

Web-Based Synchronized Multimedia Lecturing

Kuo-Yu Liu

National Chi-Nan University, Taiwan, R.O.C.

Herng-Yow Chen

National Chi-Nan University, Taiwan, R.O.C.

INTRODUCTION

Over the last decade, the emerging Web technologies have opened a new era for distance education, where online courses can be created and accessed in a very easy way not previously available. Many online courses based on HTML pages thus are now available in cyberspace for synchronous or asynchronous distance learning (Anderson, Beavers, VanDeGrift, & Videon, 2003; Gregory, 1999; Muller & Ottmann, 2000; Shi et al., 2003; Siddiqui & Zubairi, 2000). However, without the support of multimedia, the static HTML pages can only serve as different kinds of simple “dumb” lecture notes on a network. Thus most students may lose interest quickly and eventually give up self-learning (Zimmer, 2003). Furthermore, this kind of unguided, static HTML pages are clearly insufficient for diverse learning needs and for different knowledge domains. With the dramatic development of multimedia technologies, we can integrate various media and provide students with vivid multimedia lectures on the Web. For example, the presentation techniques of online language courses should stress the importance of multimedia (e.g., voice and video) and document interaction flexibility (e.g., random access and repeated play of a specific speech segment) much more than other courses do (Brett, 1998; McLoughlin, Hutchinson, & Koplin, 2002).

The Computer-Assisted Language Learning (CALL) has existed for a long time and has used the computer technology with advanced multimedia and Web technologies to fulfill a certain pedagogical approach (e.g., listening, speaking, reading, and writing) since 1990s (Warschauer, 1996). The purpose of this study is to explore in what ways multimedia and Web technologies can help, and how they can do so

in our developed system—the Web-based Synchronized Multimedia Lecture system (WSML)—to make online foreign language teaching and learning more effective (Chen, Chen, & Hong, 1999). The WSML system has been applied to online language learning that includes English as Second Language (ESL) learning for Chinese students (<http://english.csie.ncnu.edu.tw>) and enhancement of Chinese for overseas Chinese students (<http://chinese.csie.ncnu.edu.tw>) in National Chi-Nan University.

The advantages of the WSML system are described as follows:

- **Providing different types of materials can enhance students' capabilities in English/Chinese:** The online teaching materials come from two types of language-learning activities (or sources) with which most students are familiar: (1) lectures with teachers' guidance—the recitation or explanation of an article created and/or used in a real classroom process/experience; and (2) self-learning content without teacher's guidance—the Web/Internet resources beneficial to students' learning. The material involved in a real-classroom activity may include instructors' speech (and/or video), HTML-based lectures, and lecturing events imposed on the HTML lectures. The Web/Internet language material can be HTML-based headline news transcripts and the corresponding news speeches.
- **Providing easy-to-use authoring tools can assist teachers to generate multimedia lectures:** In contrast to the static HTML-based documents, authoring a multimedia document requires much time and work. Therefore, the WSML system provides several authoring tools

to assist teachers to create teaching materials, record oral guidance, and capture navigation events without programming skills (Lower, 2001).

- **Web-based multimedia tutoring breaks the limitations of conventional teaching environments:** The online courses provide flexibility for those who are limited by time, distance, or physical ability. Students can choose a suitable course according to their learning situations or suggestions from the teacher. Hence, with the WSML system, students can get adequate practice in listening, reading, and writing.

BACKGROUND

Let's take an English as a Second Language (ESL) course at our university as an example. Instructors usually prepare the teaching materials (e.g., HTML-based reading essays) accessible on the Web for student pre-readings. In class, the instructors use a computer, a microphone, and an LED projector to assist teaching. After opening remarks, the instructors may recite the article to students once at a slower pace before going through other details, such as vocabulary definition and explanation, and so forth. After class, the students are requested to write a reflection on the topic having been taught and to submit the homework through an e-mail or a Web-based submitting interface. Then, instructors receive students' homework, print it out, correct directly on it, and return it back to the students in a later class. This is a model with which we are most familiar and have used for a long while. The computer and network/Web technologies used here are merely to facilitate content exchange between teachers and students.

Imagine that if students could, for example, listen to (and see animated) an online lecture or their own homework as corrected by their teachers, and if a particular text units of the lecture (e.g., keywords and sentences) could dynamically be highlighted in synchronization with the playback of the corresponding speech; students could learn the points more effectively and efficiently. Therefore, the goal of the WSML system is to fulfill the scenarios described above. In what follows, several related works on language learning will be discussed, and the multimedia synchronization issues providing an integrated

synchronized presentation of the WSML system will be investigated.

RELATED WORK

Several language-learning systems have been developed by integrating state-of-the-art multimedia and Web technologies for online language learning. The purpose of these systems is to develop functionalities that support language learning in listening, speaking, reading, and writing skills or online assessment.

Web-CALL (Fujii, Iwata, Hattori, Iijima, & Mizuno, 2000) is an easy-to-use system allowing teachers to add or modify the content of the teaching materials according to their needs. The construction of Web-CALL consists of two units: a Web-page Materials Production Unit (WMPU) and a Learning Support Unit (LSU). The former is a useful tool for teachers to produce Web-page materials without knowledge of programming skills, and the latter enables students to study online language lessons produced by the teacher. Multimedia features such as sound, pictures, and movie files can be attached to a lecture as supplemental materials.

The goal of the Intelligent Web-based Interactive Language Learning (IWiLL) (Kuo et al., 2001) system is to build a networked learning system by integrating language pedagogy, linguistics, computer networks, and multimedia technologies. Two kinds of writing environments in IWiLL are designed to support asynchronous and synchronous writing correction process. The asynchronous writing environment mainly provides functions allowing students to submit essays via the Internet and to examine essays that have been corrected by the teacher. The synchronous writing environment provides functions enabling students and teachers to work on the same essay and to communicate with each other in real-time. In addition, Video-on-Demand technology is also applied in the IWiLL system to support online movie access.

The BRIX system (Sawatpanit, Suthers, & Fleming, 2004) was developed to address the need for a generic language-learning environment that fulfills language-learning activities. Ease of use was important in the design of BRIX, which can yield great benefits to teachers by saving the time and cost of developing courseware. Several functions are implemented for teachers to create teaching materials,

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