

COMPUTER ASSISTED LANGUAGE LEARNING: MODELS AND APPLICATIONS

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INTRODUCTION

The English Language Teaching Unit (ELTU) of the University of Qatar is launching a one-year English foundation program for the students of the Faculty of Science and the Faculty of Administrative Sciences and Economics. The objective of this program is to enable the students of these two faculties to pursue their studies in English medium. The program includes a computer-based multimedia component to reinforce the mainstream English curriculum. As most of the teachers of the Unit are not well versed in the use of the computer for classroom purposes, the author of this paper sees no better time to present an overview of Computer-Assisted Language Learning (CALL). The purpose of the discussion in this paper is to help both teachers and administrators develop a minimal working knowledge of CALL methodology and content.

The history of CALL suggests that the computer can serve a variety of uses for language teaching and learning. It can be a tutor which offers language drills or skill practice; a stimulus for discussion and interaction; or a tool for writing and research. With the development of powerful concordancing programs and the Internet, it can also be a medium of global communication and a source of limitless authentic materials. This article reviews the literature on CALL

and discusses the various applications, advantages and limitations, and draws up numerous implications for teaching and learning of foreign languages.

1. APPROACHES TO CALL: A HISTORICAL PERSPECTIVE

From a theoretical point of view, the evolution of CALL was greatly influenced by developments in four areas of research: (a) individualization of instruction, (b) experiments in programmed instruction, (c) developments in computational linguistics, (d) work in machine translation in the 1950s (Dhaif, 1989; 1990). However, Call has moved away from programmed learning toward a wide range of applications more in keeping with modern theories of language learning and current pedagogic trends over the past few years (Kenning, 1990). Today's programs aim to develop communicative competence more than linguistic competence.

Though CALL has developed gradually over the last 30 years, this development can be categorized in terms of three somewhat distinct phases which will be referred to as (1) behavioristic CALL; (2) communicative CALL; and (3) integrative CALL (Warschauer, 1996).

(1) Behavioristic CALL :

The first phase of CALL, conceived in the 1950s and implemented in the 1980s, was based on the then-dominant behaviorist theories of learning. Programs of this phase entailed repetitive language drills. Drill and practice courseware is based on the model of computer as tutor (Taylor, 1989). In other words the computer serves as a vehicle for delivering instructional materials to the student. The rationale behind drill and practice was not totally spurious,

which explains in part the fact that CALL drills are still used today. Briefly put, the rationale is as follows:

- Repeated exposure to the same material is beneficial or even essential to learning;
- A computer is ideal for carrying out repeated drills, since the machine does not get bored with presenting the same material and since it can provide immediate non-judgmental feedback;
- A computer can present such material on an individualized basis, allowing students to proceed at their own pace and freeing up class time for other activities;

In the late 1970s and early 1980s, behavioristic CALL was undermined by two important factors. First, behavioristic approaches to language learning had been rejected at both the theoretical and the pedagogical level. Secondly, the introduction of the microcomputer allowed a whole new range of possibilities. The stage was set for a new phase of CALL "Communicative CALL":

(2) Communicative CALL

The second phase of CALL was based on the communicative approach to teaching which became prominent in the 1970s and 80s. Proponents of this approach felt that the drill and practice programs of the previous decade did not allow enough authentic communication to be of much value. According to Underwood, one of the first advocates of CALL (Underwood 1984, p. 52), communicative call:

- focuses more on using forms than on the forms themselves;

- teaches grammar implicitly rather than explicitly;
- allows and encourages students to generate original utterances rather than just manipulate prefabricated language;
- does not judge and evaluate everything the students do or reward them with congratulatory messages, lights, or bells;
- avoids telling students they are wrong and is flexible to a variety of student responses;
- uses the target language exclusively and creates an environment in which using the target language simulates natural language use, both on and off the screen; and
- will never try to do anything that a book can do just as well.

Several types of CALL programs were developed and used during this phase of communicative CALL. First, there was a variety of programs to provide skill practice, but in a non-drill format. Examples of these types of programs include courseware for paced reading, text reconstruction, and language games. In these programs, like the drill and practice programs mentioned above, the computer remains within the model of the "computer as tutor". But-- in contrast to the drill and practice programs-- the process of finding the right answer involves a fair amount of student choice, control, and interaction.

