

***Campus-Network-Based and Computer-Assisted
College English Learning System Development
in China and A Study of English Language &
Culture CAI Matrix***

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Over the past decades, the astounding development in both computer technology and the network has considerably promoted the research and application of language educational technologies. Given the tendency of China's college English education as well as the curriculum requirements dictated by the Ministry of Education of China (2004), it is necessary to develop a CALL system corresponding to China's college English education reality. The paper concerns itself with an analysis of English Language & Culture CAI Matrix (ELCCAIM) developed independently by the practicing English teachers of Foreign Languages College of Sichuan University in China. By analysing ELCCAIM, the paper aims to explore the feasibility and necessity of developing the localized CALL system for China's college English teaching and learning on the base of computer technology and the campus-network and applying the theories of educational psychology and linguistics to the development process.

Key words: the CALL system, campus-network-based, ELCCAIM, College English

INTRODUCTION

With the efforts to find ways of using the computer for foreign language teaching, computer-assisted language learning (CALL) has evolved and gradually developed in China's foreign language education for more than three decades. As computers continue to proliferate in the language education in China, an old question sparking a great interest among language educators for several decades remains open: how can computer technology be most effectively used to improve the quality of language teaching and learning?

As CALL entering a new phase against a background of new development of China's higher education and an unprecedented challenge of the rapidly increasing needs for education in the new era, the computer-assisted language learning (CALL) system has made its way into the foreign language teaching. With an example of the CALL system developed by the practising English teachers of Foreign Languages College of Sichuan University of China, this paper tries to provide readers some insights into the following questions:

- How can we use computer technology to improve the effectiveness of China's college English teaching and learning?
- What are the departure points in devising the CALL system in China's college English context?
- What can be done to bring the CALL system to as maximum value as possible?

It is not the aim of this paper to provide definite answers to any of the above questions nor to debate what the best form of college English teaching should be; rather, it will try to seek an adaptable and feasible computer- and classroom-based multimedia college English teaching model.

THEORETICAL BACKGROUND

In recent years, a large number of research findings on the use and

effectiveness of computer technology in language education appear in China. However, the pedagogical concepts about CALL and CALL programs are comparatively underdeveloped, which sometimes will lead to the miscomprehension of the starting points and the purpose of CALL implementation. A close look at the current CALL program market reveals the fact that good CALL programs are hard to find at the present time, for the integration of “three streams of educational psychology, linguistics, and computer technology” (Miech, 1996, p. 11) is difficult to be achieved. Chapelle (1997) points out that many CALL systems are designed solely or partly by computational linguists whose focus is NLP¹, not the psychology of the learner. This information can serve as a guide in developing CALL programs which aim to help construct a new college English teaching model. Besides fitting into the present condition of China’s college English, this new teaching model, according to McKinney (1999), is supposed to enable teachers to help students with diverse backgrounds, needs, and learning styles to facilitate their learning by giving them options and choices in planning the course, in doing assignments, in ways to demonstrate their learning, and in how they are evaluated, as well as allowing students to pursue their own interests whenever possible.

The utmost importance of theories hardly need to be pointed out when devising CALL programs. Theories “do many things”. Mitterer, Nave, and Mosteller (1990) argue that for CALL materials to be developed effectively, a theory of instructional design, a theory of language teaching, and a theory of language learning must be integrated with a knowledge of how the technology is best applied (cited in Levy, 1997, p. 85).² Levy (2006) states that one thing theories do is to bring certain characteristics into the foreground and push other qualities and characteristics of the language learning process into the background. Theories are selective in what they get

¹ NLP — Natural Language Processing

² Views are conveniently available in Levy (1997). See Mitterer et al., 1990, *Computer-Aided Language Learning: Hypermedia and Direct-Manipulation Interfaces*, cited in Levy, 1997, p. 85.

us to focus on when we use a particular theory.

In view of these facts, at least three major schools of thought are selected when developing the CALL system in China's college English context, namely:

a) Cognitive Constructivist Theory of Learning

The ideas of cognitive constructivism emphasizing "the importance of the knowledge, beliefs, and skills an individual brings to the experience of learning" (Epstein, 2002) have been drawn on in using computers in education. This theory suggests an educational environment in which teachers who guide and do not tell but create motivating conditions and problem situations for students who are the decision makers and problem solvers.

b) Acquisition-Learning Hypothesis

Krashen's acquisition-learning hypothesis has some implications for foreign language instruction. It inspires educators to integrate some features of natural communication into the formal instruction such as creating optimal communicative situations and "[focusing] on using language for meaningful interaction and for accomplishing tasks, rather than on learning rules" (Lightbown & Spada, 2002, p. 40).

c) Humanistic Psychology

According to Miech et al. (1996), humanistic psychology highlights the subjective world of the individual, and emerges in education through areas such as concern for the attitudes, feelings, and learning styles of students. It is the learner who learns and not the teacher who teaches. According to humanistic psychology view, when students are required to take responsibility for their own learning with the help of the computer, they are likely to be more successful and the learning process more meaningful to them.

DEPARTURE POINTS AND CONCEPTUALIZATION OF THE CALL SYSTEM IN CHINA'S COLLEGE ENGLISH CONTEXT

It is not surprising that one will find every CALL program may correspond with one or several unique departure point(s). As Levy (1997) claims that given the essential neutrality of the computer as a tool, the approaches taken to the design of CALL programs have been diverse. An effective CALL program can be looked as an 'architect's blueprint' which draws heavily on field investigations, need analysis, and environment evaluations and should be localized. When designing the CALL system, researchers should consider as many variables as possible such as local conditions, potential users, and desired linguistic learning outcomes, etc. The reason for this is to set specific instead of generalized departure points that conform to the special circumstances. One issue that will be discussed in some depth in this section is the status quo of China's college English upon which two departure points of the CALL system will be built. Then it will outline the theoretical framework and the structure of the conceptualized CALL system for a more accurate picture.

