Application of Mobile Learning and Big Data on Improving Flipped Classroom and MOOCs

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**ABSTRACT:** With the popularization and development of the mobile Internet and information technology education, this paper conducts in-depth analysis of digital education and Big Data technology, elaborating how the mobile learning techniques are applied to flipped classroom and Massive Open Online Courses (MOOCs). Mobile learning platform can be used to achieve the development of massive open online courses by combining curriculum resources, technology management and mobile intelligence. Our Intention is to excavate the maximum of learner's learning potential, provide high-quality learning resources to learners and promote the transformation of education mode.

1 GENERAL INTRODUCTION

With the popularity of mobile intelligent terminal, the mobile Internet has been developed rapidly and the dissemination of information has undergone a fundamental change. Combined with the promotion of education informatization, the teacher and the learners gradually realize the feasibility of online learning. Online learning describes the multi-dimensional learning vision from the content, time and space, helping learners receive digital learning resources of high quality. According to their own interests and learning methods, learners can start learning from their own cognitive demand, which not only improves the learners' learning initiative, but also mines a greater degree of their own learning potential (Jiang et al. 2015). Online learning provides an effective method for education planning and discovers the differences of learners through collecting and collating learners' information, realizing the transformation from static mode to dynamic mode of education. Especially, with the fact that Big Data, learning analysis and other technologies are getting mature gradually, online learning provides autonomous learning with a substantial guarantee.

2 MOBILE LEARNING

2.1 Current situation of mobile learning

Mobile learning (referred to as m-learning) refers to the use of mobile intelligent terminal to help learners at any time, any place to get knowledge. Due to the fast and convenient information transmission network, mobile learning breaks the barrier of traditional learning mode and promotes the development of stimulating learning mode. Mobile learning must solve two fundamental problems: in the form, the learners must have access to the support of mobile Internet, cloud computing and other information technology which provide protection whenever and wherever possible for users to obtain knowledge. In the content, the developers have to make the reasonable arrangement of learning process and the learning substance (Zhang et al. 2013). The fragmentation and structuring of knowledge will be realized, the process of which is called knowledge management. Its main task is to manage learning resources, including the realization of the externalization of tacit knowledge in various ways, managing the explicit knowledge storage and constructing expert map (Zheng & Chen 2012). Mobile learning not only inherits the basic properties and advantages of the traditional distance education, but also becomes an effective solution to the
problem of time and space limits for continuous learning, helping learners get access to knowledge and solve other learners’ problems at any time, any place. Mobile learning has a more extensive application prospect, and becomes a hot topic and research direction in Chinese and foreign educational field.

2.2 The applications of mobile learning

The active interaction between the mobile learning platform and learners is required in mobile learning. Considering the fact that the mobile intelligent terminal operation ability is limited and the amount of data and information is huge, we will involve calculation on the server process (Zheng & Chen 2012). The client is responsible for receiving user request and displaying the final data, realizing the real-time interaction between platform and users. Nowadays, the mobile intelligent terminal can be widely supported in formal and informal learning environment tools and meet the mobile learner’s expectations of knowledge content, community interaction and cooperative learning (Chen et al. 2013). Especially in the last two years, the attention on mobile technology application in education has been moved from the improvement of intelligent hardware equipment and the better use of the mobile devices in education field to the combination of Big Data and mobile learning technology in mobile learning that makes greater contribution to education (Wang 2013).

3 BIG DATA TECHNOLOGY

With the development of cloud computing, Big Data technology has attracted more and more attention (Bienkowski et al. 2012). The era of Big Data in mobile learning has become the focus of attention. According to the new definition given by IBM, Big Data has the characteristics of 5V: Volume, Veracity, Variety, Value, and Velocity. First, compared with the traditional physical classroom curriculum, the scope of mobile learning is very large which can reach hundreds of thousands of people. The traditional database software cannot capture, store, manage and analyze such data as the mobile learning’s data. Second, Big Data is often naturally occurring data in the process of learning. We don’t need to spend a lot of time collecting data in the course of the study, so it’s immediate and convenient. Third, the types of Big Data are varied which have far-reaching research value. For example, by tracking the learners in the online classroom in each operation of learning step, mobile learning platform can collect accurate and detailed data on the learning behaviors, including the accuracy of classroom tests, the length of time on watching the video and the active degree of the community interaction, which is difficult to collect in traditional classrooms.

