THE CURRICULUM DESIGN AND DEVELOPMENT IN MOOCS ENVIRONMENT

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ABSTRACT

The paper selects over 20 online courses and analyses the subjects, organization, the way to show the content of the courses, the use of media, and design of the teaching in the case study of Chinese popular MOOC platform. On this basis, the paper summarizes the principles of curriculum design and design models in MOOC environment, such as practical course content, minimized but continuous course structure, simplified course content, the effective combination of the media with the content, learners-centered, and stressing social construction. The author is not only a member of the curriculum development team of MOOC, but also experiences the online courses as a learner, and tries to summarize the principles of curriculum design and design models after analyzing the design elements with the case study method.

KEYWORDS

Massive open online courses, Curriculum design, Knowledge Construction, Cognitive load theory.

1. INTRODUCTION

MOOC has been opened in a number of universities, institutions and organizations. In the year 2013, some top universities in China such as Tsinghua University and Peking University formally proclaimed to join edX, which is one of the three popular MOOC platforms. In October the same year, Tsinghua University formally opened the MOOC platform Xuetangx.com, thus making its curriculums available all over the world. As a member of the curriculum development team of Chinese MOOC, the author herself also experiences the online courses as a learner, and tries to summarize the principles of curriculum design and design models after analyzing the design elements with the case study method. Finally she hopes that this paper can be useful for the following curriculum development.

2. CASE STUDY

Over 20 online courses are selected and discussed about the advantages and disadvantages of their design. The selection of the subjects, organization, the way to show the content of the courses, the use of media, and design of the teaching are analyzed in details in the case study as follows.

2.1 The Selection of the Courses and Their Organization

According to the statistics, there are totally 147 online courses on the Xuetangx.com platform, including computer, cloud computation, entrepreneurial management, data science, social science and thinking training, etc. Among all these courses, over 20 subjects which are developed by Tsinghua University are selected for us to analyze.

Most online courses on the Xuetangx.com are published weekly in each semester. The courses are introduced by chapter or topic. Every unit is showed in a short video which lasts 1 to 15 minutes.

Figure1 shows the contents of the subject Principles of Electric Circuits, which is organized chapter by chapter. Figure2 is the resource list of the subject Principles of Electric Circuits, in which 99 lessons are arranged in 16 weeks. In addition, 198 tests, 109 assignments and 240 videos which last at most 12 minutes are also included.

Figure 1. Contents of Principles of Electric Circuits

week	lecture	video	length	quizzes	exercises
1	5	12	0:48:59	8	6
2	8	15	1:25:35	13	8
3	6	12	1:04:47	12	9
4	5	9	1:11:11	7	6
5	10	18	2:14:24	17	7
6	3	6	0:56:18	6	6
7	4	12	1:04:30	10	7
8	8	19	1:59:16	16	7
9	7	29	2:23:45	21	6
10	4	12	1:10:24	10	8
11	4	19	1:38:28	12	6
12	7	19	1:50:40	16	6
13	8	18	1:34:02	15	6
14	5	13	0:59:10	11	6
15	8	15	1:15:34	12	7
16	7	12	0:59:29	12	8
sum	99	240	22:36:32	198	109

Figure 2. Resource List of Principles of Electric Circuits

As we can see, every video features only one topic, short time and brevity, thus contributing to the concentration of the learners.

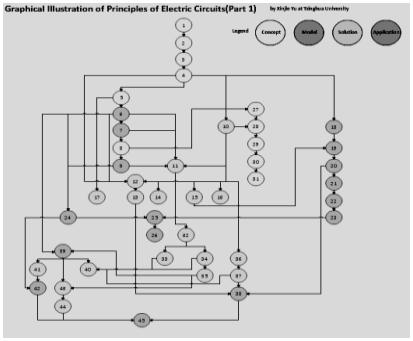

Figure 3. Knowledge Structure of Principles of Electric Circuits

Figure 3 is about the knowledge structure of the course Principles of Electric Circuits. The figure shows the hierarchical relationship between the knowledge. Besides, some pieces of the videos are arranged in accordance with the order of the knowledge.