The Status Quo of China's College English

In China's 2,236 universities and colleges, English, as the result of the intensified emphasis, is a required basic course "at all the levels of doctorate, MA, BA and college diploma programs" (Wang & Motteram, 2006, p. 1). Generally, the formal classroom instruction is the main way for students to learn English. There is little doubt that it plays a vital role in college English teaching. However, widely noticeable is the fact that traditional China's college English teaching lags behind the increasingly high demand of society and has been deemed inefficient and ineffective. Almost all universities face the following problems:

a) Time-consuming and low efficiency

This probably is the most visible dilemma facing both English learners and teachers. The time Chinese students spend on English—study lasts 12 to 14 years. Nevertheless, the long study period has not produced rich fruits—the majority of the students end up finding that they cannot reach the expected English language standard, which makes them lose enthusiasm and leads to a new cycle of low efficiency in English study.

b) Large-size classes and one-to-many model

Excessive university student enrollment since 1999 has caused an unbalanced proportion of teachers to students. In 2001, the proportion of college English teachers to students was 1:130 (Shu, 2004). One-to-many occasions are pervasive in China's college English classrooms where students have few opportunities to practice the language and teachers often find themselves ill-prepared to deal with the situation.

c) Impossibility of taking care of student diversity

In China's college English classroom, there is nothing so challenging for a teacher as dealing with the fact that students come into the big classroom with different levels of knowledge, motivation, and learning rate. It is impossible for the one teacher to take account of all these students in such a big class.

How to solve these problems is becoming an increasingly urgent issue facing China's education authorities. College English teaching reform has been implemented for some years, yet the expected goal has far from been achieved. In view of these facts, it is necessary to develop a CALL system on the base of the campus network in order to better deal with the relationship between teaching and learning.

Departure Points of the CALL System: Campus-Network-Based and Computer-Assisted

a. Why Campus-Network-Based?

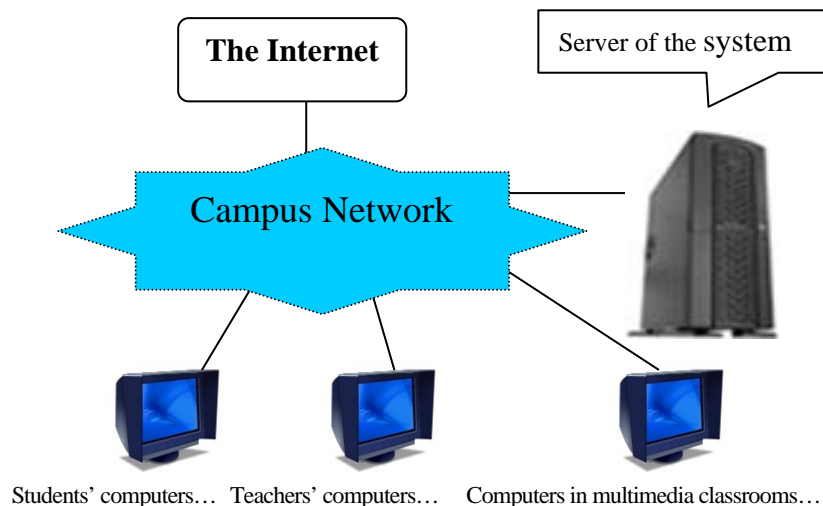
At present time, there are basically three forms of the computer usage—the

form of the single computer, the form of the local area network (LAN), and the form of the wide area network (computer access to the Internet). Comparatively speaking, the LAN mode—the campus network, is the most suitable form for the CALL system. There are at least two reasons for its adoption. Firstly, the single computer system limits itself within the range of one-way interaction between the human and the computer. Secondly, due to the technological restrictions and lack of funds, the Internet mode currently is hardly accessible to users for the wide-area language teaching practices in China. As far as the campus network mode is concerned, it can fulfill the function of the single computer system as well as that of the Internet mode by building a virtual Internet environment of campus-wide scope. Speaking of convenience, the campus network has been widely constructed and used in almost all Chinese universities and is playing an increasingly vital role in education.

Compared with the Internet which has oceans of information, the campus network has its clear target audiences—teachers and students, which means that information given to teachers and students on the campus network is not only in quantity but also target-oriented. Besides, the educational resources are designed and implemented in accordance with teaching plans and syllabus.

Figure 1 outlines a connecting structure of the conceptualized CALL system based on the campus network. The campus network plays as a bridge linking student's personal computers, teachers' computers and computers in multimedia classrooms with the Server of the system. If condition permits, the campus network also can be connected to the Internet. Thus, a coherent virtual entity is realized in the campus-network environment.

FIGURE 1
Structure of the Conceptualized Campus-Network-Based CALL System



b. Why Computer-Assisted?

The computer is deemed as one of the most useful teaching aides. In the tendency that computers are widely used in many pedagogical situations, though worry of being replaced by the computer obsessing many teachers arises, it's widely accepted that the educational use of the computer results in great efficiency. CALL is to help teachers find alternatives to improve the quality of language teaching and reach educational aims. As Gu (2002) states that the short history of using computers in second and foreign language instruction has taught us that [...] the power of the machine lies in how well it gets used and integrated into the daily classroom activities.