In addition to "computer as tutor", another CALL model used for communicative activities involves the "computer as stimulus" (Taylor & Perez, 1989, p. 63 Warschauer, 1996). In this case, the purpose of the CALL activity is not so much to have students discover the right answer, but rather to stimulate students' discussion. (Taylor & Perez, 1989. Warschauer, 1996); thus this represents an extension of writing, or critical thinking.

The third model of computers in communicative CALL involves the "computer as tool" (Brierley and Kemble, 1991), or, as sometimes called, the "computer as workhorse" (Taylor & Perez, 1989). In this role, the programs do not necessarily provide any language material at all, but rather empower the learner to use or understand language. Examples of "computer as tool" include word processors, spelling and grammar checkers, desk-top publishing programs, and concordancers.

Of course the distinction between these models is not absolute. A skill practice program can be used as a conversational stimulus, as can a paragraph written by a student on a word processor. Likewise, there are a number of drill and practice programs which could be used in a more communicative fashion--if, for example, students were assigned to work in pairs or small groups and then compare and discuss their answers, or students can even discuss what inadequacies they found in the computer program (Higgins 1988). In other words, the dividing line between behavioristic and communicative CALL involves not only "which" software is used, but also "how" the software is put to use by the teacher and students.

On the face of things communicative CALL seems like a significant advance over its predecessor. But by the end of the 1980s, many educators felt that CALL was still failing to live up to its potential (Kenning 1990). Critics pointed out that the computer was being used in an ad hoc and disconnected fashion and thus "finds itself making a greater contribution to marginal rather than to central elements" of the language learning process (Kenning, 1990, p. 90).

These critiques of CALL dovetailed with broader reassessments of the communicative approach to language teaching. No longer satisfied with teaching compartmentalized skills or structures (even if taught in a communicative manner), a number of educators were seeking ways to teach in a more integrative manner, for example using task- or project-based approaches . The challenge for advocates of CALL was to develop models which could help integrate the various aspects of the language learning process. Fortunately, advances in computer technology were providing the opportunities to do just that.

(3) Integrative CALL

Integrative approaches to CALL are based on two important technological developments of the last decade--multimedia computers and the Internet. Multimedia technology--exemplified today by the CD-ROM--allows a variety of media (text, graphics, sound, animation, and video) to be accessed on a single machine. What makes multimedia even more powerful is that it also entails "hypermedia". Hypermedia is defined as

a communications medium linking together computer and video technologies. The term describes hypertext systems that include text, image, sound, animation, and video... hypermedia has three major features: it is interactive; it involves a variety of combinations of multiple media with the particular combination of media selected by the user; and it is non-linear (lacking any beginning middle or end).(anon.,Forum 1995 p.49)

This means that the multimedia resources are all linked together and that learners can navigate their

own path simply by pointing and clicking a mouse.

Hypermedia provides a number of advantages for language learning. First of all, a more authentic learning environment is created, since listening is combined with seeing, just like in the real world. Secondly, skills are easily integrated, since the variety of media make it natural to combine reading, writing, speaking and listening in a single activity. Third, students have great control over their learning, since they can not only go at their own pace but even on their own individual path, going forward and backwards to different parts of the program.

2. CALL APPLICATIONS AND TECHNIQUES

The Data-Driven Approach (DDA) to CALL: Concordancing

Much has been written in favor of the Data-Driven (DDA) approach to learning, also called text manipulation (TM), as a device for promoting language learning through CALL. Yet many in the teaching profession either ignore or disagree with this approach. Typical examples of DDA are computer-generated cloze passages, jumbled sentences, jumbled paragraphs, sequencing tasks, etc. Learning vocabulary on the computer is believed by many to enhance motivation. Thus, just as a newspaper reader feels a strong desire to finish a nearly completed crossword, so also does a group of students who have done most of a storyboard, a powerful text reconstruction program, feel a need to finish it (Fox 1989).

The focus of discussion in this section is the concordancer- probably the most important tool for a data-driven approach. Kettermann (1998) defines a

concordance as "a list of occurrences of a particular word, part of a word or combination of words, in its context drawn from a text corpus". The concordancer can recover from the text all the contexts for a particular item (morpheme, word or phrase) and print them out in a way which facilitates rapid scanning and comparison.

The most usual format is the keyword-in-context (KWIC) concordance in which the keywords are arranged one below the other down the center of the page, with a fixed number of characters of context to the left and to the right. This approach assumes that "the language-learner is also, essentially a research worker whose learning needs to be driven by access to linguistic data- hence the term "data-driven learning" (DDL) to describe the approach. (Johns, 1991). In vocabulary, for example, sense relations of synonymy, antonymy and hyponymy can be well investigated through concordancing (refer to Appendix A for hyponymy).

