

# Application and Practice of MOOCs in the Teaching of Primary and Middle Schools

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**Abstract**—With the rapid development of network technology, the construction and research of MOOC has become a hot spot of online education at home and abroad. Foreign Coursera is in line with Udacity, edX and other platform. The domestic has also launched the school online, Ewant and other learning platforms. But now in the area of education, there is no open large-scale education website for primary and middle school students to learn. So this study begins with an analysis of the MOOC education theory, and put forward the theoretical foundation and practical programmes about the secondary school curriculum leveraging MOOC. And it also proposes the video production process of MOOC, allowing middle and primary school students to choose other schools with high quality curriculum resources. This not only greatly enriches students' quality curriculum resources, but also effectively solves the problem of imbalance of China's secondary education resources.

**Keywords**—MOOC; large scale education; secondary school; open curriculum; online Education

## I. THE DEVELOPMENT STATUS OF MOOC AT HOME AND ABROAD

MOOC(Massive Open Online Courses) [1]. MOOC was an unprecedented success in the United States in 2012. So 2012 is known as "MOOC YEAR". With the strong momentum of the development of MOOC in the world, the Chinese University of MOOC is also booming in 2013. So the year 2013 was called "The first year of China's MOOC". In a certain extent, "Online" ensure the "Open" and "Massive" and "Open" is an important prerequisite for "Massive" and "Massive" is the important basis to improve the Online learning experience. MOOC has brought about changes in the way of learning, evaluation, teaching methods and educational ideas. A MOOC could and should be much more than a traditional course delivered online. [2] The drapper MOOC video can focus the attention of students. At the same time, the design of MOOC website is based on the interactive communication of the network community. As an important role, teachers can realize the unity of organized learning and guided learning. From the field of educational technology and distance education, a long tradition and successful experience should be taken seriously and as a source of inspiration. MOOC also offer unparalleled opportunities for scrutiny and analysis of students' learning journeys stored and accessible on the Web. Chinese education researchers have been concerned about MOOC and its development; they are

planning to launch a large-scale open online course in the university step by step.

At present, the domestic distinctive MOOC websites are as follows:

TABLE I. THE DOMESTIC FAMOUS MOOC PLATFORM

Name	Website	Release time	Course type
XuetangX	<a href="http://www.xuetangx.com/">http://www.xuetangx.com/</a>	Oct, 2013	Cloud Computing, Data Science, Entrepreneurship Management, Computer Science, Social Science, Life Science
Ewant	<a href="http://www.ewant.org/">http://www.ewant.org/</a>	Oct, 2013	Science, Engineering, Medicine, Literature, Law
CNMOOC	<a href="http://www.cnmooc.org/">http://www.cnmooc.org/</a>	Apr, 2014	Science, Engineering, Medicine, Literature, Law
University Open Online Courses	<a href="http://szu.benke.chaoxing.com/">http://szu.benke.chaoxing.com/</a>	Sep, 2014	Human Sociology, Psychology, Computer Science, Management Science
Fudan University MOOC	<a href="http://fudan.xuetangx.com/">http://fudan.xuetangx.com/</a>	Sep, 2014	Engineering, Social Science
Harbin Institute of Technology MOOC	<a href="http://hit.xuetangx.com/">http://hit.xuetangx.com/</a>	Jan, 2015	Human Sociology, Psychology, Entrepreneurship

## II. MOOC EDUCATIONAL TECHNOLOGY THEORY

### A. The Teaching and Technical Characteristics of MOOC

The length of each MOOC video should be limited to 3-7 minutes. To motivate the students' enthusiasm and sense of participation, we can add diverse interactive elements to class, such as the exercises, experiments, virtual instrument and program evaluation. In addition, each section contains a formative test, such as summary of the work. The course also includes termination test, such as mid-term exam and final exam. After the result is qualified, students will obtain the graduation certificate and credit of the course. In summary, MOOC curriculum needs to build a complete learning cycle: online learning- sharing views and experiences with others-

online experiment- completing homework- taking the exam- graduation and obtaining the certificate [3].

### B. Characteristics of MOOC in Teaching Mode

The teaching model is elaborately designed based on learning science. The teaching principles of MOOC include the principles of human centered learning, constructivism learning, procedural teaching and meaningful learning. In essence, MOOC lays its foundation on students and recreates the "Teaching and learning behavior chain". Based on the interactive system of the Internet, this combines the four elements of the system, teacher, student and learning resources. The MOOC course is relatively short and pithy which can attract the attention of students. It also can quickly solve the problem of students' learning and make learning more efficient. At the same time, a large number of data from online courses in primary and secondary schools can also help teachers to understand the weak point of the students for producing feedback in the future of teaching.

