Using On-Line Multimedia with Mobile Device in the 3DIMW

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Abstract: A lot of experts predict the mobile learning is a new way of learning in the future. The primary reason was newly technology invents of information, and networks environment popularize in modern city. 3DIMW was an interactive platform for 3D models transform to 2D graphics learning, developed on 2004. This study was taken into consideration that benefit and weakness of mobile device, then further think to expand present resources useful performance with mobile device, and evaluate feasibility from mobile device access 3DIMW. Through 3DIMW on-line multimedia resources combine with mobile device access evaluate, we submit the conclusion. According the mobile device access test results, the “acceptable” was suitable word to describe present condition, in fact mobile device certainly extend the useful on presented resources, and we should focus on the serviceable parts.

Key-Words: Mobile device, 3DIMW

1 Introduction

Many experts predict the mobile learning is a new way of learning in the future. The primary reason was newly technology invents of information, and networks environment popularize in modern city. Although infrastructure of metropolitan area networks was perfect, but many users carrying a portable computer that want to find an internet access point are the major constraints for learning, mobile communication technologies can support such situations and it can prepare more flexible learning environments for learners [1]. Nevertheless the environment of wireless networks access seamless still have some constraints, but these constraints yearn for solution by WiMAX, which as "a standards-based technology enabling the delivery of last mile wireless broadband access as an alternative to cable and DSL."[2]. In the future these technologies of wireless were certainly enabling to help user on independent time and location for learning.

Except personal mobile learning that many enterprises had project to drive mobile learning to their employee training. Familiar example was IBM that began in 2003 to extensive research into the “future of learning,” an effort to identify what trends, technologies and demands would drive organizations advancement in the future [3]. Another was Stamford, Connecticut-based research firm Gartner reported that by 2010, 80 percent of key business processes would involve the exchange of real-time information involving mobile workers [4].

Bilgin (2006) submit that most of the students enjoyed using mobile technologies in education and they want to use mobile technologies in some courses. Students could easily use the mobile technologies but small screen sizes and limited keypads hindered them from performing the operations. According to study result, the cost of using mobile technologies is quite important whereas the data communication security is not important [1].

MLearning combines the technologies of mobile communications with “eLearning” [5]. Mobile devices included mobile phones, handheld computer, Pocket Pc and personal digital assistance etc. About PDA is a computer-based handheld device that incorporates personal organizer tools. It also has the interfaces to exchange data easily with personal computer [3]. Therefore a PDA should be considered as operating within a different domain to a PC. It is a different type that should not be viewed as replacement for laptops or desktops, rather as useful, lightweight portable adjuncts to these systems [6].
Although mobile device has many advantages but some limitations may constrain useful in the mobile learning. Some recommendations from the literature that were taken into consideration in the current study of design of learning objects for mobile devices included issues such as appropriate text formatting, image reduction, avoiding scrolling, design for a full screen presentation on the handheld [7]. That’s mean presented a lot of web resources didn’t fit for mobile device access, and many website need redesign the access way for desktop and mobile both.

The key limitation of handheld technology for the delivery of learning objects is the small screen that is available for effective display. The smallness of the screen not only adversely affects the clarity, but it also negatively impacts on the acceptance and integration of this potentially useful technology in education [7].

The study was taken into consideration that benefit and weakness of mobile device, then further think about expand present resources useful performance with mobile device, and evaluate feasibility on access way with mobile device.

The 3D Interactive Model Web (3DIMW) was an learning system that mainly functions included on user login management, web module management, 3d models warehouse, animations warehouse, on-line exam, web mail, forum...etc, in 3d models warehouse was an interactive virtual reality environment, the user enable observation these visual models by move mouse to rotation, zoom and pan on their screen. The animations warehouse provide many flash and videos that user could choice download or on-line play for learning [8]. Therefore the 3DIMW was a classical on-line multimedia resource (Access links address: http://www.iccite.nknu.edu.tw/3d/). The figure of 3DIMW portal is show as Fig.1.

![Fig.1 3DIMW portal](image)

The present resources of internet may integrate with mobile service in the future. That’s mean user can through browser of mobile device directly access resources from website seamless. A famous search engine “Google” that had integrated with mobile delivered service for search and mail. Daniel and John (2006) show clearly the key limitation on handheld technology for the delivery of learning objects is the screen size. At this stage availability of relevant guidelines and a solid literature in relation to solution of this problem is very limited [7].

On the other hand, most website on the condition of cost saving considering still can’t support mobile device information delivered in connected seamless. Especially a lot of educational website has same problems. Many users usually hope that solutions are significant improves in the hardware and software of mobile device, not just was transitional application on present stage.