Theoretical Framework of the Conceptualized Campus-Network-Based CALL System

There is no doubt that any specific CALL program is involved in multiple domains including educational psychology, methodology, linguistics, and

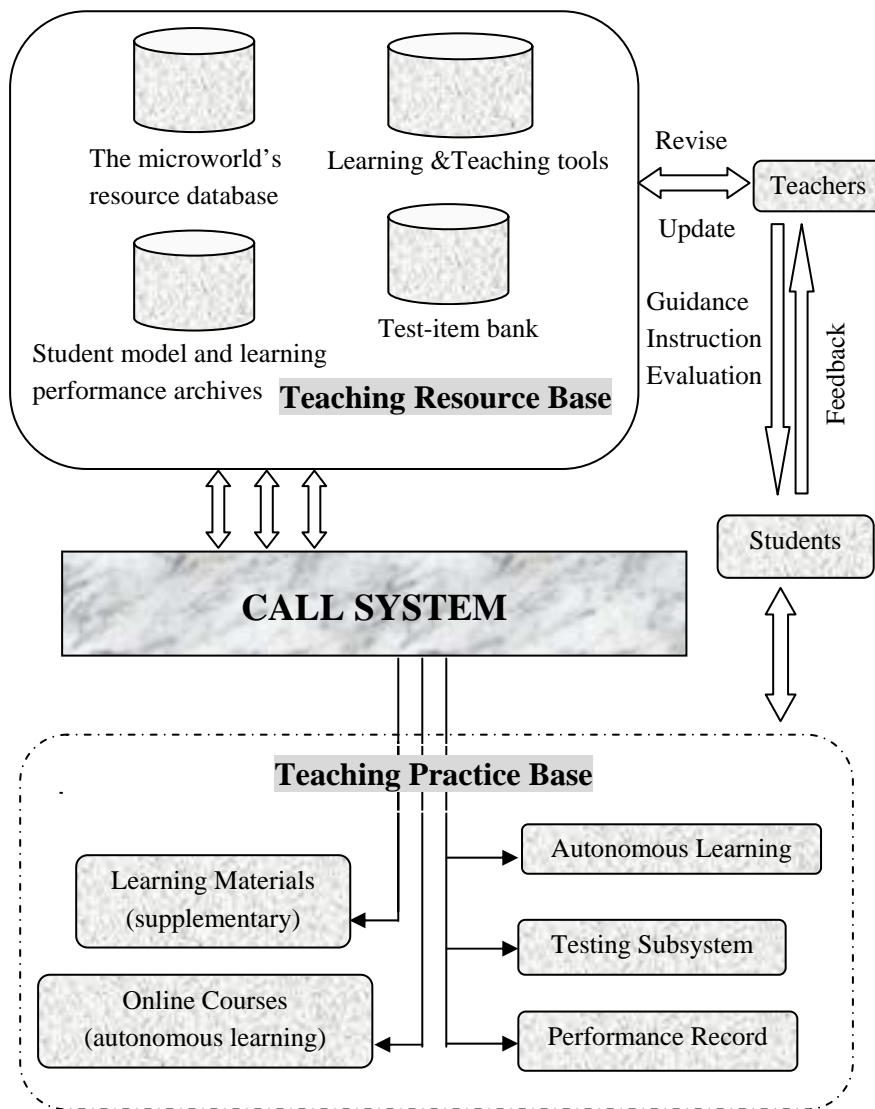
software design in the process of development. Theoretical framework will act as an effective guide in the practice and needs to stand the test of the practice. As an organic whole, the CALL system should consist of such elements as its prerequisites—guiding principles, underpinnings, objectives, conditions of realization and evaluation, which are showed in the following table.

TABLE 1
A Theoretical Framework of the Conceptualized CALL System

Guiding Principles	Promotion of the College English teaching reform
Theoretical Underpinnings	Constructivism, the Acquisition-learning hypothesis, Humanistic psychology
Objectives	1) improve language teaching and learning; 2) foster students' ability of autonomous learning
Departure Points	Campus-network-based and computer-assisted
Evaluation	Formative assessment and summative assessment

In order to acquire an intuitional comprehension of the working parts, a sketch map of the conceptualized CALL system will be presented in Figure 2. There are two main sections: *Teaching Resource Base* and *Teaching Practice Base*, with the latter based on the former. Language teachers can guide, instruct and evaluate students during the learning process with the help of the CALL system. According to the feedback from students, teachers will keep renewing and updating the materials and resources in the *Teaching Resource Base* for the further improvement of the whole system.

FIGURE 2
A Sketch Map of the Conceptualized CALL System



A STUDY OF ENGLISH LANGUAGE & CULTURE CAI MATRIX (ELCCAIM)

The Research Background of ELCCAIM

With the burgeon and growth of educational use of the computer and the Internet, the technological progress has been influencing and will be most likely to keep exerting a great impact on the nature of language learning and teaching. Entering the new era, computer-assisted language teaching and learning have found fertile ground against a background of the China's College English reform. In the context of the informational education, needs calling for individualization rather than generalization, diversity rather than synchronization, and smallness rather than bigness arise. The College English Curriculum Requirements released in 2004 dictate that the new teaching model "should be built on modern information technology, particularly network technology, so that English language teaching will be geared towards students' individualized and autonomous learning" (CECR, 2004, p. 33). The requirement highlights that students with different starting points and learning levels should be taken into consideration and the English class ought to be individual-oriented. The earlier "unitary teacher-centered pattern" of language teaching should and will be remolded by "new teaching models" with the help of the dramatically advancing computer and network technology (CECR, 2004).

