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DESIGN AND IMPLEMENTATION OF M-LEARNING FOR INCREASING FLEXIBILITY OF LEARNING SYSTEM

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ABSTRACT

Technology of study e-learning represent the form is forwarding of teaching substance which have been tested effective and have old recognized by society. While exploiting m-learning in this time still less and is not maximum. So that still few in number peoples whom recognize m-learning.

This research aim to maximize the network internet as a basic learn to teach by exploiting a application m-learning. The application m-learning also use the conducive technology multimedia in order consumer can enjoy the service m-learning with maximum service.

From research result enable the consumer to conduct the study through service of application m-learning by PDA, handphone and smartphone, GSM, GPRS and UMTS networks. Consumer do not have to come learn to access the items, but enough by access the network residing in network internet. And by using the application m-learning service, accessing of items and information will feel quicker than moment access in a computer or PC which less portable.

Key words: e-learning, m-learning, multimedia, selular

I. INTRODUCTION

Communication technology grow rapidly nowadays along with human needs. Almost in every activities communication technology is needed. Recent technology development aimed for ease human activity. Information technology development for learning purpose still growing frequently and rapidly. Internet mobile is one of methods that still developed in education. In order to used as learning facility for learner, with flexibility and accessibility which enables learning style with mobile method or known as mobile learning (m-learning). Multimedia is one of stuff that become public attention and developed by internet industry. Concerning with usability of multimedia facility, learning process with m-learning able to increasing user's satisfaction. In the internet user's side, satisfaction from obtaining good quality multimedia is not easy to get, as long as the content, multimedia delivery, and speed of internet access still low. As third generation technologies become more widely deployed, mobile data users increasingly experience ubiquitous global network access across a variety of heterogeneous GSM, GPRS and UMTS networks. Such provision of higher bandwidth in mobile environments promises greater access to rich multimedia content delivered to handheld or mobile devices such as handphone, PDAs, and laptops.

II. THEORY

A. E-Learning

E-learning is one of learning style using electronic devices, such as computer, laptop, or computer network, in order to deliver the material to student (Darin E. Hartley, 2001). E-learning not only put the learning material online, but also include distribute of information, communication, education, training, and knowledge management. Still, the learning process need contribution from teacher actively. So, it will create strong bond between teacher and student.

B. M-learning

M-learning is part of e-learning and distance education. E-learning is a specially organized studying course using electronic technologies-telecommunication and computer network, multimedia CD-ROM, radio and TV, audio/video, interactive TV and other technologies. Particular mark of e-learning is specially organized virtual environment, interactive study materials, self-control tests and study support. E-learning determines computer as technological support all the time. Each person needs a possibility to use computer not only in lecture-rooms, but also in library, laboratories, internship, work place and at home. Sometimes studies could be organized in woods or parks or other places without the possibility of computer and internet support.

C. Multimedia

Multimedia is method for making and integrating text, graphic, audio, animation (picture or video) using computer with integrating link and tools
which enables user to navigate, interact, make new stuff, and communicate. Multimedia makes those activity more alive in giving new dimension through words. Words in multimedia application can be used to trigger for extending range of text for certain topics. Insert voice, picture, music, animation, and video to make it more alive also one of multimedia utility.

D. Mobile Multimedia

Multimedia on mobile is data technology in multimedia file which can run in mobile devices, in video, audio, animation, or data file format, and able to run directly right after the download is finished. Below step by step designing process of multimedia content:
1. Prepare the content along with minimum resource of mobile phone (resolution, file size, easy to access, and attractive).
2. Compress the file without reduce the quality with codec calculations.
3. Trial on mobile phone, with testing several sample content uploading to database via internet.
4. Test the content with internet access (browsing and download).
5. Play the multimedia content on mobile phone.

![Fig. 1. Multimedia accessing process](image)

E. Codec

Codec is abbreviation from coding/decoding. In video context, codec means a method or algorithms which contained in access player for compressing and decompressing video file. This is including in digital art science. Because of that, many part need considered if want to perform compression-decompression media file. Result of this system is website, wapsite, and quite interactive m-learning application. With facility contains learning material, good feedback in learning is expected. Below will described design of m-learning application. But before move further, it is necessary to explained about m-learning system specifications.

III. METHODS

A. Mobile Network - GSM

GSM - (The Global System for Mobile Communications) is the most popular mobile network in the World, also in Latvia. GSM network is based on frequency division multiplexing, with each mobile transmitting on one frequency and receiving on a higher frequency. Also in GSM single frequency pair is split by time-division multiplexing into time slots shared by multiple mobiles. Each frequency band is 200 kHz wide, as shown in Fig.1. A GSM system has 124 pairs of simplex channels. Each simplex channel is 200 kHz wide and supports eight separate connections on it, using time division multiplexing. Each currently active station is assigned on time slot on one channel pair. Theoretically, 992 channels can be supported in each cell, but many of them are not available, to avoid frequency conflicts with neighboring cells. Transmitting and receiving does not happen in the same time slot because the GSM radios cannot transmit and receive at the same time and it takes time to switch from one to the other.

