WebELS E-LEARNING PLATFORM AND PROPOSAL FOR AUTOMATIC VIDEO SUPPORT

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Abstract: This paper discusses video contents in WebELS e-learning platform for post-graduate education and proposes ideas for automatic video support. WebELS provides a web-based, multi-platform tool, by which traditional instructors can archive their learning materials on the web and students can do their personal learning over the Internet. Uploaded contents can be used either in standalone or group learning in real-time with discussion. WebELS supports contents with text, images, audio and video. However, VIDEO, because of its nature and high volume of involved data causes series of problems regarding its capturing, uploading, transmission, downloading, viewing, code conversion, compression and so on. The vision of this paper is to discuss the WebELS editor and propose ideas to support PowerPoint presentation material with video created by standard PowerPoint presentation editor, for example Microsoft PowerPoint with an explanation of video pre-processing and video handling.

1 INTRODUCTION

THIS paper focuses on the pre-processing and handling of video contents of the WebELS e-learning platform and proposes ideas for automatic support of presentation material with video clip created by standard PowerPoint editor rather than created by WebELS editor. Animations, video clips etc. are widely used in presentation to depict any scientific discovery, research result and so on. It is very simple in the case of a stand-alone presentation. But it could be very complicated if it needs to support an Internet-based distance learning system especially in the multi-platform environment. In the postgraduate education environment, distance learning through Internet is regarded as one of the important ways to carry out education activities in a global situation. In such environment education activities are group discussions, presentations in the conference etc. & VIDEO plays an important role of making such discussion, presentation realistic. Web-based learning prevails the opportunity for the students to learn from anywhere, anytime, sitting on their own place realizing the ultimate goal of Internet i.e. virtual reality. Web-based learning brings unprecedented level of accessibility to courses in remote area, courses prohibited by budget constraints, courses updated to recently discovered knowledge, courses prepared by qualified instructors, instructions given by qualified instructors at any time etc. (Ueno, 2002).

But these opportunities come with bundle of technological complexity. Hence, the creation of quality material for web-based distance learning and carrying out full-fledged multimedia supported discussion or presentation through Internet yet remains in the state-of-the-art of research. The primary factor that prohibits the development of web-based course materials is the enormous cost associated with the tools and the number of person-hours needed to produce a lesson (Lawhead et. al, 1997). So far a number of open and commercial systems for web-based learning have been proposed. WebCT (WebCT) provides integrated e-learning systems for graduate education. Its contents can be created by external applications that produce IMS-compliant learning objects (IMS). It can produce sophisticated on-line courses and requires considerable amount of investment in software cost and training. Macromedia Breeze delivers rich web experiences for distance learning, professional development and collaboration (Breeze). It is a rich system that lets user reach their audience anytime

with multimedia content. The Virtuelles Informatik Praktikum project's main focus is to provide an environment for virtual lab classes for computer science students (VIP). TeleTeaching carried out by the University of Mannheim (Tele-teaching) supports three instructional settings i.e. RLR - Remote Lecture Room, RIS -Remote Interactive Seminars and IHL -Interactive Home Learning. Realized by multimedia and telecom technology.

The WebELS system focuses on the on-line material authoring, presentation, and management for asynchronous learning (Kurtz et. al, 2002). It should be noted that the uploaded contents on the WebELS server are used for on-line Internet meeting seamlessly as well. The system allows existing learning materials to be reused again on the web. These materials are stored on the server in a modern and flexible XML format which can be delivered to students in many different ways. Recently, MySQL based storing system is under development, which is supposed to enhance the quality and efficiency of storage and management of the system a step ahead. Unlike WebCT, WebELS is intended to provide traditional instructors and easy way to create or store their learning materials with all the required authoring tools built-in as Java Applet and automatically downloaded from the server. The instructor needs to have only a Java-supported browser. Java Media Framework based video-module of WebELS system has been discussed and with a real example it is shown how video component are pre-processed and presented using Internet-Based WebELS editor. Ideas are discussed for automatic video support.