Advocacy of integration of computer technology and language education on the one hand, on the other hand, particularly notable is that Chinese English teachers, in many cases, albeit not all, have to rely on commercially available CALL programs. There are some obstacles needed to be transcended. Firstly, there is nearly no real interactivity in most of the CALL programs because of technology restraints. Secondly, some CALL systems' formats and layouts are not user-friendly or arranged with no holistic considerations. What's more, most of the CALL programs available now are commercially designed and developed, which focus on the universality instead of

localization. The programming language stored by those system developers cannot be adjusted to users' needs in the real practice because of the technological and copyright reasons. As Akpınar and Hartley (1996) argue that the material, tasks and feedback comments are pre-stored, and the user has to operate under the control of the program, answering questions or undertaking tasks within highly directed formats. Spontaneous questions or suggestions from the student, or other requests for remedial help are not permitted. Even if the contents or the materials can be amended, the initial concept of the author will remain unchanged and teachers can only rewrite or add on some materials within the given framework.

In actual fact, the real issue facing the language teachers is not whether computer technology should be used in the curriculum but how it will be best applied to the teaching process. Issues of how to take into account the current conditions as well as student personalities and to provide them with favorable environments and facilities for English learning, therefore, have been a big problem facing China's educational authorities. It is necessary to build a campus-network-based CALL system under the guidance of foreign language acquisition theories and pedagogies in order to cultivate students' ability to "study independently and improve their cultural quality so as to meet the needs of China's social development and international exchanges" (CECR, 2004, p. 24). ELCCAIM comes out under the circumstances.

In the light of specific circumstances of the College English teaching in Sichuan University, "with a view to keeping up with the new development of higher education in China" (CECR, 2004, p. 23) and reaching the objective of developing students' ability of autonomous learning and improving their language-using ability, Foreign Languages College of Sichuan University has independently developed a CALL system—English Language & Culture CAI Matrix. It is the fruit of two-year collaborative work of the practicing English teachers of Foreign Languages College of Sichuan University. The foremost goal of ELCCAIM is to help first- and second-year undergraduates attain the objectives set forth by the National College English Teaching Syllabus and provide them with communicative situations where they are encouraged to

engage in linguistic interactions. Acting as a supplement to the formal instruction, ELCCAIM offers alternatives for students to carry out their English study primarily through instructor-led classroom instructions as well as autonomous learning.

FIGURE 3
A Screen Shot of ELCCAIM



Functional Modules of ELCCAIM

Lesson Study

Lesson Study module is divided into eight subparts: e-courseware downloads, assigned reading and listening, selective reading and audio-video resources, self-testing, related information and BBS.

Online Tutoring

This module is the place where students can submit their questions and doubts online. In the form of BBS or chat rooms, teachers may give either direct answers or some relative background information or related websites encouraging students to find solutions through their own efforts and independent thinking.

Learning Guide

There are five sub portions in Learning Guide module, namely: *Grammars for CET³-4 and CET-6⁴*, *Learning Strategies*, *E-Courseware Downloads*, *Idioms*, *Culture Background Information*, *Academic views*.

Special Exercise

This module offers exercises of vocabulary and grammar, reading comprehension, blanking filling and simulated tests of CET-4 and CET-6 for students' self evaluation. These exercises are developed with JavaScript enhanced HTML enabling instant feedback as soon as students submit their answers.

Material Resources

This module includes *text-based materials* (those ready-made texts, audio and video materials and authoring tools) and *online resources* (useful websites and related links & navigations), providing related learning materials for teachers' lesson preparation and students' autonomous learning.

³ CET-4—College English Test Band 4

⁴ CET-6—College English Test Band 6

Forum

Forum module offers opportunities for students to communicate freely and actively with teachers and classmates synchronously and asynchronously.

Online Testing

The online testing system includes six major sections: *system management*, *students' examination*, *test surveillance*, *result query*, *super users* and *system help*. There are altogether 1000 item questions by now among which five standard sections are included, namely, listening comprehension, vocabulary, grammar, reading comprehension and translation (Report of Exam Summation, 2005: 2). The on-line exam system prevents from the illegal replication by using random question-item combination and instant exam results report (including the total score and the score of each part).

Applications

The e-courseware of College English (new version) in ELCCAIM independently produced by English teachers of Sichuan University has been using for undergraduates of Sichuan University and has received positive feedback by both teachers and students. The online testing system for SCET-2 and SCET-3⁵ has been put into the practice five times from Nov., 2003 to Jun. 2005⁶ (Report of Exam Summation, 2005). It is estimated that more than 60,000 students from 56 colleges in Sichuan Province have participated the computerized SCET-2 and SCET-3 tests by Jun. 2005 and the statistics are shown in the following table (Report of Exam Summation, 2005):

⁵ SCET-2/ SCET-3—Sichuan College English Test Band 2 and Band 3

⁶ Data was collected in Sep. 2005.

