Also we can draw support from MOOC's thought which adopted flipped classroom etc.

4.4 A Professional SPOC referring to a University MOOC

After analyzing the problem exiting in Higher Vocational Colleges, we propose a professional SPOC according to the university MOOC's idea.

4.4.1 The Professional SPOC Course Structure Design

According to the MOOC in section 3, the computer professional courses' structure design also facing to the real work environment comes from the following train of thought:
- Information society need information literacy and information skills,
- Information literacy and information skills come from computational thinking(software and hardware),
- Computational thinking comes from computer knowledge (software and hardware).

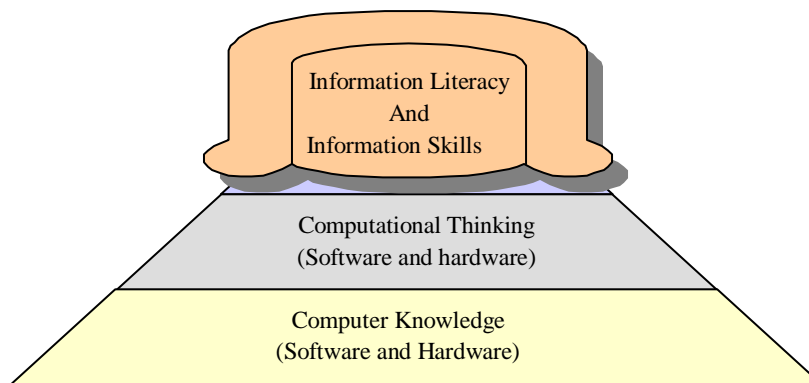Figure 3 shows the three layer model of demand of the professional SPOC course structure design.

Figure 3. The three layer model of demand of the specialty

4.4.2 The Professional SPOC Knowledge Module Design

Closely around the three layer model of demand of the specialty, we put forward the following basic process of calculating by computer.
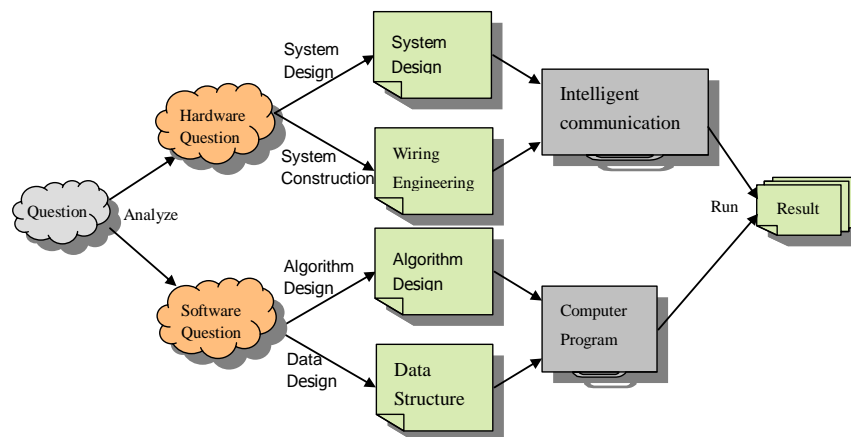

Figure 4. The basic process of calculating by computer of the computer specialty

Referring to Figure 4, solving the problem of the conceptual model as the main line of computer, the professional courses include two kinds of knowledge modules, and every module has several main courses:
(1) Hardware Module,
    (a) Basic Knowledge of Computer,
    (b) Computer Communication and Network,
    (c) Introduction to Internet of Things,
    (d) Internet Comprehensive Wiring Engineering,
    (e) Audio and video system construction,
    (f) Computer Room Construction.
(2) Software Module,
    (a) Problem Solving and Algorithm,
    (b) Data and Data Structure,
    (c) Database Basics,
    (d) Computer Program.

In the process of knowledge module design, a number of relevant courses are opened to support the specialty. And we also join some edge courses in our main module to broaden the students' vision. For example, we give lectures either by ourselves or inviting scholars of famous university.

5. WHICH IS MORE SUITABLE TO OUR STUDENTS?

We have implemented according to the design in section 3 and 4 a month long. And the course is *C Language Program Design*. We adopt the teaching method of flipped classroom as follows:
- Students learn content by micro class video,
- Students ask questions, teachers answer question, and students discuss,
- Teachers interpret the micro content again,
- Quizzing students in class and give an assignment next class.

In a month, we have gone on *Select Statement* and *Loop Statement* of *C Language Program Design* and we have a statistic data of the course's learn state in table 1.

Table 1. The learn state before and after adopting the MOOC teaching method

	Attendance(%)[a]	Enthusiasm(%)[b]	Quizzing result(Score)[c]
Before	82.3	23.0	73.4
After	87.6	43.5	86.0

Note: Table notes.

[a]Sample footnote A: the average of the attendance,

[b]Sample footnote B: the average of the number of hands to answer questions,

[c]Sample footnote C: the average of every quizzing result.

According to Table 1, the rate of Attendance, Enthusiasm, and Score (Quizzing result) have raised much. We see the effectiveness of the reform jauntily. Both teachers and students benefit from the teaching method.

There are three teaching modes which are the traditional teaching mode and the MOOC and the professional SPOC teaching mode. Which is the most suitable teaching mode to our students? Yes, the MOOC or professional SPOC teaching mode is.

6. STUDENTS' EVALUATION AND SUGGESTIONS

We cannot evaluate a kind of teaching method only from the perspective of the appearance. We should listen to the views of students. We sent a questionnaire for teaching to make students' feedback pointing at this month's teaching. We put in order students' feedback as follows in table 2.

Table 2. Students' feedback to the MOOC and professional SPOC teaching mode

	Feedback Content
Positive Feedback	We are willing to answer questions.
	We are willing to discuss problems with teachers.
	We would like to explain the class knowledge.
	We like this lesson.
Negative Feedback	We must do a lot of work after class.
	We must check the information in the library or surfing the internet
	We must think over more problems.

Note: Table notes.

The "Positive" and "Negative" are said to student..

In fact, the MOOC's thought which has been applied to teaching and specialty constriction is successful from the results of students' feedback. All feedback is motivating their learning interests which are the ultimate aim of our teaching.

7. TEACHERS' EVALUATION AND SUGGESTIONS

Most teachers approve the organization of the specialty and the teaching method. They can mobilize the enthusiasm of the students and bring passions to their own teaching process.

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