2 WebELS OVERVIEW

2.1 Background

Difference of characteristics in e-Learning is quite obvious. Two main category of system is needed i.e. e-Learning for under-graduate education and e-Learning for graduate education. Both of the systems have their own characteristics regarding design issues, education contents and so on. e-Learning for undergraduate education mainly deals with management of course registration and students, primitive education and automated evaluation of students knowledge. Education contents for undergraduate education are standardized textbooks. Examples are Blackboard, WebCT, Moodle etc.
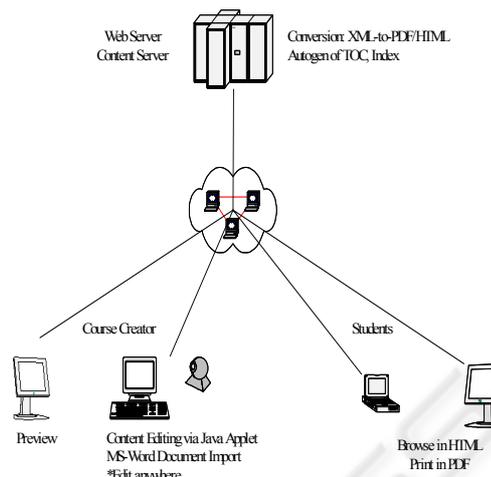

Figure1: WebELS network diagram.

On the other hand, e-Learning for post-graduate is heterogeneous in nature. Issues are fusion of education and research (lecture, research, meeting, conference) ubiquitous of education contents (journals, reports, video materials) meetings/ seminars, symposiums, conferences as well as internationalization. Contents are not-standardized, mostly personal contents. Design policy involves fusion of asynchronous and synchronous features with powerful authoring tools for self-learning and Internet meeting Supporting distributed and internationalized education in multi-language. WebELS provides contents-shared e-Learning for post-graduate education.

2.2 Design Concepts and Goal

- e-Learning system designed to meet the requests of postgraduate education: Ph.D program is the main target of use
- Supporting seamless service of asynchronous and synchronous e-Learning: Asynchronous self-learning and synchronous Internet meeting using same contents
- Multi-OS system: Supports both Windows users and Mac users at same quality
- Powerful authoring features for end-users: One-click uploading editor for Power Point, pdf, audio/video contents
- Multi-language interface to support international use: Automatic selection of English (standard), Japanese, Chinese, etc
- "Anywhere, anytime & anybody" system: Java- based system to support a variety of usage
- Open-source system

2.3 Major Objectives

Major objectives of the system are as follows:

- Povide a general purpose e-Learning environment for distributed and internationalized post-graduate education: Distance learning, distance meeting, multi-language, synchronous/asynchronous
- Provide a variety of distance learning functions such as Internet interview, Internet conference, annotation system, on-line whiteboard.
- Provide a powerful authoring feature to assist the lack of other e-Learning platforms i.e Integration to such as Moodle, Blackboard, NetCOMMONS, WebCT etc.

2.4 System Configuration

The author client computer contacts the server and downloads the necessary java tools for editing the course materials. After the program is launched locally on the author machine, the material data is downloaded from the server and the author can edit it on his local machine. This reduces the impact of network delay on content editing. After editing is completed, author uploads the updated data back to the server. In building up the web server and interfaces, the ease-of-use and ease-of-access are the optimal goals. In designing the technical aspects of the system, more attention is given in portability of the system, and reusability of the learning materials. In order to achieve minimal platform dependency, many tools in WebELS have been developed from ground up using Java programming language. This allows to realize a portable foundation with rooms for future expansion. The system attracts international attention and in use at several sites rather than NII such as NIG, Tsinhua University, China, Dhaka University, Bangladesh and so on. As the software is copyright free, every organization download the core version and the related source codes and develop depending on their own requirement. Recently NII provides three versions of the system i.e. WebELS Full version. The conceptual network diagram of the system is shown in Figure 1. The learning materials are kept and managed by the server. Authors and students can access via the Java-enhanced web-based interfaces.

