

## **Computer Assisted Language Learning (CALL) in China:**

### **Some Common Concerns**

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#### **Abstract**

In February 2004, Chinese Ministry of Education launched a teaching reform featuring the integration of the computer and networking in College English learning to stimulate students' motivation and to improve their communicative competence. Up to now, Chinese CALL is still in infancy. This article reviews the CALL literature and identifies some common concerns for CALL initiative. The article finally points out the directions for better delivery of CALL in Chinese universities.

**Key Words:** Computer Assisted Language Learning (CALL); Teaching Reform

#### **Introduction**

Computer-assisted language learning (CALL) came of age in the early 1960s (Kern & Warschauer, 2000). However it was only in 2004 that the Chinese Ministry of Education (MOE), for the first time, formally highlighted the role of the computer and

networking in its revised College English Teaching Syllabus (CETS) which would be the guide for English teaching in mainland China. This article reviewed the CALL literature and identified some common concerns surrounding the early implementation of the CALL. The article is anticipated to provide a firmer basis for governmental policy decisions about the use of CALL, to give CALL teachers and learners a better understanding about the theory and practice of CALL and ultimately to enhance the overall quality of English language teaching and learning in Chinese universities.

What is the definition of CALL? Levy (1997) defines computer assisted language learning (CALL) as “the search for and study of application of the computer in language teaching and learning” (p.1). In the recent history of language teaching, there have been three major theoretical movements, namely, the structural, the cognitive and the sociocognitive, all of which have greatly influenced CALL development. CALL developments over the past 30 years are accordingly categorized into three distinct phrases: structural CALL, communicative CALL, and integrative CALL respectively (Kern & Warschauer, 2000). Some common issues concerning CALL initiative in the literature are reviewed.

### **The role of the computer and the teacher**

In the CALL literature, the distinction between computer-as-tutor and computer-as-tool was the most common one (Taylor, 1980). The assumptions underlying the computer-as-tutor role are that the computer is a temporary substitute for the teachers and also that work with the computer as tutor can occur outside the classroom without a teacher present (Levy, 1997). The computer-as-tutor has its theoretical roots in behaviorism and programmed instruction, which assume that extensive drill and practice are the keys to second language acquisition (Levy, 1997). The role of the computer-as-tool has been widely discussed. Ahmad et al. (1985) stress that the computer is a just a tool without any inborn wisdom or a mind of its own, that the computer itself is incapable of learning or teaching and that it can only

perform the exact instructions given by a human user, without which it is powerless. Philips (1987) likewise notes that the computer was only a tool used to augment human capabilities. This view of the computer as tool became more prevalent with the advent of the multimedia computer and the Internet. Networked computers and multimedia made both synchronous and asynchronous global communication possible and provided learners with unprecedented access to a wide range of authentic materials which were regarded as essential to learning a second language (Darhower, 2002; Warschauer, 2001; Yang, 1998).

A review of the CALL literature identifies two prevalent positions regarding the role of the teacher vis-à-vis CALL: the traditional position and the progressive view. The traditional position is that the teacher is and will remain indispensable and that the teacher is the ultimate arbiter regarding the place of the computer in language learning. Ahmad et al. (1985) comment on this position as follows:

Far from threatening the teacher's position, it (the computer) is totally dependent on the teacher in many ways: for example, it is unable to create educational materials without a human to direct it. All the linguistic material and instructions for its presentation must be specified by the teacher. It is the teacher, then, who can make the computer assume various roles (p.2).

The traditional position sees the computer as a mere adjunct to the teacher's role, which remains central to the process of language learning. Other supporters of this position include, to name but a few, Putnam (1983), Hope (1984), Alatis (1986), and Secan (1990). The progressive view is that the teacher should take a less intrusive role in managing language learning especially with the advent of multimedia and networked computers. Progressivists point out that teachers are not the only source of language information in these days of global interconnectedness, and the language teachers should understand that students need to develop strategies to respond and adapt to changes rather than approaching the task of language learning in a uniform way (Warschauer & Healey, 1998). Warschauer and Healey (1998) advocates that the

teacher should play the role of facilitator rather than being the fount of all knowledge:

As facilitators, teachers must in many ways know more than they would as directive givers of information. Facilitators must be aware of a variety of material available for improving students' language skill, not just one or two texts. They also need to know how to teach learners to use the material effectively. Teachers as facilitators have to be able to respond to the needs that students have, not just what has been set up ahead of time based on a curriculum developer's idea of who will be in the classroom (p.60).

