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Mini-lectures in Computer Science on the WWW

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Abstract

The task of the Center for Language Research is to provide content-based English language instruction for students of computer science and engineering. As such, we find ourselves at the confluence of many of the streams currently running through the English Language Teaching profession, including English for Science and Technology (EST), English for Academic Purposes (EAP), English for Specific Purposes (ESP), Computer-assisted language learning (CALL), content-based instruction, and multimedia applications in foreign language pedagogy. This paper describes our initial attempts to construct a number of World Wide Web pages where students will be able to study EST, EAP, and computer science topics on their own in a multimedia environment.

Introduction and background

The main task of the Center for Language Research (CLR) is to provide content-based English language instruction for the University of Aizu's students of computer science and engineering. The CLR faculty, however, are not computer scientists. As professional EFL teachers, it is possible for us to assess our students' needs and determine what lexical, grammatical, discourse, pragmatic, and cultural skills will most likely be needed in their future studies and work within the international computer science community. On the other hand, it is highly unlikely that we, as relative computer novices, would be able to present these technical aspects of English realistically and practically to our students. Furthermore, since our students are expected to attend and participate in lectures delivered in English by non-native English speakers, they need to become familiar with any number of accented varieties of the language. Again, the CLR faculty would be hard-pressed to devise authentic presentations of such accented, technical English that our students could use to prepare for future classroom interaction.

Clearly the CLR and our students need some sort of authentic, content- and context-rich computer science material that is adjusted for the level of the students (i.e., basic English *and* basic computer

science material). In an attempt to satisfy this need, the English Conversation Courseware Project team began last year to solicit the expertise of our colleagues in the University of Aizu Software Department and Hardware Department. We began video-taping a series of short lectures on topics in computer science called "Mini-lectures in Computer Science." These mini-lectures are used in Conversation 2 and eventually, when enough videos have been produced, in Conversation 3.

The concept behind this video series is a simple one: The computer specialists who will someday be teaching computer courses to our students are better qualified to present content material to our students than EFL teachers. Furthermore, these video-taped lectures give computer science faculty members the opportunity to introduce key concepts and vocabulary to students before those students actually enter the computer science courses, saving everyone involved time and energy. As for the students, they are introduced to the names, faces, voices, accents, organization styles, and research specialties of the foreign faculty.

The role of the conversation and listening instructors in preparing and presenting these mini-lectures is to create sufficient support materials so that our students, many of whom never interacted with foreigners nor touched a computer before entering this university, are able to follow them and come away with some new understanding of both English and the topics of the lectures. Some of the mini-lectures require a great deal of support material, including full transcripts of the lectures, hard copies of overhead projections, vocabulary lists, directed listening and note-taking activities, and frequent comprehension checks. Other mini-lectures require less of this sort of thing, but all of the lessons built around these videos contain some degree of support.

The only major obstacle to our students processing all of this new linguistic and computer-related information is time. Each conversation and listening class meets only once a week for 90 minutes, for an average of 13 sessions per semester. As a result, there is simply no time to cover more than four to six mini-lectures thoroughly in a semester. In order to make these valuable English computer science resources more widely available to students, we have begun to experiment with ways to put the videos and supporting materials on the WWW. Students will thus be able to read and listen to lectures about computer science in English from nearly any workstation in the university 24 hours a day. In the following sections, we will briefly review the relevant literature on content-based EFL instruction and multimedia applications to language learning, and then outline the steps we have taken to get the first of the mini-lectures on the WWW.

Justification and implementation

Justification: Pedagogical and language acquisition issues Programs aimed at preparing EFL/ESL students for "real" academic interactions (such as taking notes, asking questions, writing summaries, and taking tests on content area material) have been successfully established at other universities. For example, Snow (1993) reports that live lectures by general education instructors at Brigham Young University--Hawaii are motivating for students, who are exposed to authentic academic English in a variety of content areas. This sort of realistic preparation might also serve to lower affective barriers in the learning environment. If the students are already familiar with the lecturers' voices, accents, presentation styles, mannerisms, etc., it is hoped that they will be less distracted by these aspects of the actual course lectures and thus be free to concentrate on the language and content of the lectures

(cf. Christianson, 1995).

Along these same lines, research has shown that foreign language learners at any level of proficiency who are familiar with a given topic have better listening comprehension (Schmidt-Rhinehart, 1994). Furthermore, exposure to video-based material improves learners' listening comprehension and overall linguistic skills because, it is hypothesized, that such material forces learners to process language "on-line," utilizing the rich contextualization possible with video (pictures, expressions, gestures, etc.) (Secules, et al., 1992).

For the most part, the support materials developed by the English Conversation Courseware team are divided into pre-listening, listening, and post-listening activities. Pre-listening activities vary depending on the difficulty of the mini-lecture content and the level of English used in the lecture. All videos, however, are accompanied by lists of key vocabulary words which students must look up (either in dictionaries or the accompanying support materials) before they watch the mini-lecture. Sometimes students are given a partial or entire transcript of the lecture to read before watching the lecture. This serves to provide the background information found by both Schmidt-Rhinehart (1994) and Snow (1993) to be crucial to comprehension. Listening and post-listening activities range from controlled cloze listening to free note-taking, from traditional comprehension questions made up by the teacher to those made up by the students themselves for other students (cf. Tsuda, 1995).

