Research of One Mobile Learning System

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Abstract—With the development of computer network technology and mobile communication technology, a new kind of distance education mode, Mobile learning (M-Learning), was created. Mobile learning can provide learners with the maximizing learning autonomy, and also can provide the instructors and education administrators with more flexible teaching and managing methods. Mobile learning is a complicated engineering and faces many problems which need to be solved. The most important precondition of mobile learning is to develop the mobile learning system. In this paper, a new definition of Mobile learning was described and the features of Mobile learning were introduced. Then the framework of one specific mobile learning system was designed, after that nine function modules of the mobile learning system were mentioned, and some function modules of this Mobile learning system were expatiated.

Keywords-mobile learning; system; framework; modules

I. INTRODUCTION

Mobile learning (M-Learning) is one new learning mode that users can use the mobile communication terminals to assist them to learn. Mobile learning is formed in the background of knowledge exploding, it syncretizes the characteristics of modern education thought, computer network technology, mobile communications technology and multimedia technology, the essential of mobile learning is the mobility of mobile terminals, Mobile learning breaks through the bottleneck of traditional distance learning and digital learning, extends the scope of network multimedia distance education, even the learners can not use the cable network, they can obtain the resources of network multimedia distance education through the mobile terminals to learn.

Mobile learning can provide learners with the maximizing learning autonomy, and also provide the instructors and education administrators with more flexible teaching and managing methods. And the lifelong learning can be realized through the mobile learning. We can say that mobile learning is the future of distance education.

Mobile learning is one of the engineering which is huge and complex. The development of mobile communications and computing technology is the indispensable foundation and guarantee for the implementation of mobile learning by which can design and implement the mobile learning systems and systems. However, the mobile learning system is neither to achieve all the functions of the traditional distance learning systems and systems, nor the repetitions of the existing learning systems. With the guidance of the theories of mobile learning and the basis of studying the technology of mobile development, we should fully consider the identity of mobile equipment and design a learning system and system which possesses the mobile learning characteristics.

How to bring Mobile learning into effect? The most important precondition is providing one multifunctional mobile learning system to learners.

The rest sections of the paper are organized as follows. In Section 2, a new definition of Mobile learning was given and the features of Mobile learning were introduced. In Section 3, the framework of one specific mobile learning system was designed. Section 4 shows the eight function modules of the mobile learning system, and each function module of this Mobile learning system was expatiated. And the last section is the conclusion and future work of the research.

II. MOBILE LEARNING

A. Definition of Mobile Learning

In his book, The future of learning: From E-Learning to M-Learning, Doctor. Desmond Keenan indicated that the development of M-Learning will make students more free in D-Learning. No matter what they are in airport or anywhere, they can learn if they want. Beyond doubt, the next generation of D-Learning will be M-Learning.

Mobile learning is the rudiment of Ubiquitous learning. Ubiquitous learning is one kind of learning that learners, whoever, wherever, whenever, can be obtained with the need of anything (information) according to need to learn.

There is no uniform definition about M-Learning still. We analyzed the definition of M-Learning in literature [1] by Alexander Dye and the viewpoint in literature [2] by Clark Quinn. In this paper, we present the definition of M-Learning as follow. Mobile learning is a kind of learning that learners can study anytime and anyplace with the mobile terminal instruments. The mobile terminal instruments must present the information which learners' requests efficiently, and must provide the interactive communications among instructors and learners.
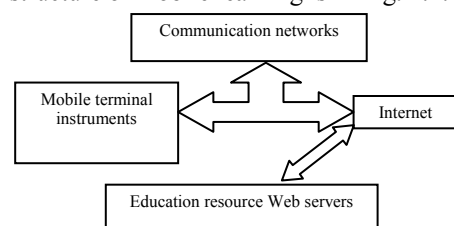
The structure of mobile learning is in Fig. 2.1:

Fig 2.1 Structure of mobile Learning

The Applicable objects of Mobile learning are Favorite learning method of Young and adults, anyone in any place in autonomous learning, Cell phone users without enough understanding of the computer, office worker and rural areas learners.