The pedagogical value of the DDL has been repeatedly addressed. Generally speaking, supporters of DDL are advocates of instructional approaches weighted toward inductivity, authenticity, and learner responsibility for learning (Stevens 1990). In the DDL, the computer is used as informant. DDL is an alternative to a rule-based approach which attempts to encapsulate linguistic "competence", and gives the learner access to the facts of linguistic "performance" (Johns 1991:2).

There is enough justification for the use of the computer in the classroom. The computer is an extremely powerful hypothesis- testing device on vast amounts of data, it allows controlled speculation, makes hidden structures visible,

enhances at the same time imagination and checks it by inductivity, thus making higher degrees of objectivity possible. The students' work becomes more exploratory and thus motivating and highly experiential (Kettermann, 1998). Concordancing is economical in terms of time to implement because it requires only a program (a concordancer) plus a text base (corpus).

The DDL, on the other hand, makes possible a new style of "grammatical consciousness-raising" (Rutherford 1987) by placing the learners own discovery of grammar and vocabulary at the center of language-learning, and by making it possible for that discovery to be based on evidence from authentic language use. Examples for the use of the concordancer for collecting evidence on many aspects of vocabulary and grammar are cited in the next section.

Concordancing: Vocabulary

As Richards points out, "knowing a word" involves knowing how to use it syntactically, semantically, pragmatically and discoursally (Richards 1976). Craik and Lockhart (1972) suggested that retention is a function of "depth of processing", where the depth relates to the meaningfulness and significance of the material to the learner. So, conscious meaning-focused vocabulary study will have a place in a computer-based system (Fox 1989). Much linguistic evidence suggests that meaning is the product of context. If we take this proposition seriously, then concordancing is an appropriate tool for teaching meaning through context (Kettermann 1998).

Despite the popularity of gap-filling exercises, students performance can be unexpectedly poor on

this type of exercise. One possible reason is that discursal clues and constraints on words allowed in a given blank may be well removed from the blank in question, and language learners, particularly at lower levels of proficiency, may not read gap-filling passages as cohesive, continuous text (as suggested in Nunan, 1985). Another reason is that, once a student misplaces one word, then that word is no longer available for placement in its correct position, and a domino effect is set up in which the number of incorrect answers is compounded. This can be discouraging for students; marks on a ten-item exercise, for example, could reach "failure" after misplacing just two words, sending a more negative signal than is deserved (Stevens 1991). In a concordance exercise, on the other hand, each word has several citations, and hence more context clues are available to the learner to help him figure out the right answer.

However, concordancing is not immune to criticism. A possible argument against concordancing is that students shouldn't do as well on such exercises because the items which draw directly from raw concordance output are truncated at either end, and students are therefore presented with fragmented text. Stevens (1991) contends that this is actually an advantage lending itself to exploitation in subsequent class periods because students can extrapolate the information missing at either end of the concordance output, and the more they extrapolate, the more they can recall and discuss the original context.

The students may be requested to fill in words immediately preceding and following the context fragment and encouraged to guess at what the entire sentence might have been (refer to Appendix B) In the event that the contexts themselves are taken from a

corpus built up from materials that are usually used by the students, the topic and the language of the texts will be familiar and relevant, increasing students' motivation to study such exercises as well as expanding opportunities for exploiting them.

Whether or not the corpus is drawn from familiar texts, the students appreciate the fact that they are dealing with authentic language and all its unpredictable insights. Furthermore, because they have more context to work with, hence double checks on their work, students succeed more often with these types of exercises than with traditional ones, and this bolsters confidence and feelings of accomplishment. The ability (or willingness) to extrapolate holistically from fragmentary evidence is a vital skill sadly lacking, even at the highest levels, in students passing through many educational systems; still, some teachers question on purely intuitive grounds the desirability of students coping with truncated text, thus further postponing the students' ever coming to grips with real-world data.

The concordancer is a useful program for material development and improvement. It is now possible for materials writers to concordance words in vocabulary lists to ascertain whether they actually appear in the textbooks, and to deal appropriately with words occurring rarely or not at all. One teacher discovered that many of the words never appeared in the science textbooks the students were reading. As a result, the English textbook was replaced by materials more appropriate to the students' coursework outside of English class (Stevens, 1991).

