OPEN PRAXIS

INTERNATIONAL
COUNCIL FOR OPEN AND
DISTANCE EDUCATION

Build optional digital textbooks for distance learners

Du Ruo & Yang Xiaotang
OER Division, the Open University of China (China)
dur@crtvu.edu.cn & yangxt@crtvu.edu.cn

Abstract

E-books seem to be a trend and an excellent solution for mobile learning lately, but what kinds of e-books are good fit for distance learners' needs? For the purpose of offering open, more appropriate, better in quality, more convenient and flexible learning materials for distance learners. From 2011, through an experimental study on the basis of research on mobile learning ubiquitous learning and any-media, a research group at the Open University of China started to explore a new type of e-books, named "digital textbooks," sampling three experimental courses for trial; mainly getting results in four areas: definition, tools, technology and functions. The experiment is still in progress, the learning pattern centering on digital textbooks is still being explored. In conclusion, how we support different learners successfully in a digital age depends on significant ways on how well we use those new media and new technology when building smarter learning materials and learning environment.

Keywords: digital textbook; learning material; media; mobile learning; ubiquitous learning

Introduction

The rapid development of new media, wireless network technology and mobile computing technology promotes booming and gradual maturity of mobile learning (hereafter called m-learning), providing relatively complete material basis and technical environment for the research and development of newly developing learning model of ubiquitous learning (hereafter called u-learning); and the development of technology pushed the reform of educational theory forward while the development and reform of the theory widely provided a firm theoretical foundation for the implementation of u-learning.

To realize the u-learning in the environment of Open and Distance Education, we explore a new kind of learning media, or a new kind of learning material combination, which is with complete content of one course able to upgrade dynamically and which can take on different patterns with on demanded styles and constantly improving aided learning function (Bennett, Maton & Kerfin, 2008). The students can read through various terminals. It can be used under various environments such as off-line and on-line, and is able to provide necessary resource support for m-learning and u-learning in the future. Is it an e-textbook? Has it replaced the printed textbook? Through what kind of technology can it be implemented? What is the function and how can it apply to teaching?

In November, 2011, the research group on development and application of digital learning materials in the context of u-learning of the Open University of China (hereafter called OUC), on the base of preliminary study and practice, allied with technology team of R&D Center for Knowledge Engineering of Beijing Normal University, aiming at the current situation of the development and application of learning materials of OUC and in view of the idea of the any media, put forward the compose of building "optional" and "new type of learning material" for distance learners. Furthermore, we selected three experimental courses including PHOTOSHOP Image Processing for trial (Small & Vorgan, 2008). Exploring how to realize the integration of information technology and education in building course learning materials at such a comparatively microscopic field, in order

to provide more appropriate, better in quality, more convenient and flexible learning materials which are accessible at every time and place for learners; exploring the any media in the context of the regular pattern of digital learning materials building, so as to offer some adopted ideas and cases for the enhancement of the quality and efficiency of building, and the enhancement of the whole ability of the building team.

The evolution and analysis of distance learning resources

The development of media technology have made human's reading habits change, promoted the update of teaching idea and also hastened the emergence and development of new teaching media. In the practice of distance learning, from the printed textbooks, audio-visual learning materials, e-textbooks to Computer Assisted Instruction (CAI), learning package and so on (see Figure 1), on the foundation of mutual complementation and interaction, many kinds of media learning resources made up the organic entirety, in order to provide an important support to distance learning.