B. Features of Mobile Learning

There are four fundamental elements in mobile learning, learners, instructors, teach contents and the teaching methods. All of them have the same feature Mobility. Compares with the traditional learning methods, mobile learning has following features:

- Mobility. As long as within the areas covering the mobile telecommunication network services, the learners can study anytime and anyplace. By the same token, the instructors can give their teaching information anytime and anyplace, and also can revise, renew the teaching resource database anytime and anyplace.
- Real time. If learners have the needs to get some knowledge, by using some technical methods, the learners can get those knowledge at once. So M-Learning is a real time learning method.
- Interactive. By using mobile terminal instruments and the services of mobile communication, both learners and instructors can communicate each other real time; So M-Learning is very interactive.
- Virtualization. The instructors can create the virtual classroom, virtual instructors, and the learners can create the virtual class. The relationship between the instructors and the learners are dynamic and virtual.
- Digitization. The teaching resource of digital multimedia, the system of network and the mobile terminal instruments, all of them determined the digitization of M-Learning.
- Individuation. M-Learning can provide the individual services according the learners' needs and the features of the subjects.

III. FRAMEWORK OF MOBILE LEARNING SYSTEM

The framework of mobile learning system is described as Fig.3.1 .the whole mobile learning system has three sections; they are presentation layer, business logic layer and data layer. The presentation layer is in the client, business logic layer and data layer are in the server.

A. Data Layer

Data layer provides data sources for the applications. The data layer of the mobile learning system includes user information database, learning resource database, teaching information database, homework supporting database, questions database, Blog information database and game database.

In user information database, not only the basic information of students, teachers and administrators, but also the processing information of students learning and instructors teaching are stored. In learning resource database, there are mobile learning courseware, electronic lesson plans, e-books, dictionaries and other mobile learning software. In teaching information database, all of the following information are included, various kinds of

educational administration information, teaching trends and online courses information such as the name of the class, the teacher, the course credits and the course introduction, etc. homework supporting database stores all kinds of data which is uploaded by outdoors users, Questions database stores the questions from students and the answers from teachers. Blog information database stores the data such as articles, pictures, criticisms and so on. Users can get all kinds of educational games in game database.
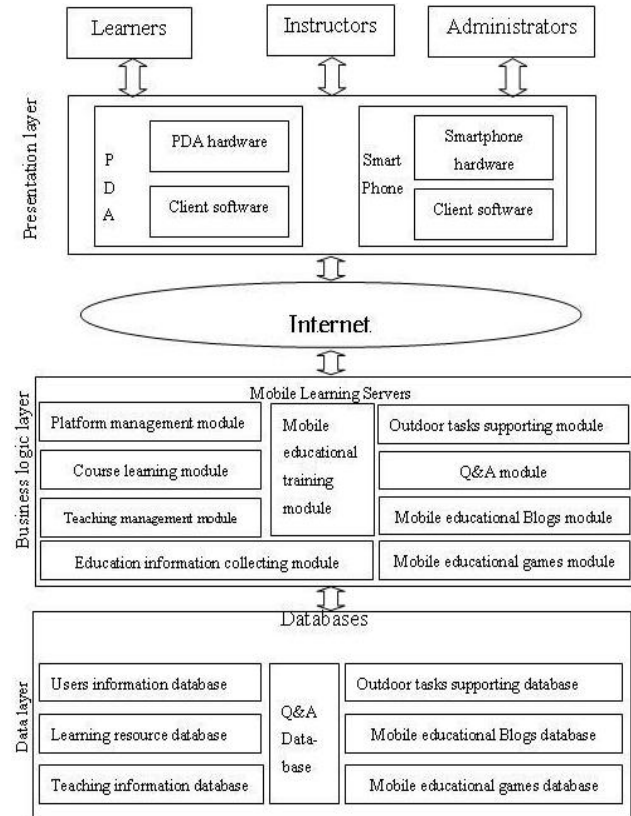

