A Study on Educational Reform in the Context of Modern Educational Technology——Mobile Education

Xiaolu Ye

Sichuan University of Arts and Science, Dazhou, Sichuan 635000, China;

yexiaolu0396@163.com

Abstract

With the rapid development of Internet and information technology, the speed of knowledge update makes lifelong education inevitable. Demands for education no longer stay at a fixed time and location, which provides a prerequisite for the germination of mobile education. People's thirst for latest knowledge lead to the emergence of an education model that enables people to learn anywhere and anytime, namely, mobile education emerges. From the basic concept of mobile education and the characteristics of mobile education, this paper expounds the basic structure of mobile education system including Internet, teaching server, mobile server and mobile terminal, elaborating on the function of mobile education and the application mode of mobile education in China amid the current research situation of mobile education at home and abroad and the theoretical basis of mobile education. With the continuous promotion of big data, cloud computing and mobile Internet and the popularization of mobile terminals, mobile education has developed rapidly, bringing infinite vitality to the growth of education and serving as a strong driver for modern education.

Keywords

Mobile education; realization model; learning theory.

1. Introduction

With the rapid development of contemporary social network, information and communication technologies, people's life and learning modes have undergone tremendous changes. In a world of information, people have to update their knowledge frameworks and grasp the knowledge structure of new things at any time [1]. Alongside with the trend of modern lifelong education and universal education system, people's demands for education no longer stays at a fixed time and place, which provides a prerequisite for the germination of mobile education. People's thirst for knowledge calls for the emergence of an education mode that enables people to learn anywhere and at any time. In this context, mobile education emerges. Mobile education makes educational resources circulate rapidly transcending time and space barriers, and injects infinite vitality into the development of education. Mobile education makes education more diversified, and has become an important part of educational globalization.

2. What is Mobile Education

Professor Wireless Andrew of the United States first proposed the concept of mobile education in 1994, and made a specific elaboration on it. Since then, mobile education has appeared in the vision of many researchers. Because of the continued upgrading of mobile education's related devices and mobile technologies, mobile education represents a constantly changing concept, which has not yet formed a universal unification. It keeps pace with the growth of times in its process of continuous development [2]. This paper argues that mobile education is mobile learning. Relying on the mature wireless mobile network, Internet and multimedia technology, students and teachers use mobile devices (such as mobile phones, palmtop computers, etc.) to achieve interactive teaching activities through mobile teaching servers. Its greatest advantage is that it can transcend the barriers of time, space and region, and enable people to learn anywhere and at any time. Its approach of teaching is

unique. Compared with traditional education, it has its own characteristics: (1) mobility; (2) personalization; (3) interaction; (4) flexibility.

The basic structure of mobile education system consists of four parts: Internet, teaching server, mobile server and mobile terminal [3]. Since the beginning of the last century, the Internet has become very mature in terms of technology and rich in resources. When users make their access to the Internet, they can easily share the resources available online and send information. Teaching servers connect to the Internet, collect all kinds of education information, store a large number of teaching resources, and install corresponding teaching software applications on the teaching servers to introduce multi-media into mobile education. Mobile server is a part of the whole mobile network, which is composed of several base station towers to transmit or receive information from mobile terminals and the Internet, and to realize seamless connection between mobile terminals and the Internet through air interface, which is a bridge to realize the connection between mobile terminals and the Internet. Mobile terminals mainly refer to mobile devices such as mobile phones, PDA and the like which can access to the mobile network. They can interact with each other through short messages, refer to information through browsers, and reserve the required information in advance through the storage capacity of mobile devices, making it possible for people to go through the reserved information anywhere and at any time.

In a word, a mobile education system can not only provide mobile Internet and mobile resource bank, but also organize data resources and establish various databases on the educational platform of schools. It can also provide mobile discussion areas, BBS and other services. It can maximize students' access to effective and rich resources without time and space constraints.

3. Current Status of Researches on Mobile Education

The research on mobile education started earlier abroad. The scope of the research is extensive and in-depth, and the forms are varied. The research is mainly conducted by some developed countries in Europe and the United States, and mobile education’s development is very rapid according to the current research’s growth.

The research on mobile education began in 1994 with the Wireless Andrew (later renamed Handheld Andrew) research project carried out by Carnegie Mellon University in the United States [4]. This project lasted three years, and finally provided high-speed wireless connection covering the whole campus for campus administrators, teachers and students through the construction of wireless infrastructure. This research became the first research project of mobile education in the world and pioneered the research of mobile education.

The m-learning project of Ultrallab Laboratory in Britain in 2001. This is a three-year research project aimed at solving three social and educational problems among young people in Europe: illiteracy, lack of continuing education and education inequality due to lack of information technology [5].