Printed textbook is mainly making by paper, then printing to textbook, on which the course teaching content mainly includes basic content, experimental content, instructional content, and learning reference content, etc. (The Open University of China, 2008). Printed textbooks have occupied the leading role for a long time. It is a teaching media that most comprehensively and systematically
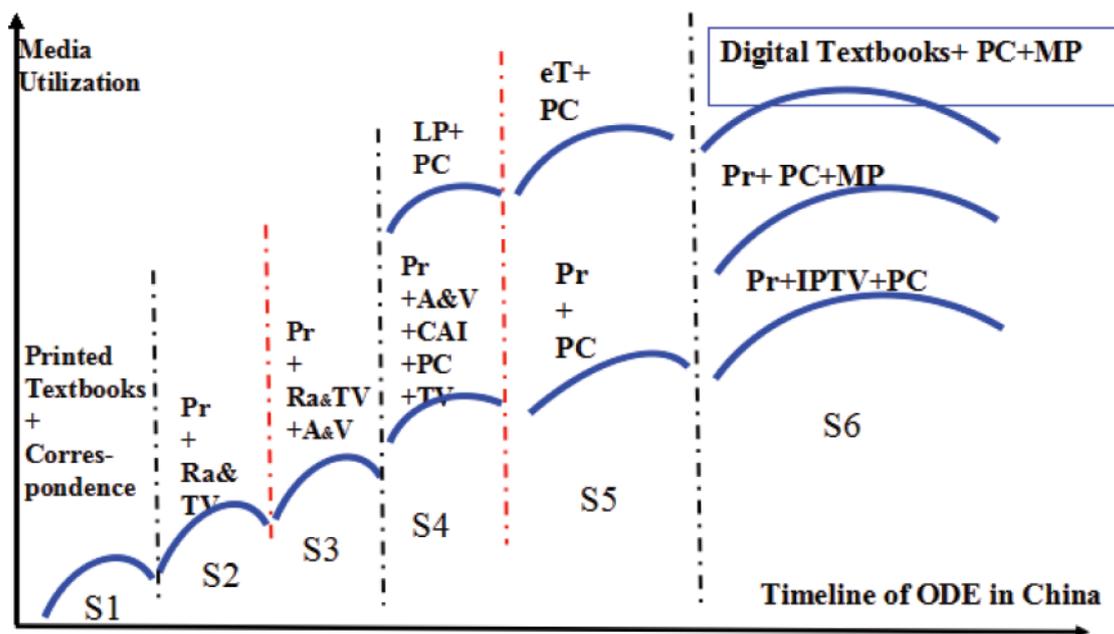

Figure 1: Media Evolution and Development of Learning Resource in ODE (Xiaotang, 2011)

Figure 1 Notion:
  Stage 1. Printed Textbooks+ Correspondence
  Stage 2. Printed Textbooks+ Radio &TV
  Stage 3. Printed Textbooks+ Radio &TV+ Audio& Video
  Stage 4. Printed Textbooks+ Audio& Video+ CAI+ PC online+ TV
      OR Learning Package+ PC online
  Stage 5. Printed Textbooks+ PC on line OR e-Textbooks+ PC online
  Stage 6. Printed Textbooks+ IPTV+ PC online
      OR Printed Textbooks+ PC online+ Smart Mobile Phone
      OR Digital Textbooks+ PC online+ Smart Mobile Phone

contains the contents of teaching, learning guidance etc.; it is the basis and foundation of manufacturing multiple-media learning materials, which can provide a guideline for distance learning, and lead the learners to finish tasks and assessment according to the pre-defined learning path; Results of a survey on the application status of students' printed textbooks conducted by OUC in the respective years of 2007, 2008 and 2012 showed that printed textbooks were still the teaching media which were most widely used, most important and most favorable among students; But with the development and application of advanced technology, its defects has also become more and more apparent, such as contents being not vivid enough, unable to update timely, relatively unitary forms, the two sides of teaching and learning being unable to communicate in time and so on (Chao & Chen, 2005).

After the printed textbook, audio-visual material and courseware appearing in different periods also have its merits and disadvantages, then what the teaching effect will be if to physically combine these learning materials? "Learning package" can be regarded as the representative of this kind of combined learning material. The most typical and the most successful case of application learning package of the Open University of United Kingdom, which is used for distance learning, often contains printed textbook, audiovisual learning material, exercise-book, courseware and etc., which, after overall teaching design, is the new type of combined learning material made up by multiple kinds of media learning material. Based on the course resources of "One College Graduate in Each Village," OUC has developed convenient and practical "course learning package" with high cost efficiency, which includes the course tutorial and textbook for each course, learning guidance for 2 class hours (VCD) or all lecture videos of the lecturer (DVD), formative assessment handbook and assessment instruction, etc. The content and form of combination are relatively flexible and provide remote learners with abundant learning resources and more choices, which to some extent makes up for distance learning loneliness. But the learning package, which physically integrates all kinds of textbooks, still fails to realize the dynamic updates of the teaching content and the live interaction of people-to-people.