4 FLIPPED CLASSROOM AND MOOCS

4.1 Flipped classroom

As a kind of teaching system born in the modern society, Flipped Classroom is called the new teaching pattern of reverse mode, its specific implementation measures are as follows. Before the classes, learners can commit themselves to the autonomous study according to their own studying levels and take the courses by watching videos, reading related articles or using their own knowledge to make sense of the new learning content. At the same time they can have a review of the old knowledge and deepen the understanding of the knowledge system when doing the autonomous learning of pre course. On the other hand, to make the learning system operate smoothly, teachers should design teaching plans and make preparation of classroom learning materials base on the teaching content, guiding learners to be active and devoted in the classroom discussion. It can help learners gain a lot and broaden their knowledge when discussing mutually in the autonomous learning mode. Besides mastering the basic knowledge of subjects in advance, learners also complete the information transmission and reception process by autonomous learning in extra-curricular and classroom learning system where they can ask the teachers for guidance of learning content in doubt. After using the tasks laid out before class as an example to explain the new knowledge, what teachers do in the classroom further help learners strengthen their understanding, cognition and mastery of the content so that they can make better promotion and application. Moreover, it helps to improve the quality of teaching, in which what can be improved obviously is learners’ abilities to grasp the learning content. Compared with the traditional teaching mode, the process of internalization of knowledge can be finished in the classroom. There is prove to show that strengthening the teachers’ guidance and the interaction between teachers and learners, and between learners themselves, can make it easier for learners to consolidate new knowledge because this kind of teaching activities can deepen impression of what they have learn. Furthermore, this mode can change learners’ situation from passive acceptance stage to the main cognitive stage, making an endeavor to stimulate learners’ learning motivation through the learning process of teachers’ explanation of the doubts, learners’ sharing of their own thinking in discussion and getting reasonable guidance from teachers in the classroom.
As a whole, the learners are no longer just taking the same notes and learning the same things without autonomy in the passive stage, but participating in the learning activities and discussions actively with the teachers and classmates to explore learning problems as to improve the learning interest greatly, which help to cultivate the consciousness and ability of learners and inspire innovative thinking to meet the learning needs.

4.2 **MOOCs**

MOOCs is the abbreviation for “Massive Open online courses (Zhang & Li 2013)”. With high degree of openness, flexible interactivity, and massive quantity and high quality of curriculum resources, MOOCs focus on creating short and high quality learning curriculum resources, to serve the scholars all over the world in ways of interactive communication anytime and anywhere, helping them break the limits of space and time to do the autonomous learning. That is why MOOCs can develop rapidly and get scholars’ and users’ fervent attention and full-hearted support.

Chasing the trend of MOOCs’ rapid development along with many other countries, China has established MOOCs platforms, but its development has lagged behind the famous universities, not to mention the three well-known platform co-operations. In recent years, Tsinghua University has established the first China Chinese Mu class platform online school, providing high-quality curriculum resources in colleges to meet the needs of the scholars, which is the essence of higher education. As a kind of open source in the environment of technology innovation, the core idea of MOOCs is to provide learners more convenient, higher quality learning resources to help learners acquire knowledge and chase the development of modern society. As one of the social characteristics of MOOCs is to be the participatory open learning resources, Mu class can help the scholars all over the world regardless of time, space, environment limits, fulfilling personalized learning plan in a virtual network classroom. Free sharing of Mu class resources mean that all people have the equal opportunity to accept college-level quality study learning resources with low education cost, which is conducive to the maintenance of world education fairness. In an effective way, MOOCs promote world teaching reform and the development of education all over the world.