The MBOILearn project, which started in July 2002, is a mobile education project led by Europe and co-sponsored by 24 research groups worldwide, including the United States, Australia, Switzerland, Israel and other countries. This educational mobile project has developed some course software for students of different majors, which is mobile technology for informal learning [6].

The research practice of M-learning in China is relatively late. Compared with other countries in Europe and America, our research level is not high, and the scale of research is relatively small. Nevertheless, we have scored some achievements.

The research on mobile education in China began in 2001 with the pilot project "Mobile Education Theory and Practice" of the Ministry of Education's Department of Higher Education aiming at the construction of mobile education platform. In May 2001, Peking University established the first mobile education laboratory in China to carry out the research on the theory and practice of mobile education. The project lasted for four years. From January 2002 to December 2005, the research was divided into four stages, and three versions of mobile education platform were developed: the first is mobile education platform based on GSM network and mobile devices; the second is mobile

education platform based on GPRS; the third is an ontology-based platform for making, publishing and browsing educational resources; the fourth is an educational semantic online platform [7].

National Central University of China has also launched a mobile education project by using PDA function to let pupils know some natural science knowledge, such as local butterfly species [8].

Nokia's "MobileEDU" project was officially launched in February 2006. Mobile phone users can download apps for free on the official website of MobileEDU (http:// www. mobiledu.cn/web/web/index.jsp), on which many content providers provide English language learning materials and other educational content [9].

4. The Theoretical Basis of Mobile Education

4.1 Cognitive Learning Theory

In the mobile education system, the status of traditional lecture-based teaching is declining, and the status of learning by discovery is gradually rising. Bruner, a well-known contemporary American educational psychologist, opposes the reinforcement-based procedural teaching and advocates that the essence of learning lies in initiatively forming cognitive structure and carrying out learning by discovery, which is Bruner's "cognition-discovery theory". Bruner believes that learning is a process of initiative formation and development of cognitive structure. It is a process of initiative selection, conversion, storage and application of new knowledge driven by intrinsic motivation of learners. The acquisition of knowledge is a process that relates to the existing knowledge, experience and cognitive structure. In this process, the existing experience plays a particularly important role [10]. Students are the leaders of learning by discovery. Teachers mainly encourage students' self-confidence in discovery, stimulate students' curiosity and thirst for knowledge, assist students in self-evaluation, and train students' ability to use knowledge to solve problems. In mobile education, when students have questions, they transmit them to teachers through wireless network. Teachers are no longer giving hard answers directly, but gradually guiding students to explore until they find the answers through their own efforts. These problems can be classroom knowledge or life knowledge. Through learning by discovery, students will remember the knowledge that they acquired through their own exploration more firmly and profoundly than the knowledge they acquired through direct inculcation.

The use of MP3, MP4 and other mobile memory for learning is the use of information processing learning theory. The theory was put forward by Gagne, the most influential educational psychologist in the 20th century. He believes that the learning mode of information processing consists of three major systems, namely, multi-store model, execution control system and expectation system. After a very short and simple sensory registration (also known as instantaneous memory) of information, it quickly enters the short-term memory of vision or hearing. After the rehearsal, it enters the third stage of processing, that is, long-term memory. When we use information, we will retrieve, search and extract it in long-term memory. When first contacting a certain knowledge, there is only a shallow impression of it, which belongs to simple sensory memory; after teachers' key tips and students' repeated browsing, the knowledge enters short-term memory; when mobile memory such as MP3, MP4 reviews the knowledge anywhere and at any time, the knowledge can be processed in the third level and entered into long-term memory. When information enters into long-term memory, it is not easy to be forgotten.

4.2 Constructivist Learning Theory

Mobile education also uses constructivist learning theory. Constructivist learning theory emphasizes learners' principal role and stresses active, social and situational learning. In the constructivist view of learning, learning is the process in which learners construct their own knowledge, which means that learners are not passively stimulated, but actively choose and process external information and actively construct the meaning of information. The meaning of external information is not determined by the information itself. External information itself has no meaning, and meaning is constructed by leaners through repeated and bidirectional processes between old and new experiences. Every learner will code new information on the basis of his own original experience to form his own understanding,

and the original knowledge will be adjusted and changed because of the entry of new experience, so information is not simply accumulated, but also includes the concept and structure reorganization caused by the conflict between new and old experiences [11].

Mobile education regards students' mastery of mobile device technology as their existing knowledge and experience, and explores the growing point of new knowledge. Through the creation of learning situations for students by teachers, students are guided to construct their own learning knowledge process initiatively.