Such problems can be solved through online courses and MOOCs, which integrating learning resources and learning activities together and quite popular in distance learning field at home and abroad, now. But it is still too early to conclude the tendency that online courses and MOOCs are able to replace printed textbooks, because the advantages of online courses and MOOCs are more embodied in the interaction of learning processes. However, the structural presentation, media operability and other aspects of learning content are still poor. Moreover, under the conditions of visiting and scanning online course whenever and wherever being limited by network conditions and devices, there is no possibility to access to the network courses when off-line. From the perspective of convenience and availability of access, printing learning materials is stronger than online courses on the contrary. Therefore, we have paid more attention to e-books and electronic textbooks (e-textbooks), with the hope of forming a new learning material through new technologies, which can not only exert the merits of printed textbooks but also help improve their shortcomings and problems (Educause, 2006).

The development of e-book and e-textbooks

- *At the international level*

The integrated application of information technology, especially the popularity of Smartphone's and Pads (tablet computers) provides more possibilities and spaces for thinking to solve the above-mentioned problems (Eason, 2011). Pad has just provided with an appropriate platform (Meurant, 2010). Compared with that of Smartphone, the screen of Pad is larger and this, on the one hand,

makes it easier to operate and on the other hand, enhances visual experience. Compared with keyboard and mouse based computer, touch screen makes human-machine interaction more natural, and is more acceptable for both adults and children. Besides, Pad, as a mobile device, makes it more convenient for learners to use in varieties of environment (Lau, 2008).

Batches of companies such as Inkling, which specially develop various enhanced e-books for Pad, enjoy a huge amount of downloading in App Store and are popular with learners. Learning material publishing magnates such as McGraw hill and Persons have also launched electronic textbooks in succession to broaden their digital publishing market. In early 2013, McGraw-Hill first launched a new e-book named "Smart Book" in CES which is more suitable for students. It can adapt to different learners' learning speed and level: all the readers see the same content in the textbook in their first 5-minute reading. However, later on, with the answers to the reviewing questions in the books, different words or paragraphs would be highlight to prompt the reader where he should take more notice. This type of e-book is able to run in desktop computers as well as tablet PCs using iOS or Android systems, and whether or not getting access to the Internet does not influence its function. Some educational institutions are also studying e-book. Take the Open University for example, it offers free downloadable e-books on its iTunesU channel, meanwhile, it is doing experiment on the application of e-book to teaching, and the experiment has not extended and applied to teaching practice on a large scale yet. The Korea National Open University (KNOU) is also developing and researching the e-book which is based on the hand-held mobile terminals.

- *In China*

e-books have developed through 3 generations: the first generation is e-book 1.0 pattern, and it is the digitization of the traditional paper-based books. The typical models were that the publishers release the electronic version for readers to download in charge mode; e-book 2.0 refers to those native e-books released on the network, and the Cloudary and China Mobile are typical examples; while e-book 3.0 is enhanced e-books containing interaction and games, which is still in its infancy. The e-textbooks can be regarded as a kind of form that e-books apply to the Education fields (Hongbing & Peng, 2001).

In the early times, there were other audio-visual learning materials also regarding as "electronic learning material," such as those relatively complete and system recordings and radios (later became VCD and CD etc.). Zhou Qiong (1998) thought that e-textbooks were just an electronization of paper textbooks. To be specific, they adopted tapes, CDs and network as the carrier of textbooks, and used multimedia technology to enrich textbook contents and patterns of manifestation. Lv Zhenghua (2009) thought that the e-textbook is another version of paper textbook. With the development of the mobile internet, ubiquitous computing and other new technologies, the e-textbook has been given new connotation from its concept to function. In 2005, when accepting an interview, Professor Zhu Zhiting pointed out that through the ways such as changing the media, extend the content and providing the guidance, new electronic learning materials need to break the original subject's structure mode of the course materials, which contains a part of the teaching work of preparing lessons, so as to alleviate burdens on teachers and make them better focus on how to optimize teaching designs and organize teaching implementation (Jing, 2011). From another point of view, students can break through various limitations of traditional written learning materials, change their learning modes and try new ways such as autonomic, inquiry and interactive learning with the help of e-textbooks.