5 APPLICATION OF MOBILE LEARNING AND BIG DATA TO THE FLIPPED CLASSROOM AND MOOCS

5.1 **Big Data generated from Flipped classroom and MOOCs**

MOOCs gather learners’ data gradually in the process of teaching. Through in-depth analysis and tracing of the data of learner characteristics, MOOCs will intelligently match the needs of next step, so as to catch the differences in knowledge transmission which enables the teacher to educate students according to individual abilities respectively. Large network open courses complete the index that the traditional physical classroom is difficult to complete. Adaptive mobile learning system is established on the basis of this, can quickly and accurately show the effects of learning, and recommend next learning points (including the key points, and how to transfer the knowledge from one aspect to another). MOOCs are considered to be a milepost of educational reform. The most important point is that modern technology can satisfy the existing educational psychology and curriculum arrangements of the teaching curriculum, and achieves the perfect combination of large-scale teaching and individualized learning. The concrete realization method is divided into learning analysis and data mining. Learning analysis is an interdisciplinary field of learning, including science, psychology, information science, statistics, and computer science and so on. A significant analysis is carried out through the study of performance monitoring and prediction of the learners, to find the problem and guide the implementation of effective learning as early as possible. The data mining is an important tool in the study of learning analysis. Data mining can identify the differences of success and failure learners (low efficiency), such as the rate of online test, the degree of participation in the discussion area. Learning analysis can help the learners which may not be well adapted to mobile learning mode by designing more flexible course contents and forms.

5.2 **Application case of Big Data**

The network course tracking data can allow teachers to better understand learners' learning behavior characteristics, let the future employers get learning behaviors and learning outcomes more comprehensive assessment of the learner. Therefore, MOOCs platform can be applied to measure the university professors and recommend talent for research institutions, industry employers. For example, 17 years old Amol Bhave comes from India, Jabalpur city. His examination scores in the EDX circuits and electronics course is in the top 3%. Therefore, he is admitted to MIT.
5.3 Analysis of Big Data processing in Mobile Learning

Mobile technology enable students to actively take part in the generation, collection, representation, visualization, analysis, interpretation and communication. The huge amount of data generated from trading and sensor, and from activities such as communication, browsing, purchase, share and search for by-products, these huge set from various sources of data and in a variety of formats used has created Big Data.

Figure 1 shows Big Data processing divided into processing flow of data acquisition, data integration and data analysis.

The data acquisition stage is mainly to complete receiving and recording operation to the external data source. The receiving mode of Big Data is the main sensor, click on the mobile device, application service access and RFID access. The Big Data record mainly completes the metadata selection to construct the data structure needed. Integration of Big Data is mainly to complete the received data extraction, cleaning and storage operation. In the data analysis and interpretation stage, when users request a query, timely analysis with the model happens, and the results to the user can accept the way back to the user.

A fundamental research about MOOCs is to tap the situational awareness and the user preference to understand the client directly, and help achieve mobile services based on emotional awareness in a better way. In general, when the user's position (i.e. the personal preferences for different situations of mobile learning) is set, the system can provide more accurate and intelligent services for users in the current situation. Figure 2 shows how to use of context information to assist the implementation of intelligent recommendation service.

6 CONCLUDING REMARKS

In the field of Internet, mobile learning mainly reflects the interaction between the user and system, linking knowledge dissemination and knowledge acceptance. Besides serving classroom teaching, it could also be used to teach or assist professionals in learning specialized knowledge outside of classrooms, such as clinicians in the medical field. Mobile learning can be used as social platforms (such as EdCast) or information education app (such as MOOC, Coursera) to get or share all kinds of information. In the application of mobile learning, Big Data technology is important for immediately selecting the useful information from the massive data. The appliance which combines the mobile learning and the Big Data technology to deal with educational data can establish preference model and prediction model, so as to accurately position the interests of users and provide learning strategy suggestion for users. It can even help the learners establish systematic knowledge map of their own from their fragmented learning.
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