Warschauer's ideas have been modified or elaborated by other researchers. Gruba (2004, p.637) refers to the teacher as a "mediator" between the computer and students throughout the learning process, serving the role of "keeping things running smoothly". The more progressive view can find support by many researchers, to name only a few of whom, Debski, Gassin, & Smith (1997), Chapelle (2001), and Wang (2004).

### **Investment of resources**

Computer technology is resource intensive. It requires substantial investment not only in equipment but also in the space to house the equipment, and the resources needed for its maintenance and security (Debski, Gassin, & Smith, 1997; Patrikis, 1997; Larsen, 1983). Warschauer and Meskill (2000) specifically mention the substantial startup expenses needed to implement new technologies in higher education contexts:

For college language learning programs, such expenses usually include hardware, software, staffing, and training for at least one networked computer laboratory where students can drop in and use assigned software and one or more networked computer laboratories where teachers can bring whole classes on an occasional or regular basis (p.308).

Furthermore, computer technology changes rapidly, which requires constant upgrade (Oberprieler, 1999). Whether or not universities can afford such an enormous investment in basic facilities becomes an issue.

### **Teacher attitudes and teacher training**

As with the broader field of applied linguistics, CALL can be located at the crossroads of a number of disciplines such as psychology, educational technology, artificial intelligence and linguistics (Gruba, 2004; Chapelle, 2001; Levy, 1997). Given the complexity of CALL, it is easy to see why many teachers experience anxiety in the face of CALL innovation and why training is required for its implementation. Some teachers feel defensive when they are asked to integrate technology into their teaching. As Larsen (1983) points out, teachers who have received years of training in language methodology and literary criticism may understandably be discouraged when required to get a complex machine to do exactly what is wanted and when it is wanted. Moreover teachers may also see the computer as a threat which risks making them “redundant” (Ahmad et al., 1985, p.7). Teachers’ attitudes to and understandings of technology play a very important role in the adoption of CALL. Philips (1998) suggests that if teachers are to teach creatively and effectively with technology, they must themselves have opportunities to learn via this method since the models teachers had as learners have been found to exercise a profound influence on their classroom practice. Thus, before integrating technology into language learning, it is very important to provide training to teachers to let them know what role they can play in the teaching process in order to alleviate their anxieties and antagonism and increase the efficiency of CALL.

Warschauer and Healey (1998) likewise mention that teacher training is a key element to success in this more flexible language classroom, enabling teachers to use multimedia and other resources effectively. Hoch (1985) offers some suggestions regarding the nature of such training, proposing a graduated scale of needs for skills focusing on seven different areas, namely: pre-skill, orientation, evaluation, application, programming in the small, programming in the large, and computer science concepts. Kreutwer and Neunzig (1997) point to the potential benefits of this kind of training reporting positive feedback from teachers involved in a training seminar.

### **The computer and individualized learning**

The past few decades have witnessed a shift in focus from teaching to learning, from the teacher to the learner. Individualized learning requires, first and foremost, respect for and accommodation of individual backgrounds and learning styles. In concrete terms, it gives the learner control in material selection/sequencing and the pace of progress (Zhang, 1998). The computer is the perfect candidate for individualized instruction because, unlike humans, it has infinite resources of patience and can teach on a one-to-one basis at a pace dictated by the individual's capabilities (Schulz, 1993). In reality, this kind of differentiated instruction is beyond the teacher's reach, especially in a large, multi-level conventional classroom. However, with the aid of the computer, this aim is more readily realized.

In addition, the computer's "flexibility of time" (Ahmad et al., 1985) and "location independence" (Yang, 1998) allows students to become active participants in the learning process and to decide when to study and how long to spend according to their individualized needs. Flexibility of time and location independence are the basis for distance language education (DLE). Through the Internet, students can attend the virtual classroom or visit on-line resources from anywhere at anytime. Many universities provide on-line courses. Students who are from different countries and enrol in such courses can learn at their own individual pace without actual presence in the classroom. Everything such as enrolling, tutorial and marking the papers is done on line. More importantly, the computer has the potential to increase students' interest in and enthusiasm for language learning and this may be helpful in motivating students to pursue independent individualized study (Warschauer & Meskill, 2000; Ahmad et al., 1985; Larsen, 1983). While it might take time to familiarize students with the computer and the Internet, the opportunities for enhancing learner autonomy through the use of on-line resources such as dictionaries, maps, music and movie guides, chat rooms and language learning websites, are enormous.

