

Research on Resource Sharing Mechanism of MOOC Based on Big Data

Liu Pingping

School of Computer Science and Engineering
Xi'an Technological University
Xi'an, China
e-mail: 1341369601@qq.com

Wan Chao, Liu Bailin

School of Computer Science and Engineering
Xi'an Technological University
Xi'an, China
e-mail: 958088613@qq.com

Abstract—Through the large data analysis, we can explore the learning process and the situation of the learners in depth, discover the learning rules, construct the MOOC platform mode of operation, construct the framework of "diversified" teaching resources development of university computer basic course, and effectively carry out the teaching of the classroom by relying on the three-dimensional teaching resources. Through the teaching practice, it is proved that the educational philosophy of the university computer basic course is integrated into the educational philosophy of Muji, reconstructing and perfecting the diversified teaching resources developed by Muji, and further mobilizing the interest of college students in computer learning, which is more conducive to professional learning.

Keywords-Component; MOOC; Multiple Teaching Resources; University Computer Foundation; Teaching Mode

I. INTRODUCTION

With the rapid development of social networks, mobile Internet, Internet of things and other information technology, The data grew at an unprecedented rate, How to tap and use these data has become a hot topic for scholars to study. Big data has changed the way a lot of people thinking to solve the problem, the education sector as well. As a new form of education oriented to mass service, MOOC education has the characteristics of scale, openness, linearity, resource diversity and participation in autonomy. It provides a new channel and a new mode of learning for students. Its advantages of flexible interaction and the simplicity of the hardware requirements is much favored by students and teachers. Teachers can build a professional dynamic resource library that students are widely involved in and it also can be updated at any time, it realized long-distance resources sharing and online communication, assessment, and other teaching activities. The big data analysis in MOOC education measured the microscopic performance in the learning process based on the new thinking and technical focus. Valuable data information can be mined from multiple dimensions such as effort level, learning attitude, intelligence level, domain ability and interactive collaboration. Online education platform based on the technology of MOOC with big data reconstruction and improve the network learning community and make full use of the resources sharing for face-to-face class, easing the burden on students, reshape the modern education concept and system.

II. BIG DATA PROCESSING TECHNOLOGY AND MOOC

Big data is a kind of new technology framework which using distributed computing architecture, based on cloud computing, distributed processing, distributed database, the cloud and virtualization technology, extracted the value from the quantitative, many categories of data through the data mining and analysis [1]. The big data processing system is mainly responsible for the management and treatment of structured, semi-structured and unstructured big data in the process of data acquisition, organization and storage. It implemented the efficient management of big data knowledge services and can provide the big data knowledge service dynamically and flexibly according to the service demand of the service user. MOOC is a large-scale online open course in recent years, The rise of "MOOC" has provided technical support for the teaching network, It extended communication activities which must have been face to face to any space. China's "Twelfth Five-Year" construction goal is to open to the people of the 1000 open video and 5000 resources sharing class, it shows that the network of teaching has become the inevitable trend of future education reform [2]. With the depth of integration of large data technology, MOOC technology and teaching process, computer basic curriculum reform has a good support environment. It realized the sharing and cooperation of educational resources and collaboration data, knowledge, resources, capabilities, services, processes and tasks, a variety of teaching resources formed an organic whole. Its teaching function provided a strong support for carrying out the teaching and learning link of computational thinking.

III. THE CHALLENGE OF COMPUTENR FOUADATION EDUCATION IN THE MOOC

The computer base of new students is uneven. Students with better foundations expect to learn more, but poor base expect to understand the course content. It is necessary to think about what students should learn can benefit all students.

1) *The contradiction between "knowledge expansion" and "hours compression"*: The course content is wide and scattered, the concept is many and miscellaneous, the depth and breadth of the teaching content is difficult to grasp, the student is hard to understand.

2) *Students' expectations for high quality courses:* It should be said that the students have just entered the university and they are full of expectation for the university classroom. With the deeply integrated of information technology and education teaching, A new "MOOC +SPOCs+ flipped classroom" teaching model has inspired students' exploring interests.