### III. HOW TO EXPLORE THE MOOC MIDDLE SCHOOL CURRICULUM

MOOC wave is sweeping across the world. It is bound to have a strong impact on higher education and radiate into all levels of education and the education in the near future. We can see some of the recent advances in the field of open courseware and rise of many online portals which provide University equivalent courses for millions all across the world and their potential to get better [4]. With the development of MOOC, it can be applied to the teaching in primary and secondary schools. It can improve students' learning initiative and enthusiasm, extend autonomous learning content and strengthen self-planning capacity through online learning, discussion and interaction between teachers and students. More middle school teachers and students will be able to enjoy the benefits brought by MOOC [5].

#### A. Middle School Should Develop More MOOC Courses.

Schools with excellent teaching resources can put their own excellent courses into the MOOC platform. So we can focus on the advantages of national resources to build a series of math MOOC courses in primary and secondary schools for teachers and students to share. These courses will play a vital role in classes and outside classes, which are convenient for learners to choose flexibly and diversely.

#### B. Adapt MOOC for Your Middle School

As the Figure 1 shown, take Harvard students as an example: the number of students aged from 21 to 25 years old ranked No.1, 25 to 30 years old the second, and the age range 11 to 20 is significantly less [6]. This may be related to the curriculum content in MOOC, while also reflecting MOOC is underutilized among the current middle school students. In order to facilitate students to learn the lesson of extra-curricular knowledge, we can set the MOOC curriculum for middle school students, which is in accordance with the criterion of curriculum. For conditional schools, we can make use of the high quality curriculum resources and develop the MOOC

platform which is suitable for our school students to build an efficient teaching design programs and methods. After completion of the school curriculum, many middle school students can continue to browse the site to consolidate and expand knowledge in time. At the same time, we should also develop a number of interest courses for the future development of the primary and secondary school students to cultivate a good foundation.

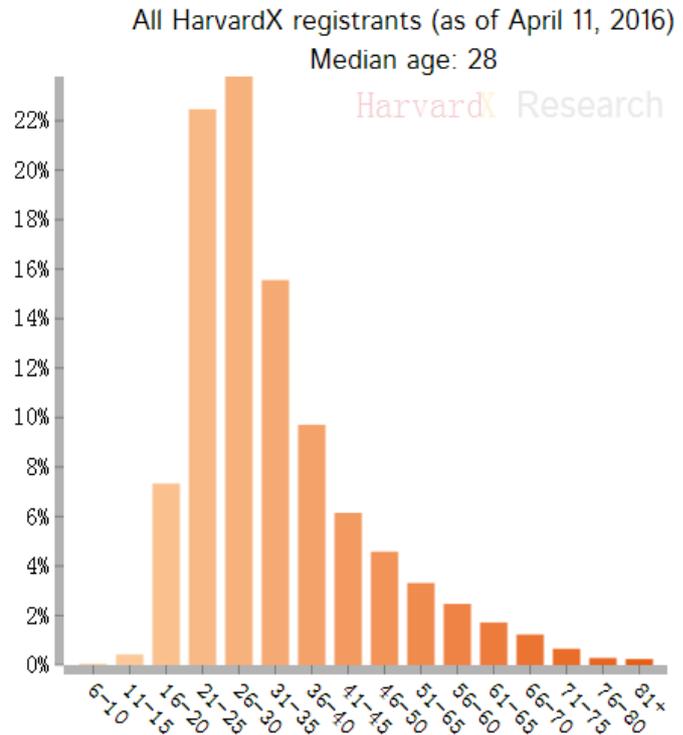


Fig. 1. Age distribution map of MOOC users

### IV. CONGRUENT TRIANGLES BASED ON "MOOC" TEACHING DESIGN

#### A. Teaching forms

Using autonomy, cooperation, inquiry and opening teaching forms to lead students to study the knowledge of congruent triangles. Autonomy reflects that students can freely choose exploration and interesting teachers for themselves on the MOOC platform. Cooperation is embodied in letting students explore questions within a group which is divided by heterogeneity between homogeneous, and then students can work with cooperation. Exploration is reflected by the teacher's guiding students to find and solving problems which aimed to improve student's independent thinking and communication ability. Problems can have various solutions, showing the openness. For instance: in proving congruent triangles, different students can use different judgment theorems proving congruent triangles.

#### B. Teaching contents

The contents of this lesson are divided into three sections.

