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1. Introduction

The effectiveness of CALL systems has been proven by many previous studies (e.g., Yang, 1997). However, the main weakness of current CALL systems is that most of the video-based multimedia materials treat language as a set of linguistic structures. Thus, language is taught as words and sentences, not as discourse and interaction in context (Duranti & Goodwin, 1992). Another problem in present CALL systems is that there is less courseware for non-native English speakers to learn English for their academic purposes (Jarvis, 1997). Even if some systems provide examples, words, etc., from the academic life, there is no major difference between the support for social language learning and academic learning in their courseware implementations. Since context and cognitive complexity will be the two main factors which affect academic language comprehension. So the current CALL systems cannot meet the academicians' requirements and needs. Therefore, our research goal is to respond to these needs, by building a hypermedia language-learning environment for teaching academic English via the World Wide Web. We intend to find the best ways to organize, present, and index multimedia information to maximize effective academic English learning for academicians.

2. Hypotheses

The learning environment and courseware that will be presented in this work is based on the following five hypotheses derived from our preliminary tests (see, Chen, 2000) and from various other research studies (e.g., Brett, 1998): 1) interaction and negotiation are important features of communication, and therefore of second language learning; 2) the courseware is designed to facilitate second language learners' interaction with the environment, and negotiation of meaning from texts in this context; 3) students learn academic language and content more effectively with the explicit instruction of learning strategies; 4) hypermedia environment with well-defined courseware can play a mediating role between academicians and their context; 5) learning should be active and dynamic.

3. AcademicEnglish: an illustrative system

Based on our hypothesis, we have developed a hypermedia language-learning environment called AcademicEnglish, which contains multimedia material targeted at undergraduate artificial intelligence (AI) and knowledge computing students. The environment allows students with some background knowledge structure of AI and education technologies (ET) in their own native language to learn to express and use this knowledge in English. The subject material for the environment is

topic-based conversations, which came from introductory AI courses. AcademicEnglish consists of a collection of information nodes, which is linked together to create one large, academic English learning document. The nodes within AcademicEnglish can contain a variety of different media such as text, graphics, videos, and buttons. Each node can be activated many times. In addition, we also adopt an advanced student model for the system, which can adapt its components to a given student.

3.1 System structure

The architecture of AcademicEnglish consists of three layers (see figure 1): *visualization layer*, *logic layer*, and *data store layer*. The visualization layer presents the actual learning material and interacts with the user or a group of users through the Internet. The logic layer serves for the processing logic and allows the users to access the teaching resources in the data store layer via the search mechanism. The last layer is the data store layer, consisting of two databases; one is the *teaching resources database*, including video on demand (VOD) files, dialogue files, activity files, expression files, placement test files, grammar files, and learning strategy files; and the other one is the *student model*, in which students' personal data and learning behaviour will be stored. Then, both user and personal tutor can retrieve this information at anytime, from anywhere.

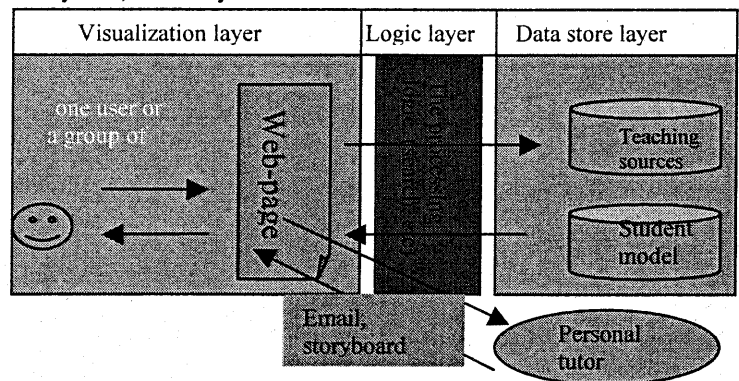


Figure 1: System Structure

Furthermore, during the learning, we provide three types of interactions with the users: interaction between the user and the system, interaction between the user and other users in the same group, and interaction between user and the human teacher.