2.2 The Way to Show the Content by Multimedia

The beginning video of every course is usually about the general idea of the course. It is designed to be dynamic in order to attract the students.

History of Chinese Architecture has the unanimous style. As we can see in the figure4, the start of the PPT, the explanation of the teacher and what is shown in the video are unified aesthetically and clearly show the style of Chinese architecture.

Figure5 is a picture of the course Principles of Electric Circuits which combines various media such as blackboard, PPT, experiments, thus solving the problems of most science and engineering teachers.

As shown in figure 6, the simple vivid animation stories are used in the course Financial Analysis and Decision Making, which is effective to explain the selling and purchasing process and their relationship.

Figure 4. The course History of Chinese Architecture

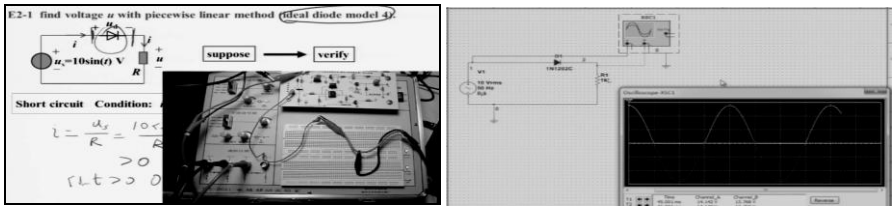

Figure 5. The course Principles of Electric Circuits

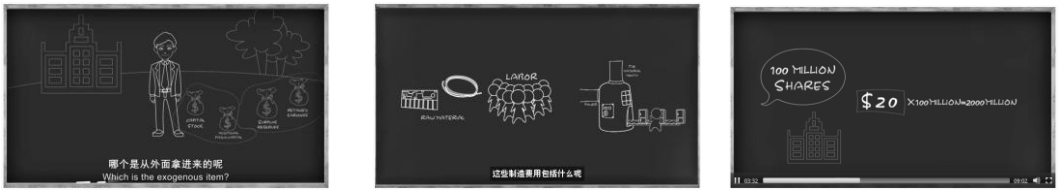

Figure 6.Video of Financial Analysis and Decision Making

2.3 Design of Teaching

2.3.1 Making up a Virtual Learning Environment

Most online courses are divided into semesters on the Internet. Instead of putting all the course videos on the Internet at one time, we upload the new course video weekly. Thus we make up a learning environment where there are semesters, homework, tests, examinations, course credits. The learning environment enables students to have a sense of belongings.

2.3.2 Interaction

Figure7 is about the drawing and writing on the PPT in the course Principles of Electric Circuits, which can attract the students to follow the teacher's ideas to study. Besides, it is much more attractive than just writing knowledge on the blackboard.

Figure 8 is about the quiz between videos. Only by finishing the quiz can the students continue to study, which plays the same role as questioning in the class.

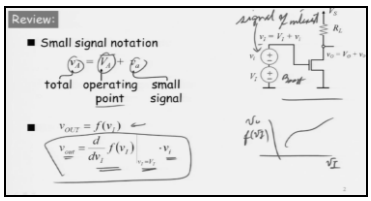

Figure7. Principles of Electric Circuits- Drawing and Writing

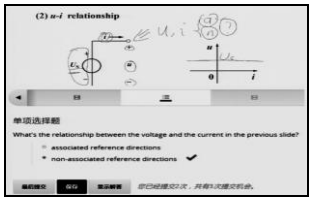

Figure8. Electric Circuits-Test between Videos

2.3.3 Communication

The Xuetangx.com platform provides communication function. Students can introduce themselves to others. Cultural communications among students from different places can also be done. They can share the study materials and information by posting to the platform. Through the online platform, the teacher may ask the students to define a vocabulary and students themselves can modify each other's definitions of the vocabulary. As soon as one student raises a question, other students will begin to discuss it spontaneously before the teacher answers it.

2.3.4 Evaluation

The Xuetangx.com platform also has the function of self-evaluation on which the students can see their course progress and scores. And that is an inspiration for the students.