### **The computer and L2 skills development**

For early CALL practitioners such as Putnam (1983), Hope (1984), Ahmad et al. (1985) and Alatis (1986), the biggest disadvantage of the computer was that it lacked the knowledge to understand the enormous range of utterances possible in any human language and also had difficulty in handling ambiguous instructions. This inability to interact was seen as a huge limitation, given that interaction is believed to be not only the most effective approach to learning a language but also the ultimate goal of communicative language study (Gass, 2003; Kitade, 2000). Zhang (1998) sees this technological constraint as the reason for the asymmetric effects of the computer in L2 skills development. He reminds us that of the four skills of speaking, listening, reading and writing, receptive skills of listening and reading are more commonly addressed by CALL programs than productive skills of speaking and writing. Even with receptive skills, it is difficult for learners to play an active role in constructing meaning because their responses are restricted to computer-processible, forced-choice type comprehension questions. As for the productive skills, the computer cannot readily process and give feedback on learner-produced language, when responses are open-ended and/or delivered orally or in free-hand writing (Zhang, 1998).

Although in recent years remarkable progress has been made in speech recognition and artificial intelligence, the interactivity of the computer and language learners is still somewhat limited, and studies reported that the computer could not contribute very much to the development of speaking ability (Fleta et al., 1999). As a consequence, CALL researchers began to seek other modes to develop collaborative learning abilities as well as oral and written competence. Substantial gains have been made. Webquests are frequently used for collaborative language learning (Goodwin-Jones, 2004). Usually, a Webquest provides students with a whole range of topics for which they can gather information on websites. In the end, students are expected to create a document that collects, summarizes, and synthesizes the information gathered. For written interaction, Web-based tools such as e-mail (Stockwell & Harrington, 2003), Internet Chat Relay (Xie, 2002), SchMOOze (Sauer

& Del Valle, 2002), Webchat and MSN (Wan, 2004) are frequently used and communications in these forms are reported to be effective in improving writing skills. Oral interaction is also made possible by audio conferencing tools, and although these require technical support, the findings of studies reporting on the use of such tools to improve oral ability are quite encouraging (Hampel & Hauck 2004; Hampel & Baber, 2003; Kotter, 2001). One of the most sophisticated forms of online interaction available at present is the oral-visual interaction described by Wang (2004). This offers an authentic learning environment, in which language learners can orally and visually interact with another human being in the target language in much the same way as occurs in face-to-face interaction. Therefore, the development of both receptive and productive skills in CALL contexts is now technically feasible. A review of the most recent literature on CALL also reveals that, with the aid of the new technology, language learning is tending to shift away from learner-computer interaction towards learner-learner interaction.

### **Acquiring cultural knowledge through technology**

The incorporation of cultural knowledge into language learning has drawn wide attention (Hall, 1997; Damen, 1987; Seelye, 1984). Language instruction is now viewed not just in terms of providing comprehensible input, but also as helping students enter into the kinds of authentic social discourse situations and discourse communities that they would later encounter outside the classroom (Kern & Warschauer, 2000). Advances in recent technology such as audio/videotapes, CD-ROMs, email, Internet and audio-visual conferencing have enabled foreign language professionals to incorporate much-needed sociolinguistic authenticity into the L2 classroom (Meunier, 1994). These authentic materials can help language learners not only in deepening their understanding of social phenomena within the target culture but also in modifying their communication in negotiation and interaction with others (Warschauer, 2001). Examples of research on this topic are a pilot study by Lee (1998) who reports on the use of the combination of Internet technologies—online newspaper and online chat rooms—to acquire cultural knowledge and to develop L2 skills;



research by Donaldson and Kotter (1999) testing the possibility of teleporting the classroom into the target culture in a MOO over a three-month period; a report by Herron, Dubreil, Cole, and Corrie (2000) on the use of instructional video to teach cultural aspect of a second language; a study by Hertel (2003) using an email exchange to promote cultural learning; and a report by Wan (2004) describing second language socialization in a bilingual chat room. The positive results of these studies indicate that cultural knowledge can be successfully acquired with the help of technology.