- The first part is mainly the introduction of the course content. In the first section, a real life example was used, "on New Year's day how to do the small triangle flags of the same size and shape". It is to attract students to think how can we prove that two triangles are congruent, after that, we can let students use the classroom multimedia system to draw triangles according to known condition and guide students to find possible cases using given three condition. According to the number of triangular edges and corners, there will be six cases, such as: SSS, ASA, AAS, SAS, SSA. Group leader is responsible for the division of labor. In order to enhance students' operation ability, students will have sufficient time to communicate with others. Every student tries to use a given condition to construct the triangle, and then contrast with the known triangular. Finally, the results in the experiment are obtained through the group communication, and the teacher sums up the congruent triangle theorem. The difficulty of this section is how to guide students to draw experiment in MOOC platform and let students explore by themselves. Teachers should preset student's problem that may appear in advance and let students submit their answers in the answer area. In order to increase the flexibility of the course, teachers should give explanations of problems that may exist in students in the teacher-student interaction or in the next class.
- The second part is the application of the theorems of congruent triangles. From the first part, the students have already learned that the judgments of the triangle are SSS, AAS, SAS and ASA. Using these theorems, teachers can guide students to find the phenomenon in daily life, such as translation, flip, folding and so on. The difficulty of this section lies in how to adopt the way which combines the inquiry with the textbook examples, such as measuring pool width and slide the tilt angle and broken triangle cardboard. Students should apply what they have learned in actual life which can also make them more interested in learning.
- The third part is to explore the right triangle congruent condition. The common method to determine congruent triangles is also applicable to the right triangle. This section contains the proof of HL theorem and using triangle congruent knowledge to solve practical problems in life. In traditional classroom, it is difficult for students to form an intuitive feeling about abstract knowledge. However teachers can use the animation, special effects and other multimedia technical means to show the abstract formula in the MOOC platform. After video knowledge explaining, teachers can set exercises for students to test their mastery of knowledge or launch initiated discussion which can make students share their learned knowledge. In addition, teachers can also provide supplementary material for students to facilitate in-depth study.

Teaching reflection is helpful to improve teachers' cognitive ability and cognitive level. MOOC teaching used

interaction between teachers and students, common reflection, summary and other ways. Finally the three-dimensional teaching objectives can be achieved. First in the knowledge and skills: students understand and master the congruent judgmental theorem of the congruent triangles. Secondly in the process and the method aspect: through the exploration of judging whether it is a triangle congruent, students can strengthen their ability to analyze problems, hands-on and problem solving. Finally, in terms of the values of emotional attitude: students can properly use classification to discuss ideas and feel the charm of mathematics.

## V. DESIGN AND IMPLEMENTATION OF MOOC PLATFORM

The video is put on the self-design website "IMOOC" after the video capture and editing for students to learn.

### A. Production Process of MOOC Website

The lecture video is divided into three sections and it is added titles, transitions, rendering which accurately reflected the actual classroom. The length of the first section of the video is 6 minutes, the second is 7 minutes and the third is 5 minutes. All the section is concisely refining. MOOC video production process is divided into six steps:

- 1) Preparation for lesson and PPT.
- 2) Practice of PPT explanation and pretending to interact with students.
- 3) Recording the HD video in a studio.
- 4) Editing and video clips.
- 5) Construction site layout and coding the MOOC web.
- 6) Test performance and launching the MOOC website.
- 7) Website feedback.

### B. Function of Website

The development software used Dreamweaver8.0. Programming language used HTML5 and Java. Database used MySQL. The requirements of browser version are more than IE8. The website users are divided into three kinds, one is the teacher's identity, one is the student ID, and the third is the administrator. Different users have different rights. The specific functions of the website are as follows:

- 1) Students could control the play speed of the videos according to their personal mastery.
- 2) Students have the right to evaluate the courses according to its strengths and weaknesses. And they could collect or download the video of the courses and PPT if they like.
- 3) Students can participate in quizzes in the class. And the results of these quizzes could be used to analyze the quality of teaching by teachers.
- 4) Learners can communicate with each other in the discussion of community. Certainly students' questions could be answered by teachers in this community.
- 5) In order to help students to learn more knowledge, the website also provides the links to other learning platforms.
- 6) Students could reflect their difficulties in the study through email and other means.

The platform also provides the chat room for students and teachers to help them communicate with each other.

## VI. PROBLEMS AND SOLUTIONS

There is no doubt that through the MOOC teaching platform, education area has been increased and the education level of the region short of teachers also got improved. MOOC can enhance the fairness of education, which explains why it has such an amazing charm. But there are some problems in the process of MOOC education platform development.

- According to the domestic and foreign MOOC construction experiences, MOOC needs a group of excellent teachers to create fine courses. Distance learning also needs designing by professional technical team, more excellent teachers and management teams of co-operation, and then completes the teaching plans, teaching designs and examinations. And it is difficult for the individual teacher to develop courses without a efficient team.
- Schools and education departments at all levels should avoid the superficial surface education information behavior. When micro class was popular, many people began to buy the hardware, and then they record the class scrambling temporarily. MOOC platform is far from a simple demonstration of teaching resources. We cannot hope it to be efficacious forever simply through one bid inviting, we should pursue a long-

term development to meet the needs of teachers and students.

- The supports of government as well as the student's parents are also essential. The government's policy and financial support is the material conditions. It is also of great significance that Parents understand the MOOC learning style and create a good learning atmosphere.

Only by the joint effort of government, school, family, and the society can we promote the construction of the MOOC platform and the long-term development of MOOC.

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