4.3 Humanistic Learning Theory

In mobile education, the concept of "free" learning is embodied all the time. The common belief of humanists is that everyone has the ability and motivation to tap their own potential. Therefore, they pay special attention to people's self-realization. Individuals are free to choose the direction and value of their own development and are responsible for the results of their choices. Carl Rogers, an American humanistic educator, divides learning into meaningful learning and meaningless learning. The former refers to material that can be understood by learners or is valuable and worth learning, while the latter is the opposite. He believes that the core of the discussion of learning principles is to let students learn freely. Therefore, he puts forward the "student-centered" theory of "non-directive" learning. He always emphasizes the "non-directive" principle of teachers and the "autonomous participation" principle of students, and emphasizes the independent status of students in learning. Mobile students can learn freely what they can understand, what they are interested in or what is worth learning through mobile devices anywhere and at any time with the help of wireless networks. In such a free and advanced teaching environment, teachers treat students with the three principles of sincerity, trust and understanding, respect students, and give students full freedom, so as to promote students' all-round development.

5. Functions of Mobile Education

In the whole teaching process, mobile education can provide all-round services for teachers and students, so that teachers and students can learn anywhere and at any time. The main functions of mobile education are:

Browsing teaching resources. Through mobile devices connected to the Internet and mobile education network, teachers can browse the required information in the sea of online resources, and students can instantly grasp all kinds of new and old knowledge.

Discussion. In the mobile education system, a virtual classroom is set up for mobile students to form discussion groups to discuss the topics proposed by teachers. Teachers can watch and participate in students’ discussions.

Questions and answers between teachers and students. When mobile students have any questions, they can ask mobile teachers through wireless devices instantly. Teachers can answer them immediately after receiving information. When mobile teachers ask mobile students questions in the teaching process, they can also receive students' answers immediately.

Searching information. Mobile students can query their grades, learning situations and other information through the mobile network; mobile teachers can query students' homework submission and students' learning situations through the mobile network.

Receiving notifications or reminders. When mobile teachers need to issue notifications or remind students, they can immediately issue notifications through mobile network or mobile SMS. No matter where the students are, they can receive notifications and reminders in time. For teachers, they can also receive teaching notifications or reminders from schools in time, no matter where they are [12].

On the basis of the growth of modern communication and network technologies, mobile education provides the feasibility of real-time interaction and cross-regional communication for teachers and students, and also provides convenience for lifelong education.

6. Application Model of Mobile Education

6.1 Mobile Education Model Based on SMS Service

According to data released by the Ministry of Industry and Information Technology on December 25, 2012, by the end of January 2013, the number of telephone subscribers in China had reached 1,403.2 billion, including 1.12 billion mobile subscribers and 280 million fixed-line subscribers. The sum of the two has exceeded the population of mainland China. Everyone has a cell phone, but not everyone has a computer. People use mobile terminals for a longer time, and use PCs for a shorter time. China's mobile phone network has comprehensive coverage and many users, which is conducive to the development of short message based mobile education.

Generally speaking, the short message service connecting WAP Internet resources provides character-oriented transmission, and its data communication is discontinuous and non-real-time, so this communication model cannot achieve the browsing of the website. This mode uses short message interaction mode to realize short message transmission among users and between users and Internet servers. The user sends short messages to online teaching servers through mobile terminals. The teaching server analyses the short messages of the user, transforms it into a data request, carries out data analysis and processing, and then sends it to terminals. Short message service can be used as an effective assistant means of teaching, and it has been widely recognized because it transcends the barriers of time and space as its edge. Mobile education based on short message mainly includes two kinds, Short Messaging Service (SMS) and Multimedia Messaging Service (MMS), which are more suitable for teaching activities with less communication data and simple text.

6.2 Mobile Education Model of Movable Memory

Since the 21st century, the development of mobile memory (such as USB drives, mobile hard disks, MP3, MP4, etc.) has been more rapid, and hardware has developed by leap and bounds year by year. Although mobile memory cannot be networked anytime, anywhere, but because of its lightness, portability and large storage capacity, we can download the required learning resources to the memory in advance, and learn as we want. Whether it is electronic dictionary or learning machine manufacturers, mobile learning products and their supporting resources have been issued in the past decade. More than 200 manufacturers, such as Noahedu, Mingren, Instant-Dict, are providing this kind of products in China at present. Due to the appropriate price of this kind of products, it plays an important role in the application and promotion of mobile education in China.

6.3 Mobile Education Model Based on Browsing and Downloading Services

According to CNNIC's latest "40th China’s Internet Development Status" statistical report, as of June 2017, the number of mobile Internet users in China reached 724 million, and the dominant position of mobile Internet has gradually strengthened. The usage of desktop computers and notebook computers has declined. Netizens increasingly concentrates on mobile terminals, and the scale of mobile netizens has continued to expand. The convenience of mobile devices to access to the Internet has lowered the threshold for the Internet and become an important force driving the growth of new netizens. With the development and popularization of 4G mobile phones and palmtop computers, educators and learners can browse, query and download various information resources in WAP servers and Web servers anytime and anywhere through the mobile education model based on browsing and downloading services. They can also communicate in real time and achieve various educational activities by installing multimedia software (such as Wechat, QQ, MSN, etc.) in mobile terminals.