3.2 Courseware structure

The objective of this on-line course is to integrate language acquiring, content area instruction, and explicit instruction in language learning strategies. The whole courseware focuses on communicative practice in a

specific setting. AcademicEnglish is to deliver teaching information through multimedia in accordance with the improvement of students' listening comprehension and furthermore with their academic language competence.

When this environment is used, in the beginning, registration details, such as name, email address, and history of English learning of the user is required. After the registration, the user has three choices: to access the learning resources, search the course via the VOD search mechanism (*autonomous study*), access the course via a placement test (*automatic study*), or enter the learning course by consulting the personal tutor and making a study schedule (*semi-automatic study*). When the user chooses one of them, the activity with VOD corresponding to the user's choice appears on a newly generated page. After communicative practice, the system will give the user an immediate feedback with some advice, and the user him-/herself can decide whether to continue the study or end it.

Each AcademicEnglish course includes pre-viewing activity, while-viewing activity, and follow-up activity. What is most significant is that academic tasks are presented within a communicative context. With the instruction of learning strategies, students learn how to use academic language to communicate domain concepts and processes more effectively.

Normally, there is an average of 10 hours of online activities in one course, which the user can access and complete at anytime, from anywhere. Through email, storyboard, and discussion center, the user can have a real-life communication with other users or the human expert teacher.

AcademicEnglish is also equipped with some additional features to help improving the students' academic language abilities, including Expressions, Grammar, Learning strategies, and Vocabulary. Moreover, 'metacognitive help' is provided to support the user's learning behavior.

3.3 Dialogue Arrangement

The courseware consists of ten topics in the domain of AI and ET. Each topic is subdivided into several subtopics, and each subtopic has three levels of dialogues. In total, our present courseware contains one hundred dialogues, and each dialogue corresponds to one video resource. The dialogues in a topic are internally presented in a form of a directed acyclic graph that we call knowledge graph. Each dialogue is presented as a small hypertext document, which represents a node in the graph, and arcs define the prerequisite relations between the dialogues. The prerequisite relations are attributes that are defined as video numbers. The inputs of the nodes are constraints to activate the actual node. The nodes have also various kinds of attributes, e.g., language learning points, and language learning strategies.

4. Discussions

In view of our research purpose, the analysis and descriptions we have just offered have attempted to

present the full potential of our illustrative system. Our methodologies involve designing CALL systems based on our hypotheses, conducting empirical studies with students, and building an interactive hypermedia language-learning environment.

Related to the system development, we intend to provide the users with a dynamic, flexible and communicative learning environment. The three types of interactions provided allow the user to negotiate the meaning in her or his academic language competence development. The selection and realization are based on our five hypotheses above.

Related to dialogue arrangement, we adopt an approach of using relatively small, linked knowledge elements, which has many advantages. Firstly, it makes it possible to effectively define specific goals for studying. Secondly, each student's knowledge of each topic can be estimated separately by enabling automated navigation guidance, and thirdly, the hierarchical structure of information is stated explicitly. In a learning context, students bring to bear a variety of knowledge, goals, and strategies. These can result in a considerable variability in the nature of the activity that arises while interacting with computational artifacts. Textbooks are typically designed with a distinct order of topics, and the level of difficulty increases while the students progress through the material. Thus, students with some relevant background can tell how much they can skip to get to the unfamiliar subjects. In hypertext systems, however, the concept of order is reduced. Our intention is to provide different types of access methods so that individual learners can make appropriate choices.

5. Conclusions

In this paper, we proposed a hypermedia language-learning environment based on the cognitive-communicative approach. Our work is in the analysis and design phase and the actual system is in progress. What we need to do in the next steps is to implement the communicative activities, and to build the student model to adapt its behavior to the given student. We also need to continue to develop the collaborative learning functions. Finally, we plan to do real-life experiments to evaluate the effectiveness of our academic English teaching environment.

Reference

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