Guang, Zhaohua and Ronghuai (2012) thought that: the e-textbook is a kind of e-book or e-reading which follows the reading habits of students, is good for organizing learning activities, accords with the requirement of course objectives and is arranged according to the styles of

textbooks; it has 5 basic functions: structured presentation, media controllability, notes, assignments and management. In practical terms, e-textbook can be understood as a kind of learning package in line with the rule of education and teaching, its main content should include the text, notes, pictures (static and dynamic), experiments, exercises and so on, and integrate a variety of auxiliary learning tool (such as a dictionary, calculator, a note-book, and some reference books) and some multimedia learning materials on the basis of its main content.

The process of experimental study

After forming the basic notion model that "on basis of the mobile terminal to develop a new learning materials," the research group and the technology team selected the experiment course, three high-practical and skill-orientation courses such as "Photoshop image map disposal" to develop and carry on the experiment of this new learning materials, explore a new way of learning and teaching, curriculum development technology and patterns, norms, standards, and processes of learning materials development, which meets the needs of national open university development, and so on.

Development process includes four stages, which are need analysis, learning design, media development and works release. On the basis of content analysis and learner analysis, we can draw knowledge figure and design learning path. The user experience design centers on the product prototype and has many iterations, including structure and interactive design, presenting interface design, format and layout design, etc. After examination and approval of the archetypal, we should perform a batch of media production, content packaging and works issuing.

- *Phase of needs analysis*

Content analysis and learner analysis is parallel working. The major task of content analysis is to characterize the capacity structure and learning objective of the course, analyze the core knowledge module and typical knowledge type of the course, analyze the relationship among knowledge modules, and identify the importance and the learning difficulty of knowledge of realizing the course objectives.

- *Learning and Designing Stage*

Knowledge points diagramming is based on the content analysis, according to the relationship between mapping rule and representing knowledge, expliciting knowledge level and its close degree with teaching objectives, forming the basic way of content organization. The drawing of the knowledge point graph is the base of learning path design.

- *Stage of system exploitation*

This stage mainly adopts user experience design and this is an iteration process which needs repeatedly review. Form excellent interactive mechanism and use experience by revising the original works repeatedly and presenting content structurally.

- *Works release stage*

Establish connections between digital textbooks and background database, accomplish the deployment of network server and guarantee the reliability and accessibility of the application of digital textbooks. Summarized evaluation plays an important role in revising digital textbooks and accumulating development experience. Knowledge graph runs through analyzing content, learning path design and users' experience design. Learners' analytical result act as the premise of drawing knowledge graph, learning path design and user's experience design which makes the whole

digital textbooks exploitation process not just a work frame of design and exploitation but also a set of logic-related and operative technology process.

In the process of experiment, the research group gradually got clear and united notions of this kind of new learning materials and understanding of their functions, and then reached a consensus. They are going to design a kind of "Digital Textbooks" suitable for remote learners to do selecting learning, which combine the ideas of all-round media and interactive electronic textbooks; they also reach a relative agreed plan for its pattern of building and developing and the following issuance and application.

The notion, functions and technology environment of Digital Textbooks in the background of any-media

The appearance of any-media, web 2.0, the technology of mobile Internet, cloud computing, ubiquitous computing, and other technologies and ideas provides the technical possibility for the intrinsic unification between human's maximum demand of information dissemination and the realistic utility (Shuqiang *et al*., 2009). The spread of any-media not only initiate a revolution of human dissemination: the audiences replaces the spreader and their different needs for information content, tools and means of spreading actually become the logical start point of spreading activities; it also provides more space of possibility and imagination for the field of education, especially the construction of digital resources in the field of distance learning. For example, how to satisfy the learning demand which has more and more diversity and individuation, in order to provide support for U-learning. It helps us to think about the solution for the existing main problems of learning materials construction, to reconstruct the main processes such as learning resource design, production and release; explore a new type of "learning material," which is with complete content, able to upgrade dynamically and which can take on different patterns with on demanded styles and constantly improving assisting learning function. Students can read and access by all kinds of terminals; it can be used under various environments such as off-line and on-line; it can provide necessary resource support for the achievement of u-learning and provide more options for students.