2 Problem Statement with Mobile’s

Although most mobile devices are computer-based appliance, it should not be considered a computer in the same way as a personal computer. Especially most website original design purpose was for use with personal computer or laptop environment. When the user held mobile device through the way of WI-FI connecting to the internet website like Yahoo maybe can’t get same results as PC. That’s because design and useful approach of mobile device is different with the personal computer, it should emphasize the convenience and portable better than PC.

We thought about these issues of above that how enhance present resource useful with mobile device was became this study subject. Therefore this study was based on the present resources delivered of 3DIMW (3D Interactive Model Web).

The 3DIMW was developed aid students learning on drawing course, which is an interactive platform for 3D models transform to 2D graphics learning, developed on 2004, the great useful was delivery many visual models with internet and help user enable access on anytime and anywhere [8]. Although 3DIMW access way was convenient that has constraint with haven't computer environment, therefore when the learner drawing picture at the tradition classroom that wants to refer these resources from 3DIMW would impossible, so the mobile device became the solution.

The 3DIMW was a learning content management system (LCMS) that it could be updates content and data by user on-line setup easily, but some functions...
was design by aspx.net, ActiveX, JavaScript and flash object...etc, these functions should be test if correctly for access with mobile device.

2.1 Mobile learning useful with 3DIMW
The 3DIMW resources delivered was used to by internet from PC, but we expect to extend access way through mobile device. A mainly reason that students can access these resources to help learning when they drawing 3D model and geometry graph to the paper at traditional classroom.

First issue we are considering constructing a wireless environment at traditional classroom for 3DIMW delivered test.

Second issue we are considering accessing validity of 3DIMW through wireless device.

According these issues we will test all functions of 3DIMW by mobile device, and then submit the relevant with solution and feasible application.

3 Methodology and Solution
The primary aim of this study was to evaluate if the tools and features of 3DIMW could be delivered to a wirelessly connected mobile device pilot. Besides, could students access in a usable format, interactive object (JavaScript, ActiveX of cult3D, Flash objects), pages of web, video etc on 3DIMW. The functions of 3DIMW were figure2 on below.

![3DIMW main functions](http://140.127.45.25)

3.1 The Test Tool Choice of Mobile Device
Mobile devices included mobile phones, handheld computer, and personal digital assistance etc. For the specific purpose we have to choice the test tools, by compare with other mobile device, the Personal Digital Assistant (PDA) became main choice finally. Personal Digital Assistant (PDA) is small handheld computers that can provide user with the ability to get salient and current information, thereby promoting mobile learning possibility. Therefore Ted Smith (2003) at the Personal Digital Assistants (PDAs) in Further and Higher Education report submits conclusion that PDAs are important devices that can be used to enhance the learning and teaching environment [6]. In addition the operating system of PDA mainly is Microsoft windows mobile 5.1 or 6.0 professional, it is very kind for use.

3.2 The Wireless Environment Construction
Although many campuses had constructed wireless environment, but following highly bandwidth and communication speed requirement of the user, we still prepare new wireless device of access point for traditional classroom installation and for remove other interferes. The specification of the access point was fit in with IEEE802.11g, 2.4GHz, and 54Mbps transmission rate of WI-FI. Beside the backbone bandwidth of Ethernet internet on campus was based on 1.2 Gbps, it is distribute on all classroom by cat5E cable of RJ45. When the wireless device was installed and setup complete with local LAN of campus, then we can deal with PDA for test, the figure of 3DIMW access way show as Fig.3.

![Fig.2 3DIMW main functions](http://140.127.45.25)
3.3 The PDA Access with 3DIMW

While the wireless environment of traditional classroom was constructed complete, except hardware installation needed to test with local LAN of campus, and the parameter of access point same as hardware needed to set fit for campus environment, because that involving wireless device if works normally, in addition the security consideration of wireless was important, a part of reason cause that 3DIMW management access need password, then next stages job was immediately access 3DIMW resources and test all content accessible through PDA. The table of PDA access result show as Table 1.