These contradictions are a problem that the course needs to solve, but it is also difficult to solve in traditional classroom teaching. Introducing the concept of MOOC in college computer courses, reconstructing and perfecting the practice teaching network learning community, make full use of MOOC resources inside and outside the school to achieve sharing, constructing the Computer Basic Teaching Resources for the development of MOOC, forming the task - driven new practice teaching model for the development of MOOC, to achieve the purpose of improving the quality of teaching and teaching effectiveness.

IV. RESOURCE SHARING MECHANISM OF MOOC BASED ON BIG DATA

A. Constructing Individualized Adaptive Online Learning Analysis Model Based on Big Data

Personalized adaptive learning based on large data not only needs to consider the individual characteristics of students, but also consider the mining of valuable personalized learning information from massive data, Learn operation mode from the MOOC platform, serving in classroom teaching and extracurricular learning, it can carry out flip classroom teaching and ubiquitous learning effectively, along with the guidance of the learning process, learning resource evaluation and recommendation functions. Construction personalized adaptive MOOC online learning analysis model based on the big data shown in Figure 1.

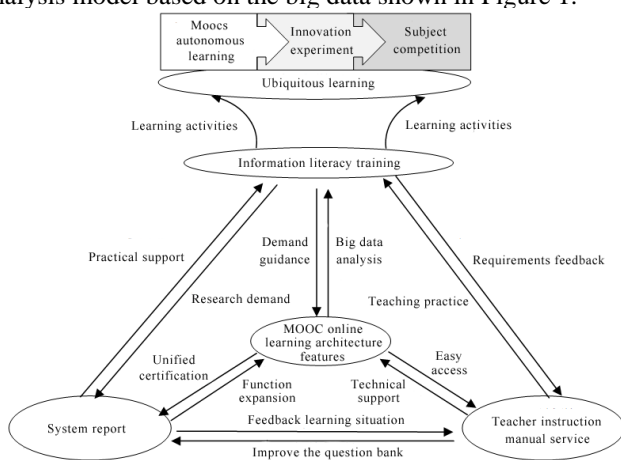


Figure 1. Personalized adaptive MOOC online learning analysis model

Big data technology provides a new approach for MOOC education quantitative research. The MOOC platform records and reviews the real-time learning data of large numbers of students, the course of MOOC in a few weeks is equivalent to the sum of data collected over several

decades, Therefore, MOOC education can be a good platform for testing teaching method and evaluation of teaching analysis.

a) *The platform not only serves the students to learn, but also effectively serve the teacher's teaching practice and support personnel to the learner's manual guidance service (provide learners with learning support, problem solving, etc.):* Platform features include learner self-registration or administrator to add bulk users; The teacher constructs the collaborative learning group randomly or according to the characteristic condition, or the learner constructs the collaborative learning group by themselves, or the system constructs the corresponding collaborative learning group according to the learner's study habit and characteristic of the search; Learning group of learners can carry out learning activities such as topics discussion, sharing of resources, sharing of works, interactive evaluation; Learning group or all learners can learn between learning resources recommended; Class-based learning group can carry out classroom teaching effectively.

b) *It can conduct adaptive learning based on the different characteristics of students, effectively promote personalized learning, support ubiquitous learning:* Learners can watch videos, discuss questions and evaluate each other, That can support 3A(Anytime, Anywhere, Anydevice) learning mode effectively. The teaching team can analyze the results according to the large data technology, carry out effective teaching reform practice, and actively explore the solution to the problem. Practice also proves that it can greatly improve the interest of students in learning computer knowledge.

c) *Support the MOOC autonomous learning model effectively:* Students learn by watching the knowledge points explanation and teaching video, the learning effect was assessed through online self-test, then the system determines the learning content of the learner according to the evaluation results and intelligent algorithm; The learner watches the knowledge point video, and the learners' learning effects are evaluated by corresponding self-test questions, the evaluation results determine whether learners can follow up, and determine the follow-up study content according to the learner's learning experience and evaluation results; The learner can start a group discussion by building a learning group; The learners ask questions online through the answering system, and the tutors give corresponding solutions.

d) *Support the teaching mode of flip classroom:* Learners learn the corresponding knowledge points online firstly, the teacher answers the student's questions in the class, or explain the corresponding subjects in the relevant issues should how to analyze and abstract, how to build a mathematical model, how to get the results of the problem through programming based on the characteristics of the subject.

e) *Support the traditional classroom teaching model:* Sometimes we need to use the traditional classroom teaching model according to the teaching content and the difference of the requirements of students, learning models, this is also the course team has always insisted on the concept of "teach no fixed law", The teaching model needs to be flexibly adjusted according to the specific needs.