Materials developers with access to concordances will face two problems, especially with students who have little experience with either experiment-based

learning or computer-based technologies. The first problem is that students will not know how to approach a stream of linguistic data with the view to elucidating patterns in the language under study. The second is that students may be familiar with none of the basic concepts of computing that program developers may have taken for granted.

Concordancing: Grammar

In working with reported speech, often taught in schools in connection with the "backshift rule" (cf. Quirk et al. 1985: 1026), this rule covers about 3/4 of all cases of reported speech, however, speakers don't usually go through the trouble of reconstructing the original or direct utterances because there is no "communicative need" for this. Kettermann (1998:3) argues that there has been too much emphasis on the "mechanics" of the rule as the tendency has been to stress more the "formalism" than the "semantics" of reporting. More attention needs to be laid on the "situational context" and the "reported meaning". If this is done, then it will be possible to explain the "exceptions" to the "backshift rule", where the language users have chosen not to shift (refer Appendix C).

What these examples (refer to Appendix C) have in common is that the information in the reported clause is not oriented toward the past. In sentences 1, 2, 8 and 9 the notional meaning is Factivity, in 3,4 and 5 it is Recentness, in 6 Currentness and in 7 and 10 the notion expressed in the reported clause is Present Changes. These sentences are thus no "exceptions" if one take communicative intention seriously. Students should at least be taught to expect them (Kettermann, 1998).

The use of the concordancer can have considerable influence on the process of language learning, stimulating enquiry and speculation on the part of the learner, and helping the learner also to develop the ability to see patterning in the target language and to form generalizations to account for that patterning. What is distinctive about the DDL approach to inductive language learning is the principle that the data is primary, and the teacher does not know in advance exactly what rules or patterns the learners will discover: indeed, they will often notice things that are unknown not only to the teacher, but also to the standard works of reference on the language. It is this element of challenge and of discovery that gives DDL its special flavor and stimulus.

Concordancing: literature

Another area that benefitted a lot from DDL is literary criticism. A literary text can be analyzed in a variety of ways with the help of a concordancer. However, concordancing is, in no way, a substitute for critical thinking, but rather a tool which can be used investigatively, to enhance the interpretative power of the scholar. Concordancing is an appropriate tool for teachers to use both for individual, personal exploration of the text and very practically as an instructional tool for training students in critical thinking (Kowitz and Carrol 1991)

A growing amount of literary text is available commercially in computer-readable form, or increasingly often in CD-ROM. Oxford University Press has produced major works of literature in electronic text or CD-ROM format.

There are many reasons why concordancing can be a valuable tool in the literature classroom:

1. Perhaps for overloaded teachers, it provides a way of rapidly creating individual assignments.
2. Concordancing makes a text more accessible, by focussing attention on specific elements, rather than confronting the student with the whole text. These elements can be studied individually without the student having to extract them from an intimidating mass of text. For example, concordances can be made on words related to "eyes", "white", "gold" and "yellow", which have a major symbolic role in the Great Gatsby).
3. The methodology encourages group work that enhances learning considerably.
4. Because each student makes a specific, personal contribution to the task, which no other student can make, and for which there is no set answer available, active engagement is encouraged, rather than memorizing or simply "getting through the exercise".
5. Concentrating attention on small sections of text with a controlled focus (rather than on extensive reading and the absence of pre-digested guidance notes promote the development of interpretative skills.
6. Attention is focused on the interaction between the student and the text, rather than on the input from the teacher. The teacher, therefore, no longer holds the center stage.

Computer Aided Writing:

The Word processor

Of all the computer tools available to the language teacher, the most liberating and enabling by far is the

word processor (Kemble and Brierly 1991). Four basic word processing facilities are basic to any word processor-based writing course: formatting, cut and paste, insertion/deletion, and search and replace. Exercises for using these facilities can be aimed at improving the learners' abilities in punctuation, paragraphing, cohesion and coherence, morphological, grammatical, and syntactic patterns; lexical, semantic and pragmatic patterns.

Taylor (1995) found that when students rewrite a hand-written composition, they tend to start making the same mistakes all over again. But when they make specific corrections on a document which is on the screen in front of them, they tend to concentrate more on the corrections. Other features of the correction facility in word processing may facilitate the writing process. When students write a composition, their thinking tends to be linear. That is, one sentence follows another. But the word processing capability of moving around blocks and text frees students to see how sentences, phrases or paragraphs can fit together in new ways.