On the basis of comprehensive research, analyzing the development and change of various media learning materials of distance learning courses, domestic and overseas e-books, and electronic learning materials, the research group combined the advantages of media technological development and put forward the concept of "digital textbooks," of which features can be summarized with 3 words: any-media, digitization and optional. The technical supports in behind are any-media, mobile internet, cloud computing, ubiquitous computing, etc. and the development of idea. Mobile internet technology expedites the emergence of new media, let us see the possibility of further enrich the teaching interaction can be used by the media, brings about a series of changes to the distance education in the digital resources construction and application, learning support, education management, provides the environment support for the spread and application of digital textbooks (Piret & Jaan, 2008). By applying cloud-computing technology to construct learning environment, learners can get data synchronously freely in various terminals, and to share with anyone. Cloud computing has good openness and sharing, is helpful to the study of resource construction, sharing and sharing, as much as possible to reduce the formation of a single learning resource island.

- *Concept and application of any-media*

The concept of any-media is not formally put forward in the academic circle, and it comes from the application level of media sector. It came to prominence in the field of domestic news spread around the year 2008, and it gets more attention and is applied in the field of media, publishing. With the

popularization and development of information technology and communication technology recently, it is a new form gradually deriving from the base of the concepts of "new media," "media convergence," "media," "multimedia" and practice in the past. Yao Junxi and Liu Chunjuan (2010) thought that any-media was the integrative application of media form, media production and spread in broad sense; In a narrow sense, based on the development of modern technology and the communication concept of media integration, any-media refers to the comprehensive application of media generated content, media forms, communication channels and modes, ways of media operation, and media marketing.

The core connotation of the "any-media" spread is not only superficially big and complete, and it purses to be small and differentiation. In the context of the any-media, the prototype of the learning materials must be "digital," "digital" contains two meanings, one is the digitization of the traditional media learning materials, another is the learning-materials composed by the original ecological digital media. "Digital learning materials" are the any-media themselves, which are the integration of the pictures, words, sounds, images and paintings, and fit all kinds of spread and application. Meanwhile, it is the base of other media-type learning materials, that is to say, produce learning materials of various media types according to the needs; create printed and video learning material in accordance with the publication requirements; generate presupposition content of network course at PC end, presented as basic learning material for m-learning and u-learning on mobile phones and pads.

- *Concepts and functions of digital textbooks*

Digital textbook is not a new concept (Choi & Shin, 2008). Strictly speaking, it belongs to electronic learning materials, but after research, the research group thinks that "digital" can better reflects that the material compositions are original digital media, namely, picture, text, audio, video and animation, thereby generating other media learning materials from the transformation of digital form, which is the idea of multiple output. Thus, the research group adopted the notion of "digital textbooks." In the context of any-media, the notion digital textbook is defined as follows: It refers to the digital textbook which makes use of the Mobile Internet and the idea of the new media technology, regards the core knowledge points of the course as the basic unit, directly takes on by the digital medias such as picture, text, audio, video and animation etc., carries the course learning goals, teaching basic contents, main learning activities, learning reference contents, exercises and tests, and especially fits students to adopt the mobile terminal to learn and read in various environment (on-line and off-line environment). And it has the following functional characteristics:

- Regarding the core knowledge points of the course as the basic unit, and integrating the digital media like picture, text, audio, video and animation and so on;
- At least providing one most suitable learning path and also other non-linear learning paths so as to make it convenient for learners with different learning needs to select;
- Supporting for multiple output means that the presupposed contents of printed textbooks, video learning materials, network courses and others could be generated on the basis of any-media digital learning materials;
- Dynamic update and human-human interaction could be achieved under the on-line environment;
- Learning functions such as bookmarks, labeling, the study notes, evaluation practice, learning, sharing, hyperlinks, etc. can be realized;
- The main rendering styles are books, magazines and network video;
- Application, spread and distribution can be cross-browser, across different systems and equipment.