B. Constructing "Multi - element" Teaching Resource Framework with "Student - centered"

The MOOC platform provides a supporting environment for the teaching reform of "diversified, modular, integrated and networked", and it guide the "University Computer Foundation" series of courses to develop "diversified" teaching resources framework development based on advanced teaching theory [3]. The diversity of teaching methods is realized, it provides the applicable learning mode and materials for each student. It is adapted to the difference of the students' learning time, style and personality, implements the multi-angle comprehensive teaching mode. As shown in figure 2.

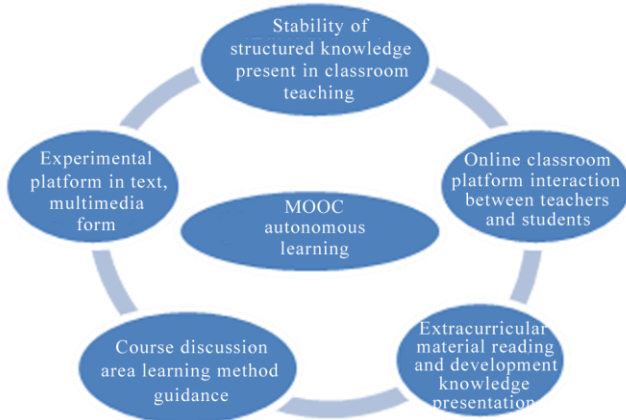


Figure 2. "Diversity" teaching resources development framework

In the development of multiple teaching resources, we can introduce more high-quality curriculum resources of Chinese universities through MOOC platform. "Diversity" of teaching resources including online classroom, classroom practice, in-class discussions, homework, in-class experiment teaching, recommend reading reference materials, extracurricular experiment report and other teaching resources. They form a whole, and present diversification, it enable students and teachers to use "multiple" teaching resources to carry out various forms of teaching and learning activities, and provides a strong support for the teaching and learning of computational thinking.

In the development of "diversity" teaching resources framework, building a Shared and open support environment, which can make the teaching resources become three-dimensional and support the development of a variety of teaching modes by using MOOC and other advanced modern education technology. It provided a variety of online teaching and learning kits to support the whole process of information online teaching activities,

such as classroom teaching demonstration kit, online autonomous learning kit, student collaborative learning kit, teacher collaborative teaching tool kit, etc. The various supporting tools are shown in table 1. The teacher completes the preparation of each unit teaching resource according to the multi-teaching resource framework, and the teaching resources can be combined with different professional demands to form different teaching resources, then discuss the teaching method, eventually form this course's three-dimensional learning resources [4].

TABLE I. OFFER A VARIETY OF INFORMATION TECHNOLOGY TEACHING SUPPORT TOOLS

Support tools' name	The role of learning support
Classroom demonstration and independent learning tool kit	Teachers can form their teaching ideas into several knowledge nodes clearly and connect with resources. Students can clearly understand "what the teacher needs me to accomplish", "What the teacher had given me help", "Which operations need to be done by myself" when conducting self-learning activities.
Skills learning and testing platform	Students can use computer aided assessment techniques to realize the repetition of knowledge points. When the degree of knowledge of students is reached to a certain extent, the system will open up more targeted and integrated professional training cases for students to practice. Finally, students can solve professional problems gradually with the help of computer.
Course teaching interactive platform	Put the content of each course which has the diversity, dynamic nature, variability and extension on the learning platform to make up for the lack of the content renewal cycle of the text teaching materials. And the learning platform is used to carry out the job submission, interactive BBS, the interactive evaluation of works and other learning activities.