Desktop publishing

Although most DTP programs do have at least rudimentary text and graphics editing functions, their chief purpose is not the creation of textual and pictorial data, but the integration and arrangement of such data on the pages of a document (Minnerup 1991). One of the most common application of DTP in foreign language learning is the production of mock-up newspapers and magazines. The most obvious, and in many ways most attractive DTP exercise, is the production of one or more lookalikes of foreign newspapers or magazines. A different approach is to take the students own environment as a starting point

and produce a departmental newspaper/newsletter in the foreign language.

Interactive Multimedia

Video is to the spoken language what the book (or, more recently, the newspaper or magazine) is to the written language. It gives permanency to what is usually characterized by its ephemerality: speech. It provides a corpus for analysis, a model for imitation, a topic stimulus, a comprehension task (Coleman 1991).

The most obvious application for video is as an input for aural comprehension and as a model for imitation. Responding appropriately is the second approach, and there is no doubt that model dialogues can help. By repeatedly imitating a phrase spoken on video by a native speaker, a learner can acquire the correct structure, lexis and intonation, and can soon produce the phrase fluently (i.e. without hesitations). A further aspect of video is the socio-cultural information- the physical sights and sounds of the country, its towns and its people.

Interactive video, if used in sound-off mode, can provide the similar activity in which students predict the dialogue or commentary that accompanies a video sequence, and then-- with attention and motivation enhanced by expectation (and perhaps a competitive element)-- check their version against the real one.

In the past, some computer-literate linguists have thought of interactive video (IV) as CALL with a few pictures added. Few people these days would be likely to share this definition (Coleman 1991). Interactive video (IV), is described by as "potentially the most exciting development in educational technology this

century" (Hill 1988). Video has imposed itself as the sine qua non of communicative language teaching, specially at intermediate and advanced levels.

An example of how hypermedia can be used for language learning is the program "Dustin" which is being developed by the Institute for Learning Sciences at Northwestern University (Schank & Cleary, 1995). The program is a simulation of a student arriving at a U.S. airport. The student must go through customs, find transportation to the city, and check in at a hotel. The language learner using the program assumes the role of the arriving student by interacting with simulated people who appear in video clips and responding to what they say by typing in responses. If the responses are correct, the student is sent off to do other things, such as meeting a roommate. If the responses are incorrect, the program takes remedial action by showing examples or breaking down the task into smaller parts. At any time the student can control the situation by asking what to do, asking what to say, asking to hear again what was just said, requesting for a translation, or controlling the level of difficulty of the lesson.

The Internet: An integrative approach to language learning

The Internet is probably the single computer application to date with the greatest impact on language teaching. For the first time, language learners can communicate directly, inexpensively, and conveniently with other learners or speakers of the target language 24 hours a day, from school, work, or home. Communication through the Internet can be asynchronous (not simultaneous) through tools such as electronic mail (e-mail), which allows each participant to compose messages at their time and

pace, or it can be synchronous, which allows people all around the world to have a simultaneous conversation by typing at their keyboards. It also allows not only one-to-one communication, but also one-to-many, allowing a teacher or student to share a message with a small group, the whole class, a partner class, or an international discussion list of hundreds or thousands of people (Bush 1996).

The Internet is described as an "amorphous global network of thousands of linked computers that pass information back and forth" (Tillyer 1995). This definition, however, neglects the richness, color, variety and texture of "Cyberspace" (Tillyer, 1997). The Internet is a powerful research and teaching tool which creates vast opportunities for cultural and linguistic exchange.

Using the World Wide Web (WWW), students can search through millions of files around the world within minutes to locate and access authentic materials (e.g., newspaper and magazine articles, radio broadcasts, short videos, movie reviews, book excerpts) exactly tailored to their own personal interests.

For educators, the most revolutionary and important attribute of the Web is hypertext. Essentially, hypertext is a way of presenting material and information in layers, or "stacks". A piece of text that has hypertext item is prepared in HTML (hypertext markup language), and certain words and phrases in the text are colored differently from the rest of the text. The color coding indicates that if the reader clicks on the colored word with the mouse, another text or set of information can be accessed and revealed. Hypertext allows one piece of text to be read at varying levels of complexity and depth. One

application for language learners is to have the dictionary "embedded" in the document, so that readers can "click" on a word that they don't know and immediately get a definition of the word. Other sources where learners can find hypertext is the CD-ROM; for example, the Microsoft Encarta CD-ROM encyclopedia (Tillyer 1997). The learners can also use the Web to publish their texts or multimedia materials to share with partner classes or with the general public.