In addition, the mobile internet device based digital textbooks possess all functions of printed textbooks. Moreover, they can do what printed textbooks cannot do, such as interaction, renovation, corrigendum, integration and we media; It can also bound learners with their learning process, realize the cloud service synchronization of learning dada, record the learning process of learners, intelligently analyze the learning achievement of learners and imaging present the analytical result, and it can combine with teacher's ideas to provide learners' study with guidance and help.

- *How to understand "optional"*

Firstly, "optional" reflects in the design idea of digital textbooks, as far as possible to decompose major learning content of the course into little knowledge units or knowledge points, then logically select and scientifically combine the learning content and learning strategy of knowledge points with learning media. Designing modularized and structured system of learning materials aimed at different learners and providing excellent optional multiple media learning materials, fully exerting advantages of all kinds of media, which can improve learning effect and efficiency. Designed with the idea of "optional," digital textbooks have optional learning contents. Learners can select corresponding knowledge to study according to their foundation and needs; Media are optional. Learners can choose to study by watching videos, listening to audio or reading texts; the learning path is optional. Learners can learn by linear path, namely, the optimal path and can also learn by case learning or other paths. In terms of the subscription of printed textbooks and digital textbooks, it is also optional. Learners can choose to subscribe the printed textbooks or the digital textbooks based on the mobile devices in line with their own reading habit to study.

- *Development tools and technology of digital textbooks*

EPUB standard. The manufacture of digital textbooks contents should conform to the industrial standard EPUB of international digital publishing, and the latest version is EPUB 3, supporting HTML 5, CSS 3 and JavaScript, etc., consequently makes E-learning materials support the cross-platform interoperability among different reading terminals. Moreover, the content, presentation and the appearance have consistency. In October, 2011, International Digital Publishing Forum (hereinafter referred to as IDPF) formally identified the EPUB 3 standard. EPUB 3 content is based on the strict or extensional HTML 5.

HTML 5. HTML 5 technology is used to replace the HTML standard versions of HTML 4.01 and XHTML 1.0 that were formulated in 1999, which is still in developing stage, but most browsers have supported some technologies of HTML 5. HTML 5 has two main features: first, it strengthens the expressing performance of the webpage. Secondly, add Web application function to local database. When talking about HTML5 in broad sense, it refers to a set of technical combination including HTML, CSS and JavaScript. It hopes to decrease the plug-in-based rich internet application (RIA) of browser, such as Adobe Flash, Microsoft Silverlight and Oracle JavaFX and provides more standard clusters which can efficiently enhancing network application.

Analysis and Discussion

Many on-line resource developers often make use of original materials, which become learning content based on tablet PC after simple adjustment and edit, for example, remove original network course to tablet PC like Pad after splitting knowledge points according to resources, does it count on digital textbook? We do not agree with this opinion, digital textbooks based on Pad should follow the idea of "precedence of m-learning and design," which should accord with property of mobile Internet and possess at least one or two characteristics as follows:

Seen from the user experience in human-computer interaction, application programs or materials should be specially designed for the touch screen and the gesture, but not just convert from the original mouse and arrow.

○ According to the technology of learning content use, we should utilize some special technology that mobile equipment possesses, such as, inductor including accelerated inductor, near field inductor, camera, NFC and so on (Sung-Moo, 2008).

○ For the adaptability of the devices, the content on screen should self-adjust when the device is conversed or erected. The application of m-learning should be in good effect in either way.

○ In addition, considering digital textbooks in different devices to synchronize updates learning record and synchronous notes, etc. is needed to be taken into consideration, and make learners' user experience seamless.

○ In terms of the design and development of digital textbooks, we should focus on studying how to reflect the above three features, instead of simply removing the on-line contents on homepage (Tan & Kinshuk, 2009). We should adapt to and utilize the features and functions of the device itself, develop more convenient, flexible and interactive learning materials and gradually achieve the transform from digitized to wise learning environment.