The final pedagogical issue we will discuss here is the appropriateness of using a multimedia presentation on the WWW. As previously mentioned, WWW pages can be accessed at any time by any University of Aizu student, allowing them to direct their own study. In a multimedia environment, we will be able to incorporate the video tape of the mini-lecture (albeit in a smaller format--see below), audio (either with or without the video), and all of the support materials, which will be hyperlinked to each other. This combination of hyperlinked, interactive resources allows users to "participate in their own learning," which is valuable because "[t]he act of choosing what to learn and how to learn it increases motivation and attention, as well as retention" (Ryan, 1995, p. 46). On a more practical level, the WWW offers multimedia capabilities heretofore available only on CD-ROM, an increasingly popular language-learning medium. CD-ROMs, however, while no longer prohibitively expensive to produce, still require a great deal of time, money, and planning to put together (cf. Hinds, 1990). And once the CD-ROM has been produced, revising it or changing its format is a difficult task. Pages on the WWW, even high-quality interactive ones, can be altered relatively easily and inexpensively. And the source files can be written in HTML, a relatively easy mark-up language to master. The following section deals in more detail with other technical issues.

Implementation: Technical issues The following is a description of the process which we are currently using to put the Mini-lectures in Computer Science on the WWW (this description can also be found at: <http://www-ci.u-aizu.ac.jp/admin/make-a-video.html>). In order to follow the same steps, you will need the program `dmrecord` and the following tools:

- soundplayer
- movieplayer
- moviemaker
- moviemaster

- audiopanel
- videopanel

SCANNING THE VIDEO

Use an Indy workstation and a compression option (e.g., Sheliak). Put the video into a video cassette recorder attached directly to the workstation. Start the `videopanel` and the `audiopanel`. Set the input rate to 8khz. Select live video input to monitor your recording. Read the manual page for `dmrecord`. Put your data into `/tmp` because only on a local disk do you have the needed transfer rate. With an `nfs`-mounted harddisk, frames would be lost. Finally, enter the command: `dmrecord -t 100 video,device=evl,comp=jpeg,engine= cosmo -p audio,channels=1/tmp/video.mv`

SCALING AND CONVERTING

The resolution of the original video is too high for existing networks. A recording of 100 seconds of video with TV quality needs around 150 MB, even using a compression scheme like MPEG. To reduce the amount of data there are several options. First the image resolution should be reduced. We use 320 by 240 pixels. This is enough to achieve a certain dynamic. For details, still images can round up the multimedia document. The frame rate can also be reduced, depending on the action in the scene. For a simple recording of a presentation (e.g. hand movement) we used 12 frames per second. For a bouncing ball or a car race, a higher frame rate is needed. Sound data can also be reduced. Here again we used an 8 khz sampling rate for a mono recording of a normal voice and 16 bit resolution. With these parameters, the file size for a 100-second recording can be reduced to around 7 MB. In a local area network under normal conditions the transfer rate is around 80 140 KB per second, so the movie is ready to play after 5 to 10 seconds, which is acceptable if the user is engaged with other things on the Web page. For users working under worse Net conditions, a plain audio file should be provided which has only one-tenth of the movie size.

Start the program `moviemaster`. Specify the input file and output file, and set the parameters as discussed above. The conversion time for 100 seconds of video, even with hardware support, will be 45 minutes. The same program can be used to extract the audio part.

EDITING

The program `moviemaker` allows you to edit a movie. Bad frames can be removed or substituted for with others. This program allows you to do all of the same things to the video that a normal video cassette recorder can do.

FORMATTING

What is a suitable data format? It should be readable on most platforms. Wide-spread formats are MPEG and Quicktime viewer. Both video format supports audio and have similar compression rates.

PREVIEWING

The previewers are xanim and movieplayer.

Progress to date

At the present time, the English Conversation Courseware Project team has five video-taped mini-lectures along with support material for each. We hope to collect a series of dozens of such lectures in the coming years. The lectures we now have are:

- "Queuing Networks" by E. Billard, Department of Computer Software
- "Why are Memory Subsystems so Important?" by O. Hammami, Department of Computer Hardware
- "Virtual Reality, VRML, & the WWW" by J. Herder, Department of Computer Hardware
- "Visualization and Sonification of Methods and the Aizu Supercomputer Software" by N. Mirenkov, Department of Computer Software
- "Nuclear Physics and New Elements" by P. Moeller, Center for Mathematical Sciences

Our prototype pages, including the video, audio, overhead projections, lecture transcript, and glossary of terms from Professor Billard's lecture can be seen at <http://www-ci.u-aizu.ac.jp/Public-Lectures/English/>. These pages are being continually updated and added to, so those interested in observing the development of this on-line EST resource should visit the pages regularly for updates.

Ultimately, the English Conversation Courseware Project team would like to put a number of multimedia resources on the WWW, including video-taped conversations between real students and faculty members in real-life situations (see the Conversation Courseware Project Progress Report on pp. 13-18 of this issue for more details). With practically unlimited potential for archiving and accessing such resources, University of Aizu students would have unprecedented opportunity for self-directed, multimedia-based EST and EAP study.

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