6.4 Mobile Education Model Based on Blog

Blog is a personal "Reader's Digest" in the network era. It is a network diary with hyperlinks as its entrance. It represents a new way of life, work and learning. This model has the characteristics of convenience and interaction, and is favored by educators. With micro-blog as a buoy, micro-bloggers (educators) can display mobile learning content to their followers (learners) by publishing texts, pictures, videos and the like. At the same time, followers can browse, repost, comment and share,

which further strengthens their knowledge, and can display the use and attention of mobile education resources in real time. Through WAP or APPS, it ensures vividness, high efficiency, three-dimensionality and sociability. Learners and educators can effectively complete the interaction and learning process through the functions of micro-blog, achieving good learning results, strengthening the interaction between learners and educators, eliminating the sense of distance, and thereby realizing mobile education.

6.5 Mobile Education Model Based on Streaming Media

This model pays more attention to the interactive interests of the learners in the learning process, and pursues the fragmentation of learning content. This model has overcome disadvantages like the mismatch between traditional media and mobile learning resources, single process and so on. It can transmit multimedia files in real time, save resources greatly, and have strong flexibility in content and forms. Among them, the representative streaming media learning includes MOOC and so on. This learning model is cherished by learners, for it arranges its content regularly, highlights key points and difficult contents, provides lecture downloads and enable repeated study, thereby having a high utilization rate [13].

7. Conclusion

Mobile education has begun since the late nineteenth century. Mobile education projects need to be developed and gradually popularized. With the continuous promotion of big data, cloud computing, mobile Internet, the continuous improvement of mobile communication network environment and the further popularization of mobile terminals, Internet education is like a tsunami sweeping across the whole field of education, and with the maturity of mobile e-commerce, it forms the trends of mobile terminals. From the great mobile education market and users' scale in China, we can see that the mobile education industry is a thriving industry and a fertile land to be reclaimed urgently. However, with the rapid development of Internet and information technology, mobile education is also developing rapidly. Nowadays, various kinds of mobile education applications are constantly emerging. Online service providers such as New Oriental, BaiCiZhan, ZuoYeBang, and ZhiDao have sprung up. Especially, the technology of photo search promoted by ZuoYeBang is eye-catching. Tencent's signature product Tencent Classroom is well known, and MOCC China, Youdao are popular in users. With the gradual integration of mobile education of phones, PDA and other palmtop computer devices, through GSM and GPRS technologies, making full use of the Internet and WAP network, modern education embraces a new world.

References

[1] W.y. Yang:Exploration of Mobile Learning Framework under Lifelong Learning Theory , China Distance Education, Vol. (2013) No. 4,p. 78-81.
[2] C.L.Ye,F.Y.Xu and Jun.Xu:Review of Mobile Learning, Research on Audiovisual Education, Vol. 131(2004) No. 3,P. 12-19.
[3] L. Tao: Research on the Current Situation and Development Prospect of Mobile Education , Journal of Jilin Institute of Education, Vol. 25(2009) No. 5,P.26-27.
[4] W.Q,Sun: Proficient in Struts: Java Web Design and Development Based on MVC (Electronic Industry Press, China 2004),P.9-10.
[5] J. Liu: Foreign Mobile Education Research, China Education Network, Vol.(2007) No. 4,P.62-64.
[6] Information on http://www.blog.edu.cn/.
[7] Q.J. Sui, Y.P. Zhang and J.B. Zhang: Mobile Education: A Review of Practice Studies at Home and Abroad,Educational Exploration, Vol.158(2004)No.8, P.66-67.
[8] X.C. Wang, Y.S.Li and R.H. Huang: Measurement tools and surveys used by middle school students in mobile learning equipment, Research on Audiovisual Education,Vol .190(2009) No. 2,P. 97-101.
[9] R.H. Huang:Mobile Learning-Theory, Trend and Current Situation (Science Press, China 2008), P.83-88.

[10] Y.M. Xie, L.Y. Yu:Current Situation and Realization Model of Mobile Education ,Educational Technology Guide, Vol .(2006) No. 1,P. 6-8.
[11] X.H. Chen: Modern Educational Technology(Beijing University of Posts and Telecommunications Press, China 2009) ,P. 24-34.
[12] L. Yang: Research and Design of Mobile Education Model, News world , Vol .(2008) No.3,P.71-73.
[13] T.H. Liu: Research on Adoption Factors of mobile education in the Internet + era (MS, Yunnan University of Finance and Economics, China 2017), P.11.

Attachment:

Author's brief introduction: Ye Xiaolu, male, born in 1974 in Zhengyang County, Henan Province, teacher of Information Construction and Service Center, Sichuan University of Arts and Science, experimenter, master, research direction : the theory and practice of educational technology. E-mail: 66523362@qq.com Tel: 18782800016.