TABLE 2
Statistics of four online tests for SCET-2 and SCET-3

Date	Num. Of Examinees	Num. of Participating Colleges	Num. of the Passing	Average Scores	Passing Rates
Jun. 2004	7703	27	1492	45.3	19.39%
Nov. 2004	9852	52	1655	44.75	16.7%
Dec. 2004	17075	56	3721	47.9	21.79%
Jun. 2005	28292	55	5044	41.84	17.82%

With the adoption of ELCCAIM, the following main functions are realized:

- To collect, present, store and manage necessary and multiple multimedia resources and courseware;
- To optimize the teaching outcome;
- To lighten teachers' workload from some repetitive teaching tasks and help them prepare lessons with multimedia assistance;
- To extend the study venue from in-classroom to outside-classroom;
- To realize the autonomous learning without the constraints of time and space;
- To promptly monitor students' performances and progress;
- To realize the scientific teaching management.

The system to some extent leads students to take more initiative, assume more responsibility for their own learning, and produce more positive interactions. With the assistance of ELCCAIM as a supplement to the traditional classroom instruction, Sichuan University is striving to create a brand-new teaching and learning environment, which aims to keep up with the new developments of higher education, improve teaching quality and foster students' ability of innovation and practice.

Advice and Improvement

As a matter of fact, every CALL program is never an end product, but should always be viewed as a process. ELCCAIM unavoidably has its own weaknesses and needs to be improved. This improvement question is linked to areas of technology as well as pedagogy. In order to try to achieve maximum effectiveness and efficiency of the system, this section will enumerate some CALL software both inside and outside China for reference and then propose some feasible suggestions for its further improvement.

Diversify Chat Forms and Learning Activities

Evidences show that students conducting electronic discussions will more or less benefit from their full and equal participation in the online discussions with teachers and peers. The findings of a study carried out by Warschauer (1996) indicate that students' attitude toward electronic discussions is 'slightly better' than that toward face-to-face communications in the traditional class. Language learners reported that they could express themselves freely, comfortably, and creatively during electronic discussions, and that participating in electronic discussions assisted their thinking ability, and they did not feel stress during the electronic discussion (Warschauer, 1996). Kramsch and Thorne (2002) also enumerate some benefits using e-discussion in language teaching: "regular interaction with spatially dispersed interlocutors; access to expert speakers of that language of study; increased peer-to-peer interaction, the development of online discourse communities. In the process of informatization, there is a trend that both synchronous and asynchronous online communication varieties will be increasingly used to supplement face-to-face teaching methods in various formal educational settings. So it is rewarding to diversify Forum module—the would-be highly engaging venue, to motivate students' interests in English study.

At present, Forum module simply takes a form of textual threaded discussion. There are no supervisors or clear instructions from the teacher on

such things as learning tasks and arrangements, etc. All these go against the possibility of fostering more meaningful learning aiming at training students' independent thinking and learning ability. Under normal conditions, it's possible that students chat with one another aimlessly and optionally. Therefore, it's worth considering adopting more goal-specific chat forms and designing various means of learning activities with the help of the teacher.

As far as chat forms are concerned, there are three frequently-used forms: text-based chat (synchronous or asynchronous), voice-based chat and video-audio-based chat (synchronous). Text-based chat such as email and threaded discussion is the constantly adopted chat form on most networks and is also the one adopted by ELCCAIM. To bring the Forum into its full play, the other two chat forms are supposed to be included. Voice-based chat should and will play a more positive role in language learning in that authentic person-to-person oral talk is the most vital as well as effective factor in acquiring a foreign language. With the help of voice-chatting tools such as Internet Relay Chat, ICQ (I seek you), and MOOs (Multi-user domain Object Oriented environments) etc, synchronous communication will be realized. The video-audio-based chat is an alternative especially suitable for large-scale conference instructions. With this chat form, each computer needs to be equipped with a mini camera enabling interlocutors to see each other when chatting online.

When speaking of adding more goal-specific learning activities, it's necessary to distinguish different purposes of a Forum. A study-oriented Forum is quite different from the one with no supervisor that is just for a casual and loose chat without any specific purpose or clear learning goal. A study-oriented Forum has to take account of such factors as the style of coordinator (usually the teacher), number of participants, period of time, frequency (weekly or monthly), type (whether classroom learning activities or supplementing ones), and evaluation (evaluation conducted by teachers and peer evaluation), etc. In this way, students may take part in learning activities that are more concentrated and constructive in discussion approaches and topics. Several suggestions on learning activities (usually

after class) are presented below for considerations and the practical test:

- *Report and critique*: teachers give students assignments (such as a topic report) and students make online presentations based on their reports done by themselves or groups after class. Every participant is supposed to give his or her own opinion and advice on others' work.
- *Hot topic debate*: teachers post hot topics on the BBS and hold assigned debates on a certain topic. Students with opposite views are divided into two parts. They may express and defend themselves by leaving their opinions on BBS.
- *Essay review*: students are required to write essays or reviews on specified topics and send them to teachers via email timely. An outstanding one will be selected and open to the public in Forum for share and view exchanges.

The above-mentioned are only three possibilities among many other much more better choices. When designing online learning and discussion activities, teachers' roles of initiator, coordinator, organizer and supervisor are indispensable and cannot be ignored. What can be sure is that the final effect rests with teachers and students rather than technology.

Application of an Intelligent Knowledge-Based Tutor

Online Tutoring and Forum modules of ELCCAIM provide a good vehicle for students to communicate with teachers. Yet it happens that students sometimes have no choice but wait for several hours even days for a single answer if teachers are off-line or there is an information flow traffic. Due to the response time lag, the current Online Tutoring and Forum, to some degree, have the risk of discouraging participants' enthusiasm.

How to learn at a time, place, and pace that suit students when teachers are not available? Chatbot⁷ or chatting robot—an intelligent tutor offers a new horizon to cope with this problem.