Fig.3.1 Framework of mobile learning platform

There is something we should mention here that learning resource database is open for learners, it is updated according to certain choice mechanism. We can see its choice mechanism in Fig.3.2:
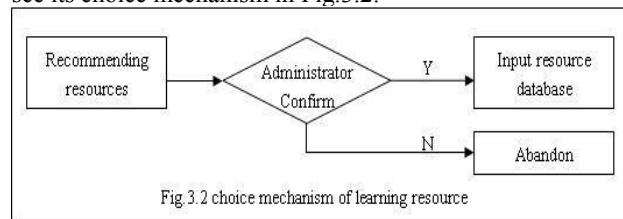

Fig.3.2 choice mechanism of learning resource

B. Business Logic Layer

Business logic layer is the main part of the whole mobile learning system; the services of the mobile learning system are encapsulated in this layer, it has the responsibility to deal with the application requests of the presentation layer and to make logical estimation of the result, if the logical estimation is legal then the data is invoked by the system from databases, and deal with the data, at last the results are return to the presentation layer.

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There are nine function modules in the business logic layer of the mobile learning system including system management module, course learning module, mobile educational training module, teaching management module, education information collecting module, outdoor tasks supporting module, Q&A module, mobile educational Blogs module and mobile educational game module.

C. Presentation Layer

The presentation layer is interactive interface between users and system, its responsibility is to deal with the dialog between users and system. The client mainly includes two kinds: intelligent mobile phones and PDA (Pocket PC), each of them is composed by their respective hardware and software.

For the modules using application programs (C/S structure) of Smart Device, the client software mainly is client application programs of the mobile equipment operation systems and browsers. Users visit mobile learning system server through the browsers and return the data to the browser s according to their requests. The communication between users and results is implemented by running XHTML, WML, and JavaScript in browsers. The presentation layer provides separate different user interfaces for students, instructors and administrators.

IV. FUNCTION MODULES

Mobile learning system mainly provides learning services for mobile users through the mobile terminals. Therefore, mobile learning system should incarnate the characteristics—mobile and provide particular functions of mobile learning system following the principles and mobile learning theories of mobile learning. In this mobile learning system, we designed eight feasible functions including course learning, teaching management, education information collecting, mobile educational training, outdoor tasks supporting, Q&A, mobile educational Blogs and mobile educational games. In addition, students log in the system through the function of registration and logging in, instructors and administrators manage all the modules of the system through background management function, the two functions belong to system management module.

In here, we described emphatically the following modules as below:

A. System Management Module

There are three kinds of user types of the mobile learning system: students, instructors and administrators. Firstly, users' registration and authorization is set and managed by the system management module. Secondly, instructors and administrators can manage the whole mobile learning system through system management module. According to the implement technologies, the foreground of the system is composed by application programs of Smart Device and the Web application programs of browsers. Instructors login the system to manage the background of the system and manage students information, students learning resources, instructors can upload test and practice resources, manage the teaching information, answer questions. Administrators have the highest level authority; they have the authorities to set and

maintenance of the system besides all of the functions of instructors.

B. Course Learning Module

Course learning is the main function of any kind of learning system including the mobile learning system. The aim of course learning of the mobile learning system is the same as the E-learning system, but mobile learning is through mobile terminals to carry out learning activities, so we must fully consider that those methods of the mobile learning are individual, spontaneous and portable; must consider the hardware and software characteristics of mobile terminals, so the course learning of mobile learning is designed for those knowledge points whose content can be split into small ones. The main present method of information is text with few pictures and animations.

So when choosing the types of mobile learning resources, we should consider the following preferred kinds likes: Web courseware, E-teaching plan, E-book, Electronic dictionary, etc. so the functions provided by course learning are including mobile learning resource online browsing, mobile learning resource local operation and learning resource download.