2.5 Functions

WebELS system has three versions, i.e., WebELS (full version), WebELSx (beginners version) and WebELS Meeting (Internet meeting system). Full version was developed first to provide a powerful e-Learning platform for postgraduate education which comprises of different modes of operation. WebELSx is for beginners for further development according to a real user's request in a graduate education at Sokendai, the Graduate University for Advanced Studies (Vuthichai, 2006 & Gong, 2006). WebELS Meeting is a software platform for Internet-based distance meeting and interview, etc. WebELS consists of two main modes, i.e., Learning mode and Editing mode. These functions provide following features. Note that WebELSx is designed for novice users by means of simplified user interface, where both functions are combined in a unified manner.

Asynchronous mode in WebELS is for doing self – learning by students. The users of learning mode are classified into two types: guest and specific user. Guest users can access public contents without registration in the learning mode. Specific users can access non-public contents after logging into learning mode. In the learning mode, contents are consisted of various types of courses. Each course is indicated by the title, author, update time, category, media type, etc. Each course can be displayed on the computer screen or printed out. The courses in WebELS can be one (or combination) of the following primitive types: (1) Formatted text with different typefaces, colors, languages; (2) Still image in the following formats: JPG, GIF, and PNG; (3) Animation such as GIF Animation; (4) Embedded and On-Demand Streaming sound; (5) Embedded and On-Demand Streaming Video Clips. There is a searching function to locate the course quickly.

Usually on WebELS, contents can be presented to the students using one or combination of the following delivery modes: (1) A single HTML page; (2) Multi-page HTML for slideshow presentation. Each slide may correspond to a SECTION in the content; (3) Video presentation; (4) Multi-Modal-Synchronize video presentation with slides, side-by-side; (5) PDF hardcopy; (6) On-line Internet meeting. Multi-page HTML is used to divide a lengthy content into smaller studying units, each can be finished in a reasonable period of time. A navigation bar is provided for the users to navigate through the slides. For efficient content management
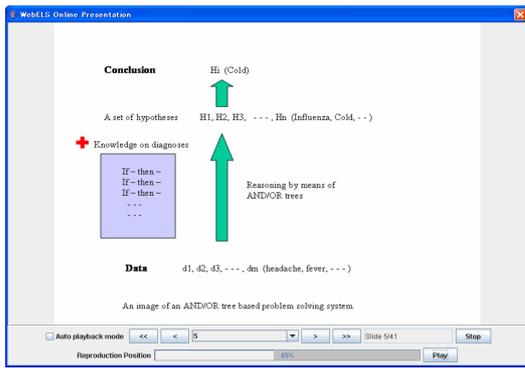
Figure 2: Self learning in asynchronous mode.
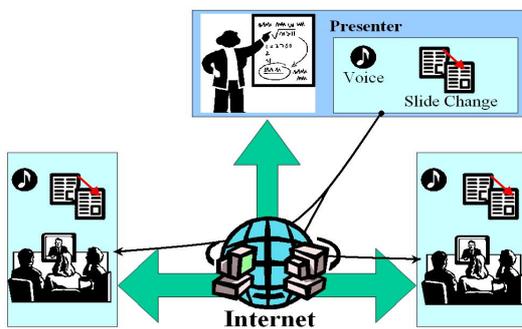
Figure 3: Meeting version.
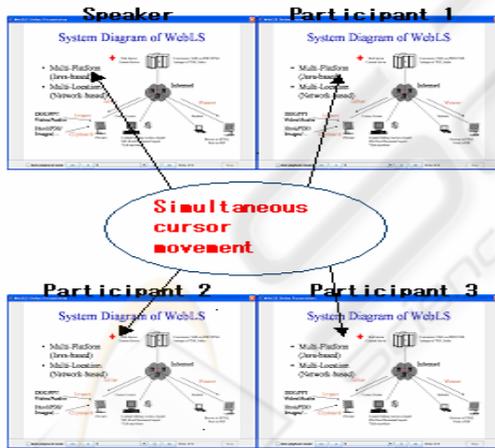
Figure 4: Simultaneous cursor movement.