C. Empirical Research on Personalized Adaptive Learning Effect Based on Big Data Analysis

With the support of big data analysis, we can comprehensively record, track and master learners' different learning characteristics, learning needs, learning foundation and learning behaviors, and create personalized learning paths for different types of learners, and implement intervention teaching by adjust teaching contents, time, methods and other factors dynamic adaptability, it can enhance students' learning efficiency. It evaluate a student's learning and mastery of the knowledge points by data analysis, and visualize the learning state, implement personalized intervention guidance, as shown in figure 3.

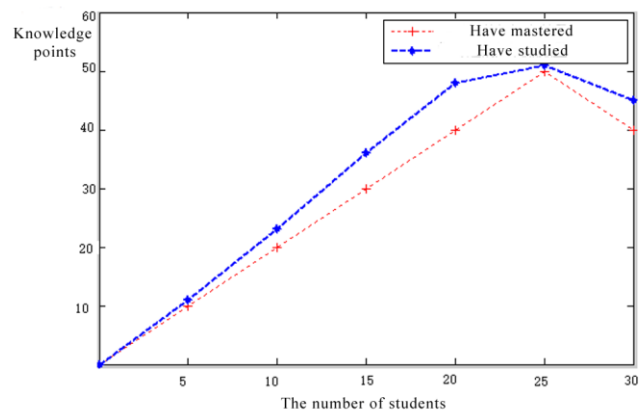


Figure 3. The analysis and evaluation of big data carry out personalized intervention guidance

In figure 3, the X-axis represents the number of students, and the Y-axis represents the number of knowledge points for students to learn. The blue line is the number of knowledge points that have been learned, the red line represents the number of knowledge points already mastered, the distance between two points represents the number of knowledge that students have not mastered. When the distance between two points is lower than the setting threshold (20), the system will automatically send a warning based on student learning, at the same time, push the difficulty suitable knowledge point to study according to the learners' cognitive ability, and inform the students of the former knowledge, related knowledge and the follow-up knowledge points after completion of learning, this kind of personalized intervention helps promote teaching and learning.

V. EPILOGUE

The big data age has great practical value for learners' learning process analysis, the personalized push and learning quality analysis of learning resources will have a feasible solution with the support of big data analysis, personalized learning appeal has a new approach in the era of big data. The teaching model based on MOOC puts forward a new task for the cultivation of information society talents [5], it has been proved that the construction of university computer basic series courses in MOOC environment lies in the construction and improvement of diversified teaching resources[6]. Organization teaching through MOOC's course management mode and teaching concept, design a student - centered personalized learning process, focus on cultivating students' ability of computational thinking and solving, analyzing and processing problems in combination with professional

requirements through online learning and discussion[7]. And enable students to master the new learning mode in MOOC environment through curriculum reform, resource construction, provide a new way of thinking for future socialization and lifelong learning.

ACKNOWLEDGMENT

School reform project: xi 'an university of technology, 2016 university computer base MOOC/SPOC online course construction. School educational reform project number: 14JGY17

REFERENCES

- [1] Li Guojie and Cheng Xueqi, Research Status and Scientific Thinking of Big Data [J], Bulletin of Chinese Academy of Sciences, 2012, 27(6): 647-657.
- [2] He lixue, Research and Implementation of Online Test Model Supporting Mocc-spoc Characteristics [D], Shaanxi Normal University, 2015.
- [3] Wang Yizhi, Lu Lingyun and Zhou Wei, a New Way of Thinking for the Development of Basic Curriculum Reform in Computer Based on Computational Thinking [J], China University Teaching, 2012(6): 39, 41.
- [4] Chen Fangqin, Zhu Yanhui and Liu Qiang, The Concept of Multi-dimensional Network Teaching Resources Construction in Colleges and Universities [J], Computer Education, 2013(2): 40-43.
- [5] Yu Ping and Zhu Zhiting, Openness, Copyright and Profit-Research on the Focus Issues of Open Resources [J], Modern Educational Technology, 2013(6): 9-12.
- [6] Liu Shaokun. Research on assignment scheduling algorithm for MapReduce mass data processing platform [D]. Beijing university of technology, 2015.
- [7] Wang Jian. Based on the Hadoop cloud computing education resource sharing platform [D]. The design and implementation of Inner Mongolia university, 2015.