In addition, the instructors and administrators can upload mobile learning resources, and manage the mobile learning resources including delete and modify access authority.

C. Teaching Management Module

Teaching management module is an essential one for learning systems, including the mobile learning system. In the design of our mobile learning system, it provides the following functions.

Functions for students: Selecting courses online, Students plan, teaching evaluation, backup the term data management and receive the notices of teaching activities.

Functions for instructors: applying new courses, managing the information students' courses selecting, modifying courses information, receiving the system information, and managing of teaching evaluation, applying the transceiver mechanism of teaching management information.

Functions for administrators: After log in, administrators can have the functions of visiting and managing the teachers' applications, managing the exist courses, managing students' courses selecting and issuing the system news. To manage students grades and to backup score data and the teaching activities information.

D. Mobile Educational Training Module

In the mobile learning, for the mobile terminals are portable, learners can make full use of various discrete times to learn, these features of mobile learning are very suitable for testing and practice, this module is called mobile educational training module.

The mobile educational training module of the mobile learning system can provide the following functions:

Functions for students: providing online testing and practice, giving feedback and score: recording grades and the learning process information.

Functions for instructors and administrators: setting and upload test and practice, analyzing grades and the learning process information, and treating this as a gist of improving for learners.

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E. Outdoor Tasks Supporting Module

The mobile learning system can support outdoor tasks better, because of the portability, communication function, location function and picture function. Therefore, outdoor tasks supporting module become the excellent module of the mobile learning system. This function is especially suitable for outdoor tasks such as the field investigation information collection of biology, geography and archaeology. For example:

- For the biological field research, the information of the propagation specimen can be recorded, pictured, uploaded and stored.
- For the geographical field research, this function can provide the services to query users' position information, to acquire accurate GPS coordinates and to record the local geographical data. Especially in the exploration of complex terrain, users can carry out the research plan and can communicate the outsides easily and conveniently.
- For the archaeological field research, users can records the information of antiques such as time, place, volume, temperature, pictures and so on by using this function.

F. Q&A Module

Question & Answer module is also the indispensable function module of the mobile learning system. The main feature of the Question & Answer module is real-time and intelligence, this feature is origin from the portability and communication function of the mobile devices.

Functions for students:

- Ask the teacher questions. If some students have simple but urgent problems, they can ask teachers at any normal time by mobile terminals, it is not necessary to ask questions in designated place at designated time. Namely real-time question, real-time answer.
- Automatic reply. Possible questions were uploaded into question database by instructors or administrators beforehand, after students' questions were input, the system searched databases according to the method of matching keywords retrieval, if it found there were some answers for existing similar questions in databases, the system feedback those answers to those users automatically.
- Browsing questions and answers. Students can browse the existing questions and their answers through the system, and can improve from the existing questions and their answers.

Functions for instructors and administrators:

- When there is an emergency problem from students, instructors can answer those questions instantly in the system by the methods of phone or short messages.

- When the concrete number of the students' questions is a certain number, the system can notify instructors to browse.
- The instructor can browse and answer students' questions, and can store those questions and answers in databases.

V. FUTURE WORK

Because the existing researches and applications of mobile learning system are still in the first phase, and because of the limits of time and personal capability, there are many shortcomings in the mobile learning system of this paper, all of them can be the directions of the future works.

The description of mobile learning theory is not further and precise enough. Because mobile learning is strong application system, the theory researches are indigent. As a result, the existing definitions and theories descriptions are not precise enough.

The functions design of the mobile learning is not all-sided. Mobile learning is in its developing phase, so the new applied functions must be design to add into the existing framework according the new needs of users.

The detailed requirement analysis of this mobile learning system is not good enough. We believe that it can be perfected gradually in following researches. So the functions design of mobile learning system will be another research emphasis in the future.

To this mobile learning system in this paper, there are further researches must be done in the future such as the un-implement functions and the tests, modifications, perfects of the implement functions.

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