### **The evaluation of CALL initiatives**

A review of the literature has revealed that the majority of the empirical studies on CALL have tended to evaluate specific areas of language learning such as pronunciation training, speaking ability, reading ability, vocabulary learning, grammar learning, writing ability, translation skills and distance language learning through technology (Wang, 2004; Hauck & Haezwindt, 1999). Few empirical studies have tried to evaluate the effectiveness of more comprehensive uses of technology in language learning. The researcher examined 464 articles published in *CALICO Journal*, a major CALL journal in the world, from 1983 (Volume 1, Number 1) to 2003 (Volume 21, Number 1) and found that only two articles comprehensively evaluating the effectiveness of a CALL program (Adair-Hauck, Willingham-McLain, & Youngs, 2000; Green & Youngs, 2001). The two studies were both conducted at Carnegie Mellon University, the first study (Adair-Hauck et al., 2000) carried out in 1996 with second semester French students as participants and the second (Green & Youngs, 2001) in Fall 1998 and Spring 1999 with first-and second-semester German students participating in it. Both studies followed the same design: the treatment group took part in technology-enhanced activities for one of the four class periods each week and the control group attended a regular class. In the first study multimedia were used to investigate whether the treatment group's performance was similar to that of the control group in the areas of reading, writing, listening, speaking and cultural understanding. The second study, an actual follow-up to the first, made use of web for the same purpose. The findings of the first study revealed that there was no

significant difference between the treatment group and the control group in listening, speaking, reading and cultural understanding, except that the control group's writing scores decreased while the treatment group's increased. The results of the second study manifested that there was no patterns of statistically significant differences between the treatment and the control groups in any of the aforementioned five areas. Both studies concluded that technology-enhanced independent language learning is as effective as classroom instruction.

Theories on comprehensive and systematic CALL program evaluation are sparse and may require new research techniques to better understand how practitioners shape their projects, design materials, and teach with computers (Gruba, 2004). A good example of the sparse CALL program evaluation is the judgmental and empirical model proposed by Chapelle (2001). This model is based on the judgmental and empirical analysis of CALL tasks. Judgmental evaluation offers a methodology for making systematic hypotheses about the benefits to be achieved through CALL activities, grouped by Chapelle (2001) into five types: computer-assisted classroom discussion, a microworld, text analysis, storyboard and concordancing. Empirical evaluation aims to support the hypotheses made in judgmental evaluation with empirical data and those empirical data can be collected from six perspectives: suggests, language learning potential, learner fit, meaning focus, authenticity, positive impact and practicality, as Chapelle (2001). By using this model, Chapelle (2001) means to provide a way to comprehensively evaluate CALL tasks.

## **Conclusion**

The article began with the definition of CALL and a brief overview of the development of CALL came next. Some common issues and concerns associated with CALL were then discussed, among which were the roles of the computer and the teacher in language learning, the resource intensive nature of CALL initiatives, teacher resistance to CALL and the need for training in CALL delivery, the potential

of the computer to provide for individualized learning, the role of the computer in L2 skills development and in the acquisition of cultural knowledge. Finally, reference is made to the evaluation of CALL programs and to the dearth of such evaluations.

The review also points out directions for future Chinese CALL delivery. To make the computer achieve the desired impact on English learning in China, the following suggestions are offered. The first suggestion is to increase investment in computer-related facilities. The successful application of CALL would inevitably entail a large investment in the facilities. The second suggestion is to introduce teachers to relevant CALL theories in order to inform their day to day practice and to guide students' English learning more effectively. It is suggested that the theories taught could include those formulated by Chinese CALL practitioners as well as those borrowed from other countries. The third suggestion is to better the software. CALL Software development is quite a complex process drawing on other disciplines. It is unnecessary and impractical for the every CALL teacher to learn how to develop large and complex software programs. However, a team at the university level could be formed to develop software which might be more suitable for the university's unique situation. The fourth suggestion is about the way to assess performance in the CALL classroom. Both the content and format of traditional assessment tasks can be changed to reflect the new goals and methods of learning with the aid of the computer. The fifth suggestion is to provide training opportunities for CALL teachers. Training is essential if better outcomes are to be achieved. The training program should cover a range of areas including a explanation of the purpose of the MOE's reform, cultivation of basic computer skills and of ways to develop software, introduction to theories underlying the CALL. The sixth suggestion is related to the training of students in computer technology. If students are expected to integrate computers into their English study, they must have a fair degree of computer knowledge. Although such knowledge seems to be taken for granted by CALL proponents in western countries, in more recently industrialized countries like China the need for such training is far more pressing. A number of other suggestions should be be considered

such as CALL teachers meet on a regular basis to exchange experiences and an effective feedback system should be established to deal with the problems emerging from CALL practices. Had these issues been considered and solutions provided by Ministry of Education before the reform, the results would have been more encouraging.