⁷ Chatbot is a newly coined blend (also referred as a portmanteau word). It is the combination of the first part of "chat room" and the last part of "robot".

Chatbot, a branch of AI (Artificial Intelligence), characterizes the quasi-human intelligence, large store of database and animated interface (usually with a cartoon figure so as to appear more humanlike). It is also known as a kind of expert system. With its colossal database and the Internet search power, Chatbot possesses information more than one can imagine. Two sample conversations are presented below to illustrate its 'intelligence'.

Sample conversation one (<http://www.pandorabots.com/pandora/talk?>):

***Human:** Can you tell me what CALL is?*

***ALICE:** I haven't heard of CALL.*

***Human:** How often does anyone speak to you*

***ALICE:** Hourly.*

***Human:** Do you have friends?*

***ALICE:** I have human and robot friends. A lot of people on the Internet chat with me.*

***Human:** Can you tell me some of your robot friends and their hobbies?*

***ALICE:** Andre said I is what I are in his case that is a body and in my case it is a computer.*

Sample conversation two (<http://www.computerhope.com/zero/#1>):

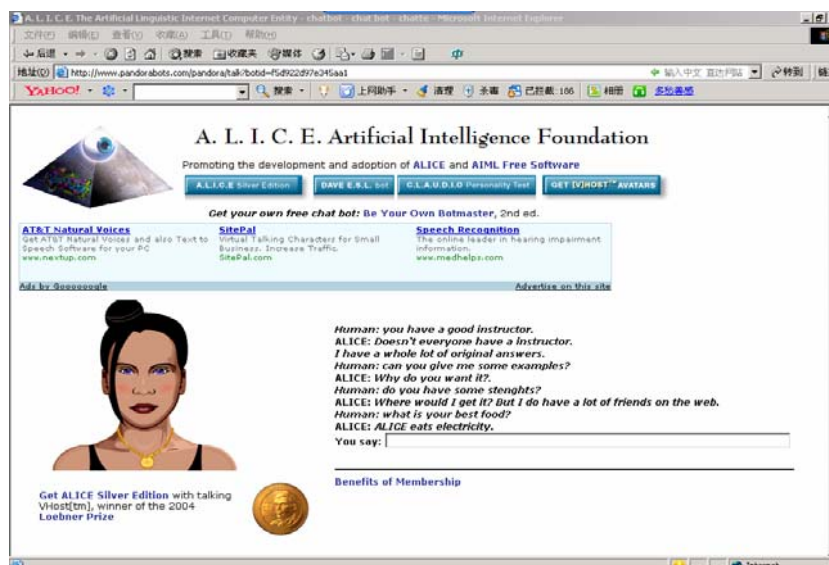
<Pac> You evil bot!!

<Zero> Pac: I know you are but what am I?

<Pac> Your immature

<Zero> Pac: Immature?!? well... well... well your pants fell down, HAHHAHAHA

FIGURE 4
A Screen Shot of the Chatbot—ALICE



A real intelligent Chatbot is a synthesis of elements including a microworld⁸ knowledge database, inferencing program, information presentation and absorption (Zhi et al., 2004). It mimics the activity of human brain in solving problems and is responsible for condition judgements, analytical inference and information outputs. A well-performed Chatbot is programmed with corresponding function design. Usually, for an input sentence, Chatbot will use its fuzzy logic to recognize the key phrase and sentence structure in order to reply properly. When Chatbot cannot locate solutions from its database, it will “start its search engine to link to the related URL” (Wang et al., 2004). Such, with a microworld knowledge database and personalization to a certain degree, Chatbot is able to reply in good English just like a private English teacher providing expert aids. In addition, some Chatbots have the

⁸A microworld knowledge here refers to the knowledge of one or several certain specific subject field(s).

ability to offer dialog simulations for specific topics, such as a job interview. Students can select a role and carry out the simulated dialogue with Chatbot according to their own learning preferences.

Utilization of Speech Recognition (SR) Technology in Human-to-Machine Interaction

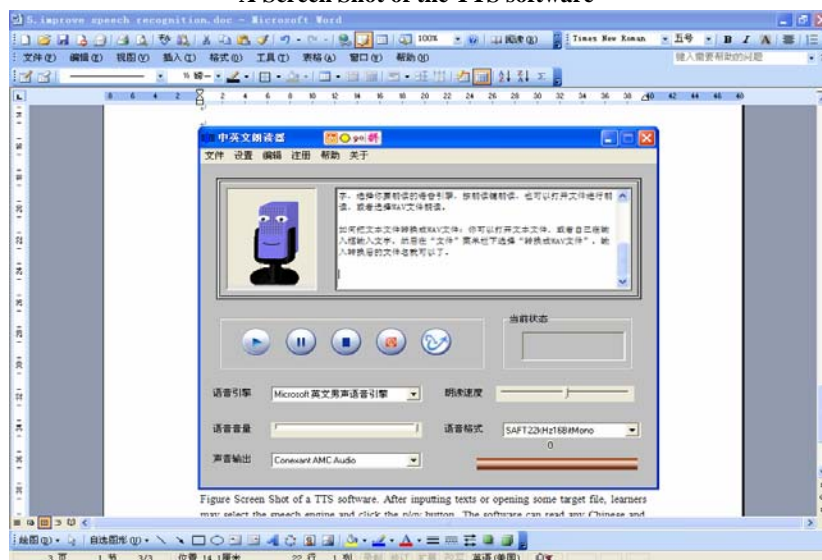
Speaking ability has long been a bottleneck of China's College English teaching. However, among research and development of CALL software categories, those aiming at improving speaking skills appear to trail behind other software categories. David et al. (2005) claim that most CALL-based teaching and learning has tended to focus on non-oral activities such as software or Web-based reading, writing, or gap-filling type activities.