Figure 9. Communications on the Online Platform

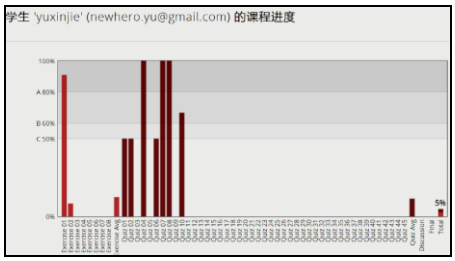

Figure 10. Principles of Electric Circuits-Study Evaluation

In conclusion, every course has the design of teaching, including a virtual learning environment, the interaction, the forum of each course, the function of self-evaluation and resources. However, we can see few online courses which involve in the cooperative learning and research.

3. PRINCIPLES OF CURRICULUM DESIGN

Basing on the analysis and summary of the design of teaching after our experiencing of the online courses, we draw a conclusion of the design principles of the curriculums in the MOOC environment.

3.1 Practical Course Content

The investigation of the learners in e-learning courses shows that the biggest cause of their stopping the learning is that they are not interested in the content. Research shows that examples or problems from our real life are helpful to inspire or maintain the students' interest when learning. The design of MOOC should emphasize on inspiring and maintaining the interests of students. So the key is the practical course content.

3.2 Minimized but Continuous Course Structure

The cognitive resource of the learner is limited according to the cognitive load theory. Once the information is overload, the meaning-construction of the knowledge will be influenced (Rohani Ahmad Tarmizi & John Sweller, 1988). Researchers such as Gerhard Ross from the European brain lab had also proved that minimal content and frequent repetition are the best for study from a neurobiological perspective.

We should follow the principle of modularization, short time, refined knowledge granularity and focusing on the important knowledge. In other words, the course content should be divided into small modules according with the teaching goal, each of which should only have one knowledge point and last 5 to 10 minutes. However, we don't suggest random division ignoring the systematicness of the course.

3.3 Simplified Course Content

Good cases of the online courses can best explain and simplify the content. They are usually characterized by the simple writing performance, graphs and animation stories which can show the relationships.

As to the way of course content presenting, it should follow the cognitive load theory so that the inner cognitive load of the students can be lessened. Therefore, the following suggestions can be adopted: reducing the irrelative information on the screen, explaining the abstract content with graphs. Meanwhile, we should also stress the improvement of learner's relative cognitive load. Marking the key content or setting reminders can promote the efficiency of the learners.

3.4 The Effective Combination of the Media with the Content

Numerous studies show that a combination of various media is conducive to the construction of knowledge. For example, with long-term research, Richard.E.Mayer concluded that it was more efficient for students to be shown with both words and pictures than just the words in the class. Only by being shown both the words and pictures can students form a module of them and establish certain relationship between them. Finally the meaning study is realized.

Hence, a good design of the course should be, basing on what is to be presented, the appropriate combination of the media.

3.5 Learners-Centered

In the MOOC environment, learners are the subjects who choose what they learn and control their own progress. Virtual learning environment should be built to support learners with different learning modes.

The MOOC environment should meet the following requirements: first, the knowledge should be arranged step by step so that learners can do independent learning and complete their knowledge construction smoothly. Second, diversified resources should be provided to meet the individual needs of the learners. Third, platforms for the communications should be offered to support collaborative learning. Last, automatic mechanism for evaluation of students' study together with the homework, tests and examinations should be given to students, aiming at a timely feedback for students' study.

3.6 Stressing Social Construction

In the virtual classes, we should attach great importance to the guidance of students' communication, the efficient problem-solving process for the students, and the providing of various network tools for students to communicate and share knowledge. If so, the students can get their knowledge strengthened and learn something new through the Internet.

4. CONCLUSION AND FUTURE RESEARCH

The curriculum design and development in the MOOC environment is meaningful. The author hopes that this paper can be useful for the future development of the MOOC. With a direct analysis of the MOOC, this paper might be limited in the design principles of the curriculums, which need to be revised and improved in the future.

The future research will focus on the modes of the curriculums in the MOOC environment, aiming at providing a better way for teachers to develop MOOC curriculums and improving learners' efficiency.

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