![Fig. 2. GSM uses 124 frequency channels, each of which uses an eight-slot TDM system](image)

The TDM slots, shown in Figure2, are part of a complex framing hierarchy. Each TDM slot has a specific structure, and groups of TDM slots form multi frames, also with a specific structure. A simplified
version of this hierarchy is shown in Fig.4. Here we can see that each TDM slot consists of a 148 bit data frame that occupies the channel for 577 μ sec.

Each data frame starts and ends with three 0 bits, for frame delineation purposes. It also contains two 57-bit Information field, each one having a control bit that indicates whether the following Information field is for voice or data. Between the Information fields is a 26-bit Sync field that is used by the receiver to synchronize to the sender’s frame boundaries.

As can be seen from Figure 3, eight data frames make up a TDM frame and 26 TDM frames make up a 120-msec multi frame. Of the 26 TDM frames in a multiframe, slot 12 is used for control and slot 25 is reserved for future use, so only 24 are available for user traffic.

B. System Requirements Specifications

In system requirements specifications part will covered about software and hardware system requirements (client and server) which support for making and system operation.

Client Specifications

Below listed the client specifications for implementation of application program:

1. Hardware requirements, minimum mobile phone with WAP browser facility (minimum WAP 1.2), but ideal m-learning system it is recommended use smart phone or at least GPRS supported with VideoPlayer and Quick Office. System requirements for PC (Personal Computer), at least Intel Pentium or AMD with 233 Mhz clock speed and 512 MB RAM, or better specification is recommended.

2. Software requirements, WAP browser, emulator application for access WAP site and which used for this research is Nokia WAP browser from Nokia N79. Those browser can be used for WAP 1.2.1 – WAP 2.0 XHTML implementation. In figure WAP used MicroEmulator from MicroEmu. Afterwards, mobile phone with facility like WAP browser (minimum version 1.2) or 3G supported for XHTML, the internet browser website can be used automatically.

Server Specifications

Below shown the server's specifications in this application program implementations:

1. Windows XP SP2 operating system.
3. PHP, WML and J2ME language programs for making applications.

C. M-learning Design System

Below is the design of m-learning application system which able to fix compatibility and interoperability platform with support 3 kind of protocols: http for PC or notebook, WAP for low memory device, and web 2.0 for today’s device or commonly called smart phone.

Fig. 5.

Model System Design of M-learning

In order to used it, user must register to interactive streaming service first. After the registration is success, the administrator will activated it. After activated user become able to access the service’s features such as discussion forum, lecture, academic news, learning with audio like TOEFL learning or using video streaming which available in this interactive streaming service. Besides that, user also allowed to upload and download the material, which can be performed whenever and wherever.

IV. DISCUSSION

A. Design Result

Result of this system is website, wapsite, and quite interactive m-learning application. With facility contains learning material like English in common use, and another learning material, good feedback in learning is expected.

Below will shown the display design from each sub-website, WAP-site, and m-learning Java applications. But before advanced further, it is necessary to discuss about implementation and system requirement from website, WAP-site, and m-learning.

B. Common Implementation

System Requirements Specifications
Fig. 6. Nokia N79

**Server Specifications**

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**C. System Test**

In this part will covered application program testing in mobile learning system through WAP-site m-learning and m-learning website as application support. With this test, error rate from data processing or system expected to minimalize.

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**WAP-site Page**

In order to run this application, we need to write address from WAP-site to URL (Uniform Resource Locator) WAP-site. For example here is the complete address: http://wap.morning-streaming.co.cc.

From WAP menu display, user need to register before they can access the content. This page is especially designed for mobile phone with limited hardware. Only main point which shown in this page. Available content can accessed directly and send to mobile phone.

![WAP menu M-Learning](image)

**Fig. 8. WAP menu M-Learning**

**D. System Evaluation**

In most of things, this system has been run well in both mobile phone with WAP browser 2.0 and mobile phone with XHTML browser.

For this evaluation performed analysis from several user which directly accessed the website and
WAP-site, and ask them to give the data in questioner sheet. The disadvantage from this system is inability of the WAP-site to run multimedia content directly. Instead, the content need to download first, then it able to run in mobile phone. For secondary option run the whole multimedia content, m-learning website can become alternative, which can be accessed with mobile phone and HTTP full browser support.

E. Questioner Analysis

Data taken from questioner sheet which directly responded by user which previously watch and operate how m-learning work, and test the multimedia facility inside.

V. CONCLUSIONS

From design of multimedia content for m-learning, here is the main point:
1. With PHP, WML, and J2ME technology, we can create m-learning application with multimedia content.
2. Multimedia content able to run in several HTTP and WAP protocol, and the result is depend on each mobile phone system.
3. In multimedia m-learning, a point which greatly influenced the evaluation or result is the content and ease of access from application.
4. The questioner result from of m-learning implementation design and system which has been given to students shown that m-learning get a good response in academical environment.

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