## References

- Adair-Hauck, B., Willingham-McLain, L., & Youngs, B. E. (1999). Evaluating the integration of technology and second language learning. *CALICO Journal*, 19(2), 269-306.
- Ahmad, K., Corbett, G., Rogers, M., & Sussex, R. (1985). *Computers, language learning, and language teaching*. Cambridge: Cambridge University.
- Alatis, J. E. (1986). Technology is good, but humanity is better. *CALICO Journal*, 3(4), 6-10, 48.
- Chapelle, C. A. (2001). *Computers applications in second language acquisition: Foundations for teaching, testing and research*. Cambridge: Cambridge University Press.
- Damen, L. (1987). *Culture learning: The fifth dimension in the language classroom*. Reading, MA: Addison-Wesley.
- Darhower, M. (2002). Instructional features of synchronous computer-mediated communication in the intermediate L2 class: A sociocultural case study. *CALICO Journal*, 19(2), 249-278.
- Debski, R., Gassin, J., & Smith, M. (Eds.) (1997). Language learning through social computing. *Applied linguistics association of Australia occasional papers 16*, (pp.39-65). ALAA & The Horwood Language Center.
- Donaldson, R. P., & Kotter, M. (1999). Language learning in cyberspace: Teleporting the classroom into the target culture, *CALICO Journal*, 16(4), 531-557.
- Fleta, B. M., Sabater, C. P., Salom, L. G., Guillot, C. P., Monreal, C. S., & Turney, E. (1999). Evaluating multimedia programs for language learning: A case study.

- ReCALL*, 11(3), 50-57.
- Gass, S. M. (2003). Input and interaction. In C. J. Doughty & M. H. Long (Eds.), *The handbook of second language acquisition* (pp.224-255). Malden, MA: Blackwell Publishing Ltd.
- Goodwin-Jones, B. (2004). Emerging technologies, language in action: From webquests to virtual realities. *Language Learning & Technology*, 8(3), 9-14.
- Green, A. & Youngs, B. E. (2001). Using the web in the elementary French and German courses: Quantitative and qualitative study results. *CALICO Journal*, 19(1), 89-123.
- Gruba, G. (2004). Computer assisted language learning (CALL). In A. Davies & C. Elder (Eds.), *Handbook of applied linguistics* (pp.623-648). Oxford: Blackwell.
- Hall, S. (1997). *Representation: Cultural representations and signifying practices*. London: Sage Publications.
- Hampel, R., & Baber, E. (2003). Using Internet-based audio-graphic and video conferencing for language learning. In U. Felix (Ed.), *Language learning on-line: Towards best practice* (pp.171-191). Lisse, The Netherlands: Swets & Zeitlinger.
- Hampel, R., & Hauck, M. (2004). Towards an effective use of audio conferencing in distance language courses. *Language Learning & Technology*, 8(1), 66-82.
- Hauck, M. & Haezwindt, B. (1999). Adding a new perspective to distance (language) learning and teaching-the tutor's perspective. *ReCALL*, 11(2), 46-54.
- Herron, C., Dubreil, S., Cole, S. P., & Corrie, C. (2000). Using instructional video to teach culture to beginning foreign language students, *CALICO Journal*, 17(3), 395-429.
- Hertel, T. J. (2003). Using an E-mail exchange to promote cultural learning. *Foreign Language Annals*, 36(3), 386-396.
- Hoch, F. S. (1985). Computer literacy and the foreign language teacher. *CALICO Journal*, 3(1), 17-18, 32.
- Hope, G. R. (1984). *Using computers in teaching foreign languages*. CAL.
- Hutchby, I. (2001). *Conversation and technology: From the telephone to the Internet*. Malden, MA: Blackwell.