MySQL based database system is under development. Figure 2 shows the example of a course downloaded for Asynchronous self-learning. It shows slide no. 40 of 61 slides and the bar on the top shows the progress in sound by 16% that is synchronized with cursor. If Auto playback mode is checked, the slides will change automatically one after another.

Using WebELS Meeting multi-sites on-line meeting is available over the Internet by sharing Microsoft® PowerPoint® content. It is shown in Figure 3. Internet-based interview is available by using WebELS Meeting as well. Microsoft® PowerPoint® contents can be prepared using a usual Microsoft® PowerPoint® system, and then can be uploaded to the system by means of "Create a New Content for Presentation" located under the Contents List. Password could be attached to the contents if needed. Changing of slides can be controlled by the speaker by clicking "Speaker On" and control bar.Speaker can be switched by clicking Speaker icon at the next speaker's site. Voice line can be chosen from usual telephone line, Skype™ and VoiceLine of the system. Current VoiceLine is available in a limited condition. Shared Whiteboard system is available, to discuss and work on the Internet. Finally, an advanced presentation mode is provided in WebELS, called on-line Internet meeting. It uses the function of client synchronization. That is, it allows teacher to make real-time presentation with group of students over the Internet. As long as teacher and students open the same course saved in WebELS, the teacher can control slide which can be changed synchronized in the student's computer.

Teacher can also use a pointer to indicate the contents in the slide. This pointer can be synchronized appeared and moved in the student's slide. It is shown in Figure 4.

3 WEBELS VIDEO MODULE

3.1 Video Pre-Processing

To date, JMF (Java Media Framework) supports limited video formats as described in (JMF). Also it supports some specific Codecs. So, some pre-processing may need to make it applicable to WebELS video module. Currently, WebELS support .avi video format in Windows/Linux or .mov video format in Macintosh OS with cinepak codec by radius. Once the video is pre-processed using any OS, it becomes versatile i.e. it can be uploaded and viewed in any Operating System. Here, an example is given to pre-process video so that it could work fine with WebELS video module. If the .avi file doesn't have cinepak codec by radius suitable for WebELS editor, it can be done by VirtualDub what is a freeware. It is available at: http://www.virtualdub.org/ (VirtualDub)

- **Step1:** Download and install VirtualDub on your PC.

- **Step 2:** Start VirtualDub, double clicking on VirtualDub.exe file.
- **Step 3**: Open video file and from pull down menu of **video** select **compression (ctrl + P)**
- **Step 4:** There are many options of video compression. Out of them select Cinepak Codec by Radius and press **OK** as shown in Figure 5.
- **Step 5:** Save the file using **save as avi (F7)** of the pull down menu of **file** with a new name or it can be rewritten on the same video file. Here original codec of the file will be replaced with new one.
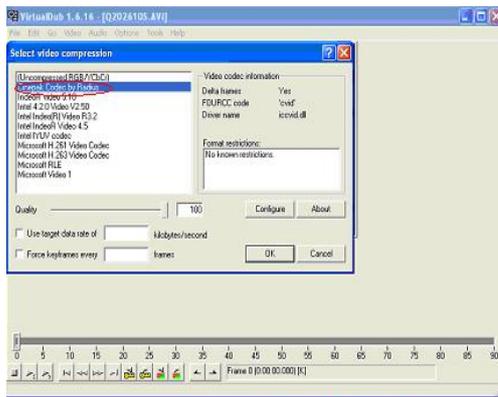
Figure 5: Codec selection.

3.2 Video Handling

As WebELS is completely based on java platform, JMF based media player plays an important role to handle video contents. Media player is embedded in the Applet and starts on a single click. For experimental purpose we used the WebELSx version of the system. To produce a presentation material with video contents we have to follow the following steps.