Conclusion

The research group only achieved primary development on the research of digital textbooks, m-learning, u-learning, and so on. The above experiment was still unfinished. We have a long way to go on the aspects such as how to lead learners who use digital textbooks into deep learning and how to apply it to practical teaching, and so on. At least now it appears that we are only providing distance learners with one more option when subscribing textbooks, which is digital ones or printed ones, while the learning pattern centering on digital textbooks has not yet to form. But we are convinced about one thing, that is, how we support different learners successfully in a digital age depends in significant ways on how well we use those new media and new technology when building smarter learning materials and learning environment. And we can see the bright future, the digital textbooks of OUC open to everyone who wants to learn.

Acknowledgement

References

Bennett, S., Maton, K. & Kerfin, L. (2008). The "digital natives" debate: A critical review of the evidence. *British Journal of Educational Technology, 39*(5), 775–786.

Chao, P. Y. & Chen, G. D. (2005). Interacting with Paper: Coordinate Systems as Tools to Link Paper with Mobile Phones, *Proceedings of the IEEE International Conference on Wireless and Mobile Computing, Networking and Communication*, 66–72.

Choi, J. I. & Shin, N. (2008). A digital textbook design principle based on the Universal Design for Learning. *Journal of Korean Educational Technology, 25*(1), 29–59.

Eason, G. (2011, October 18). *Digital textbooks open a new chapter*. Retrieved from http://www.bbc.co.uk/news/business-15175962

Educause. (2006). *7 things you should know about ebooks*. Retrieved from http://www.educause.edu/library/resources/7-things-you-should-know-about-e-books

Guang, C., Gong Zhaohua, G. & Ronghuai, H. (2012). E-textbook: Definition, Functions and Key Technical Issues (in Chinese). *Open Education Research*, *2*, 28–32.

Hongbing, M. & Peng, Z. (2001). Understanding and practice of electronic teaching material (in Chinese). *Journal of Tarim University of A cultural Reclamation*, *9*, 35–37.

Jing, C. (2011). *Research on design and application of dynamic textbook: a case study of National elaborate course in modern distance education* (in Chinese), 7–9.

Junxi, Y. & Chunjuan, L. (2010). Concept discrimination of any-media (in Chinese). *Journalism & Communication*, *6*, 13–16.

Lau, J. (2008). Students' experience of using electronic textbooks in different levels of education. *Scroll, 1*(1). Retrieved from http://fdt.library.utoronto.ca/index.php/fdt/article/view/4907/1768

Meurant, R. C. (2010). The iPad and EFL Digital Literacy. *Multimedia, Computer Graphics and Broadcasting, 123*, 224–234.

Piret, L. & Jaan, M. (2008). What Is Important in Electronic Textbooks for Students of Different Achievement levels? *Computers & Education*, *50*, 1483–1494.

Qiong, Z. (1998). Multimedia electronic textbook realizes opened up learning (in Chinese). *Open Education Research*, *5*, 34–36.

Shuqiang, J., Siwei, M., Shiliang, Z., Shuhui, W., Chunxi, L., Qingming, H., Xilin, C. & Wen, G. (2009). Development report of multimedia technology (in Chinese). China Computer Institute (2009). *2008 Development Report of China Computer Science and Technolog*y. Beijing: Mechanical Industry Press.

Small, G. W. & Vorgan, G. (2008). *iBrain: Surviving the technological alteration of the modern mind.* New York: Harper Collins Publishers.

Sung-Moo, J. (2008). Leading Future Education: Development of Digital Textbooks in Korea. *12th UNESCO-APEID International Conference Quality Innovations for Teaching and Learning*, 3.

Tan, Q. & Kinshuk. (2009). Client mobile software design principles for mobile learning system. *International Journal of Interactive Mobile Technologies*, *3*(1), 32–37.

The Open University of China. (2008). *Technology norm of learning materials of the Radio and TV universities*. Beijing: China Central Radio and TV University Press, 10–30.

Xiaotang, Y. (2011). Ubiquitous learning: theory, pattern and learning materials (in Chinese). *Distance Education in China, 6*, 69–73.

Zhenghua, L. (2009). Tendency of e-textbooks and the scheme of digital publishing. *Research of textbooks, 2*(2)*, 112–118.