Table1. PDA access 3DIMW result

<table>
<thead>
<tr>
<th>Contents</th>
<th>Accessible</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Login Management</td>
<td>A</td>
</tr>
<tr>
<td>Web Module Management</td>
<td>A</td>
</tr>
<tr>
<td>3D Models Warehouse</td>
<td>A.B.F</td>
</tr>
<tr>
<td>Animations Warehouse</td>
<td>E.F</td>
</tr>
<tr>
<td>Flash Animations</td>
<td>D</td>
</tr>
<tr>
<td>On-line Exam</td>
<td>A.B.F</td>
</tr>
<tr>
<td>Web Mail</td>
<td>A</td>
</tr>
<tr>
<td>Forum</td>
<td>A</td>
</tr>
</tbody>
</table>

Remarks: 3DIMW compose content with below.  
A = Web page of apsx.net  
B = ActiveX object of cult3D  
C = JavaScript  
D = Flash object  
E = Video (formats: wmv, avi, mpg, mpeg, asx, gif, etc)  
F = Image

According the result of PDA access with 3DIMW that has some problems of false with 3D models database, animations database, and on-line exam. We try to separate the detail content and one by one do testing, this way is try to find reason of connecting false, the test items with detail content show as Fig.4

The test for three items (accuracy, applicability, effect of vision) was to check the detail content of 3DIMW (ActiveX object, JavaScript, Flash object, Video, Image) which get false at access.

The study is concern mobile device accessible useful in present website, except enable to connect with 3DIMW for resources access, we wish probe the validity on PDA application.

The first test item was applicability that was wanted to probe detail content of 3DIMW if able to access on PDA. The second test item was accuracy that was wanted to probe detail content of 3DIMW if able to operation on PDA correctly. The third test item was effect of vision, same with above items that was wanted to probe detail content of 3DIMW if able to display on PDA correctly. The table of PDA access test items result show as Table 2.

Table2. PDA access test items result of 3DIMW

<table>
<thead>
<tr>
<th>Contents</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Feasibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>ActiveX object</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>JavaScript</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Flash object</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Video</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Image</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Remarks: Test items.  
1 = Applicability.  
2 = Accuracy.  
3 = Effect of vision.  

According the result of table2 that particularly parts was video test, because the video of
3DIMW delivery some formats into PDA, including windows media video(wmv) format and other well-know video formats, but only windows media format and gif format was smooth show on the PDA. A test condition of video was show as Table 3 and Fig.5

<table>
<thead>
<tr>
<th>File name</th>
<th>Camera.wmv</th>
<th>Camera.mpg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display Size</td>
<td>320 x 240</td>
<td>352 x 240</td>
</tr>
<tr>
<td>Video Decoder</td>
<td>Windows Media Video V8</td>
<td>MPEG Video Decoder</td>
</tr>
<tr>
<td>Audio Decoder</td>
<td>128 kbps, 44 kHz, stereo CBR</td>
<td>128 kbps, 44 kHz, stereo</td>
</tr>
<tr>
<td>Time</td>
<td>33 sec</td>
<td>33 sec</td>
</tr>
</tbody>
</table>

Fig.5 Videos and images test with 3DIMW

On the detail content test of 3DIMW that ActiveX object of Cult3D, JavaScript, and Flash object has some problems when access from PDA, the ActiveX object of Cult3D was can’t display anything on the screen of PDA, the JavaScript even if can display something on the screen but the result was incorrectly, the Flash needs download flashplayer6 or 7 to PDA for correct watch. The web-pages design with flash objects had combine web component into pages for flash playing.

Another problem as ActiveX object of Cult3D but that solution was different with Flash object, because the Cult3D was a virtual reality technical, didn’t support format output of video, but we still are able to capture frames from PC by use special tool, like Anicam or GifAnimator, and then transform the capture results into videos for PDA access.

4 Conclusion
This study employed new-specification PDA to access present resources of internet that we expect while connecting with the 3DIMW was seamless and smoothly. According the test results of last section, we will submit the conclusion.

Regarding the test results, we have to say the “acceptable” was suitable word to describe present condition. Although still have some problems must be solve on 3DIMW to make the different content could delivery to different device, and fit with the operating system and related application program, related limitation may disturb application of mobile device. In fact mobile device certainly extend the useful on presented resources, and we should focus on the serviceable part.

Although detail content of 3DIMW access from PDA didn’t everything smoothly, but find out the other method may transform these objects to display on the PDA. As Flash objects that can download and setup flashplayer6 or 7 to PDA for correct watch. The web-pages design with flash objects had combine web component into pages for flash playing.

Further research
Many research reports appear the key limitation of handheld technology for digital content delivery of learning objects is the small screen that is available for effective display, and further effective arrangement of the elements of the interface as well as effective organization of content is the key for successful e-learning environments [9]. Therefore we must thinking about how arrangement and reduce information on the small screen, not just resize some objects from PC transform to PDA, it would be considering about perception and visual of human interactive with computer (HCI), Because that may is the key for successful mobile learning.

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