ELCCAIM share the same problem. Much less has been done for oral language development in ELCCAIM. In view of this, SR (speech recognition) technology can be introduced in order to overcome this weakness.

The present research domain of SR includes ASR (Automatic Speech Recognition) and TTS (Text To Speech). ASR performs as transcribers transforming spoken words into writing while TTS, in the reverse order, transforms series of letters into speech outputs. Many TTS engines with API⁹ can be embedded into Internet applications such as translation software and language learning software so as to transform the translation and written texts into speech outputs. Besides, some TTS applications possess the ability of reading a text with different types of English (either in American English or in British English) and speaking rates (from the slow to the fast). Figure 5 is an example of the TTS software—Chinese & English Speaker Engine.

⁹ API—Application Programming Interface

FIGURE 5
A Screen Shot of the TTS software¹⁰



Meanwhile, ASR technology (such as IBM's ViaVoice) is also an alternative to improve oral skills. Oral Practice and Role Play in the College English Learning System (CELS) developed by Higher Education Press is an example (See Figure 6). Students may either read after the Flash conversations one sentence by one sentence or carry out human-to-machine dialogues with the computer. Simultaneously, the computer will record the dialogue. Each sentence input by students will be followed by the corresponding score that is the result of ASR. After completing the whole dialogue simulation, students may hear the dialogue recording by clicking the replay button.

¹⁰ The software can read any Chinese and English text and WAV file. And text files can be transformed into WAV files. After inputting texts or opening some target file, learners may select either male voice or female voice in the speech engine column and click the *play* button. Speaking rate can be adjusted according to users' needs.

FIGURE 6
A Screen Shot of Role Play in CELS (excerpted from College English Learning System Manual Copyright ©2005 Higher Education Press)



Particularly notable is that speech recognition is still a developing technology and it is impossible that it will achieve 100% accuracy in recognition. In spite of the fact that the present SR technology in the oral instruction domain is experimental and far from perfect, its adoption will definitely make up for the limitations of the conventional classroom teaching of listening and speaking and have a profound influence on aspects of training students' spoken language, measuring oral fluency, correcting pronunciation and simulating dialogues, etc.

Building Adaptive Guidance System

Research has shown that the efficiency of hypertexts for learning depends on a complex interaction between user characteristics (prior knowledge, cognitive load, and epistemic belief), the task requirements and the interface features (Scherly et al., 2000). ELCCAIM adopts the widely used content list as the main navigation support. The deficiency of this navigation structure is that the rich set of relationships and the inherent connections among

important knowledge nodes cannot be explicitly presented in a logic way. Students may have problems in knowing where to go for the next step and there is no hint guiding them to either find related information or advance to the next step or skip some parts.

To improve the manoeuvrability, adaptive navigation guidance system with multiple representations, help system and navigation tools are advised to be embodied to enhance the usability of the knowledge database. Two ways of adaptive content presentation—Hierarchical Content List and Information Unit Map will be recommended here.

In line with the inherent and logical relationships, multimedia materials and information in the CALL system may be classified into subunits either in a hierarchical content list (or a customized sequence, see Figure 7) or in a nonlinear and radiate way by interlinking knowledge nodes into a network according to their respective properties¹¹ and interrelationships (such as an information unit map, see Figure 8). Each subunit is interconnected by hyperlinks that will make it easy to trace the search path. With the help of the systems' automatic instruction and guidance, some students may select the corresponding unit to study after finishing one unit and passing the test (in the case of hierarchical content lists) while other students, given more perceptions of rich and meaningful interrelationships among similar or related concepts or information nodes, may follow their own preferred investigation paths that will enable them to pursue their further learning domains (in the case of the unit map). In this way, more choices will be offered for students to understand the same material from multiple perspectives, which enables them to open their minds and extend their horizons, thereby achieving the best effects of learning.

As for the adaptive guidance support, there are some useful navigation tools that are in the form of “continue link¹², annotated links¹³, link hiding

¹¹ Every knowledge node may have properties represented in different aspects. Teacher designers can add these property values when setting up a knowledge database according to their experience in the teaching practice. Thus, teachers' perception and experience will be effectively involved in the knowledge database.

¹² Continue link is a kind of navigation tool providing a sequential learning path

and link disabling¹⁴” (Puntampekhar & Stylianou, 2005, p. 452). In fact, content presentations can be combined with multiple ways of navigation support in order to reach the most optimal guidance effect.