- Kern, R. & Warschauer, M. (2000). Introduction: Theory and practice of networked-based language teaching. In M. Warschauer & R. Kern (Eds.), *Network-based language teaching: Concepts and practice* (pp.1-19). New York: Cambridge University Press.
- Kitade, K. (2000). L2 learners' discourse and SLA theories in CMC: Collaborative interaction in Internet chat. *Computer Assisted Language Learning*, 13(2), 143-166.
- Kreutzer, M., & Neunzig, W. (1997). Computer assisted learning, teacher training and a evaluation of a seminar for language teachers. *CALICO Journal*, 14(2-4), 65-79.
- Larsen, M. D. (1983). Persistent problems of computer-assisted instruction. *CALICO Journal*, 1(5), 31-34.
- Lee, L. (1998). Going beyond classroom learning: Acquiring cultural knowledge via on-line newspapers and intercultural exchanges via on-line chatrooms. *CALICO Journal* 16(2), 101-120.
- Levy, M. (1997). *Computer-assisted language learning: Context and conceptualization*. London: Clarendon Press.
- Meunier, L. E. (1994). Computer-assisted language instruction and cooperative learning. *Applied Language Learning* 5(2), 31-56.
- Oberprieler, G. (1999). Outcome-based learning and the role of CALL in South Africa. In R. Debski & M. Levy (Eds.), *WorldCALL: Global perspectives on computer-assisted language learning*. Swets & Zeitlinger.
- Patrikis, P. C. (1997). The evolution of computer technology in foreign language teaching and learning. In R. Debski, J. Gassin & M. Smith (Eds.), *Language learning through social computing* (p.176). ALAA& The Horwood Language Centre.
- Philips, J. K. (1998). Media for the message: Technology's role in the standards. *CALICO Journal*, 16(1), 25-36.
- Philips, M. (1987). Potential paradigms and possible problems for CALL. *System*, 15(3), 275-287.
- Putnam, C. E. (1983). Foreign language instructional technology: The state of the art. *CALICO Journal*, 1(1), 35-41.

- Sauer, C., & Del Valle, J. (2002). Grazing at SchMooze. Paper presented at the TESOL convention, Salt Lake City, Utah. <http://schmooze.hunter.cuny.edu>
- Schulz, R. (1993). What one has to know about methodology in computing. *CALICO Journal*, 10(4), 39-56.
- Secan, M. E. (1990). The Anxiety over technology (and why I like computers anyway. *CALICO Journal*, 8(2), 41-47.
- Seelye, H. (1984). *Teaching culture: Strategies for inter-cultural communication*. Revised edition. Lincolnwood, IL: National Textbook Company.
- Stockwell, G., & Harrington, M. (2003). The incidental development of L2 proficiency in NS-NNS email interaction. *CALICO Journal*, 20(2), pp.337-360.
- Taylor, R. P. (Ed.) (1980). *The computer in the school: Tutor, tool, tutee*. New York: Teachers College Press.
- Wan, S. E. L. (2004). Second language socialization in a bilingual chatroom: Global and local considerations. *Language Learning & Technology*, 8(3), 44-65.
- Wang, Y. P. (2004). Distance language learning: Interactivity and fourth generation Internet-based videoconferencing. *CALICO Journal*, 21(2), 373-395.
- Warschauer, M. (2001). Online communication. In R. Carter & D. Nunan (Eds.), *The Cambridge guide to teaching English to speakers of other languages* (pp.207-212). Cambridge: Cambridge University Press.
- Warschauer, M., & Healey, D. (1998). Computers and language learning: An overview. *Language Teaching*, 31, 57-71.
- Warschauer, M., & Meskill, C. (2000). Technology and second language learning. In J. Rosenthal (Ed.), *Handbook of undergraduate second language education* (pp. 303-318). Mahwah, New Jersey: Lawrence Erlbaum.
- Xie, T. W. (2002). Using Internet relay chat in teaching Chinese. *CALICO Journal*, 19(3), 513-524
- Yang, P. J. (1998). Networked multimedia and foreign language education. *CALICO Journal*, 15(1-3), 75-88.
- Zhang, Z. S. (1998). *CALL for Chinese: Issues and practice*. Retrieved July 26, 2004, from [http://www.csulb.edu/~txic/learn\\_online/issues.htm](http://www.csulb.edu/~txic/learn_online/issues.htm)