- **Step 1:** Create new course: After log in as a user in WebELSx version the interface will come out. Different options are here regarding a course. One can view, edit, export, copy a course in the list. To create a new course one has to click on "create new course" button.
- **Step 2:** Select a type of slide to add: There are several options of adding a slide such as PDF, IMAGE, PPT and VIDEO. To create a video slide we have to check VIDEO button.

- **Step 3:** Template selection: There are several built in templates for creating a slide with video. As the user often needs to add annotation or image to describe a video, the template has a variety of selections to add image and texts.
- **Step 4:** Background selection: To choose a suitable background, one can use customised background colour from pop up colour selection pad
- **Step 5:** Adding video, annotation and image: In the selected template upper left corner is for image, upper right corner is for image annotation, lower left corner is for video and lower right corner rectangle is for video annotation.

A complete video slide edited with WebELSx editor is shown in Figure 6. It contains Video with sound, image
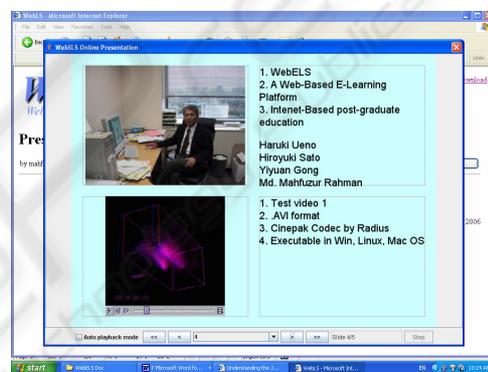

Figure 6: WebELSx edited slide.

and text annotation. Video content uploading, downloading, viewing etc. are tested in WinXP, Fedora Core Linux and Macintosh OS. Format of the video file is in .avi format with cinepak codec by radius. The size of the file is 690KB. It uploads very fast on a single click and playback on the Java Applet as shown in Figure 6. It is tested with different web browsers such as Internet Explorer in WinXP, Mozilla in Linux and Safari in Macintosh.

3.3 Proposal for Auto Video Support

Video module of WebELS doesn't support video directly if the presentation file is created by standard PPT editor, for example, Microsoft PowerPoint. The limitation is due to the fact that the slides are opened as PNG image file and the video portion appears as a still image as shown in Figure 7. However, if the presentation file is edited with WebELS editor in that case it supports video with power point as shown in Figure 6. WebELS users obviously want to

open and present PPT file that may contain video. In this section ideas are discussed so that WEBELS could supports PPT automation for video.
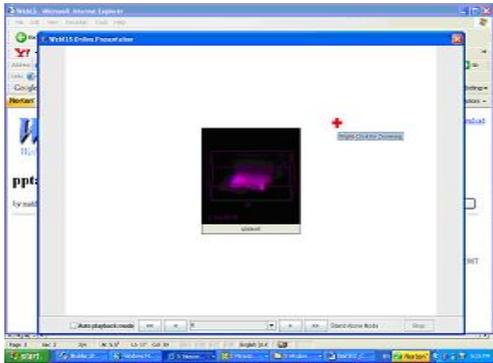

Figure 7: Slide containing video.

The proposed ideas can be summarized as follows:

- **Step 1:** Open the specified PPT file and insert video using the present module of inserting video as shown in Figure 6.
- **Step2:** Save as HTML so that the elements of slide will have hyper link.
- **Step3:** Check the slides whether any of them is having link to video. HTML format should also contain the size and location of video.
- **Step 4:** If there is a link to video, then just put video on top of slide image.

4 CONCLUSIONS

This papers contribution is in detecting the limitation and proposing probable solutions of video contents with a discussion of video pre-processing and video handling. The existing video model supports some of the well know video formats but it has limitation to directly support ASF i.e. Advanced Streaming Format Media. With some format and coding conversion, however, it is possible to apply the existing module to a wide variety of video contents. Further extension of the module is possible making it applicable to ASF. Standard PPT edited embedded video support system is under investigation.

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