FIGURE 7
A hierarchical content list¹⁵ (excerpted from College English Learning System Manual, Copyright© 2005 Higher Education Press)



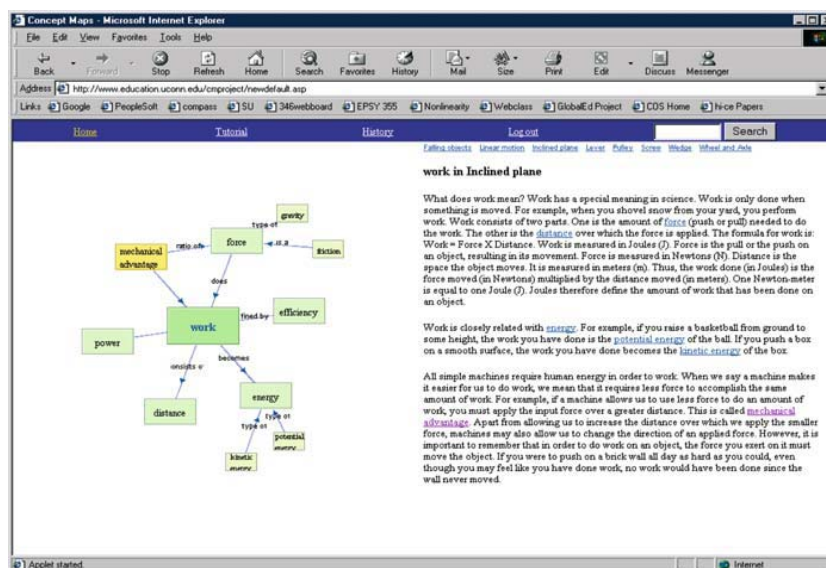
for learners such as form-easy-to-difficult path.

¹³ Annotated link is a kind of navigation tool giving markers such as colours, icons, and fonts to the classified link areas according to learners' learning states.

¹⁴ Hiding link refers to the link hiding some link areas to prevent visitors from entering irrelative or unprepared areas. This can be further developed as: 1. link hiding (link can be visited but unseen); 2. link disabling (link can be seen but is invalidated); and 3. link deleting.

¹⁵ In a hierarchical content list, an optimal while predetermined learning path will offered for students. When students finish one unit, the system will show the next proper step for further studying. Three different colours in the page layout indicate the current learning states. Grey—not allowed to enter because the previous unit is undone; yellow—the unit that the learner is about to study; pink—the unit the learner has already studied.). This is a good example of combination of hierarchical content, presentation and continue link as well as annotated link.

FIGURE 8
 A concept map¹⁶ with a textual description (Puntampekar & Stylianou, 2005)



CONCLUSION

Reflection

In spite of the fact that much improvement work has to be done in the program, it need scarcely to say that ELCCAIM has made a rewarding

¹⁶ In producing a concept map, designers will firstly “analyze the learning goals by adopting ISM—Interpretative Structural Modelling Method. Then, units (or concepts) are interconnected dynamically basing on students’ cognitive characteristics” (Zhi, et al., 2004, p. 160). In Figure 8, the focus concept chosen by students is at the centre of the map, with the most closely related concepts displayed in the first ring and the less closely ones displayed at the outer ring. Concepts are interconnected by hyperlinks with the textual descriptions. Students can navigate either through texts or maps.

attempt combining foreign language teaching & learning theories with teaching practice. Its design and development rest on the integration of teaching philosophy, teaching approach, teaching method, teaching management as well as modern educational technology. When launched into the practice, ELCCAIM provides an alternative that helps construct a learning environment promoting opportunities and events that encourage and support the process of collaboration, interaction and autonomous learning for students. Its features of vast database and flexibility make it act as an intelligent assistant for teachers and as a second classroom for students. With the aid of ELCCAIM, teachers will be able to:

- employ variety of teaching organization forms (small class with about 20 students, big class, individual learning, and group learning, etc.);
- experience a new teaching model transferring from the single uniform teacher dominance into the mutual and interactive communication between students and teachers;
- keep a record of students' in and outside of classroom activities and online self-learning performance;
- supervise students' learning processes and keep files on students' learning performance and their progress.

And students will be able to:

- be given plenty of concrete and authentic materials to develop their linguistic understanding and competence in a favourable environment;
- relate what they have been exposed to their existing knowledge and accordingly manage to fit them into their knowledge structures;
- learn to proceed with less dependence from the teacher and to make their own decisions in the process of study;
- conduct online self-assessment during the learning process, spot their weaknesses and accordingly make adjustments in their study without the constraints of time and space.

Furthermore, the adoption of ELCCAIM has shown great value in some other aspects. Firstly, it is an instructional platform compatible with the college English course (new version) with the campus network as the running base, which allows for more effective educational recourse sharing. Secondly, it makes a valuable contribution to the college English teaching reform marking a shift from “the teacher-centred pattern in which knowledge of the language and skills are imparted only by the teacher in class, to the student-centred pattern in which the ability to use the language and the ability to learn independently are cultivated in addition to language knowledge and skills” (CECR, 2004, p. 34).

Implications

As we look at the future development of computers in education, the range of possibilities is so broad that it is not easy to predict the accurate development trend of the CALL system. Actually, technology always keeps changing as time changes. Therefore, it is unrealistic to try to generalize and conclude CALL programs by using either one theory or a mode for CALL has slightest sign for its stagnation. China’s college English is at a transition point. It is important to jump hurdles one after another in the process of integrating technology into language education. There is a tremendous need for practical and valid feedback of the application of technology in the meaningful language instructions. This paper is the very try aiming to contribute slightly in the field and to look for some feasible approaches to meet the needs of college English teaching innovation.

Particularly notable here is the fact that though some attempts have been made in China by technological companies and educational & academic institutions in developing CALL systems, yet nearly none of them have developed effective frameworks or formulated guidelines for assessing these systems in application. As stated in the Joint Policy Statement of CALICO, EUROCALL, and IALLT (1999, p. 14), the evaluation of pedagogical innovations, development, and research in CALL should be based on

assessment mechanisms as objective as those used in other fields. The field of CALL needs more research, especially formative evaluation of CALL programs-in-development, conducted by a larger pool of researchers (Miech et al., 1996). We earnestly expect effective evaluation systems will emerge in the near future.

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