It is not hard to see how communication via the Internet can facilitate an integrative approach to language learning. The following example illustrates well how the Internet can be used to help create an environment where authentic and creative communication is integrated into all aspects of the course.

Students of English for Science and Technology in La Paz Mexico don't just study general examples and write homework for the teacher; instead they use the Internet to actually become scientific writers (Bowers, 1995; Bowers, in press). First, the students search the World Wide Web to find articles in their exact area of specialty and then carefully read and study those specific articles. They then write their own drafts online; the teacher critiques the drafts online and creates electronic links to his own comments and to pages of appropriate linguistic and technical explanation so that students can find additional background help at the click of a mouse. Next, using this assistance, the students prepare and publish their own articles on the World Wide Web, together with reply forms to solicit opinions from readers. They advertise their Web articles on appropriate Internet sites (e.g., scientific newsgroups) so that interested scientists around the

world will know about their articles and will be able to read and comment on them. When they receive their comments (by e-mail), they can take these into account in editing their articles for republication on the Web or for submission to scientific journals.

From pen-pals to e-pals

E-mail presents an alternate and innovative version to the old pen-pal programs. One advantage of using e-mail is that the students acquire the skill of word processing if they are not familiar with it, and get plenty of practice if they are. On the other hand, the same technical ability can cause problems and hinder the flow of letters due to any number of software or hardware problems (Sela 1997).

Tillyer (1995) discusses two broad categories of communication: person-to-person; and person-to-data:

1. Person-to-person electronic communications: This can be a one-to-one format as in private messaging via electronic mail.
2. Person-to-data electronic communication: Teachers can access any of the libraries in universities to create bibliographies, check references or obtain articles.

Machine Translation

At the simplest level and considering the systems available for classroom use, it is probably best to divide development of machine translation (MT) into two periods, pre- and post- 1966. In his review of Hutchins, Knowles (1990) points out that the chronological and geographical approach to the

development of MT has been supplemented by a differentiation of MT approaches into direct, transfer, interlingual and artificial intelligence (AI) systems.

The main consideration which faces the translation service or technical writing section when considering the purchase of hardware and software is the extent to which the use of the computer will cut down the time and effort which translation entails.

The use of MT packages in the classroom is divided into three different modes of application:

- using an MT system as a means of learning more about a foreign language (in this case the language, not the MT system, is the object of interest);
- using a particular MT system as a way of introducing students to the general concept of MT (MT as a field is the object of interest);
- showing students how to use the various facilities available on a specific system and encouraging them to evaluate the system's knowledge (the software itself- and its eccentricities- are the object of interest) (French, 1991)

3. CALL ADVANTAGES AND LIMITATIONS

Advantages

Because it is largely a hands-on task, novel, game-like, exploratory and involves a lot of problem solving, CALL is expected to boost motivation for a wide base of students. For some even the tedious pattern drills can become more interesting outside its conventional text format.

CALL programs offer a valuable source of self-access study adaptable to the learner's level. They also provide immediate feedback for error identification and self-correction.

The computer can offer unlimited types of activities with considerable potential for learning situations, can be connected to a video for visual input or to a cassette recorder for listening comprehension.

On a more general note, the CALL programs, beside teaching a foreign language, will provide the learner with some sort of computer literacy, which is becoming essential in our modern societies and which could be of great help in future training and career prospects (Mirescu 1997).

Learning vocabulary on the computer enhances motivation, interpersonal interaction and reader-text interaction.

It has been pointed out that one of the advantage of exploratory approach is that students can be provided powerful means of systematically accessing data, and so can, in theory, learn by observing and manipulating more comprehensive and authentic databases of materials than they could using any other medium.

While programmed instruction (PI) might actually limit student access to linguistic data, in so far as it restricts them to a prescribed program of learning, the exploratory approach broadens the field considerably and encourages student's independence and curiosity (Dheif 1990).

Machine-readable authentic text is often available in the workplace in the form of material that ESL instructors, or teachers in other discipline, have

created using word processors. Students are thus able to work interactively with texts that are authentic and often of immediate relevance to them (see Stevens 1988a, for a description of the use of such programs in a language learning setting).

Some types of software for exploring databases allow permutation of text, creating reconstruction puzzles which students then resolve. For example, sentences are put out of order, and students restore them; or sentences are encrypted and students decode them; or cloze passages are created, and students replace the missing words (Stevens and Millmore, 1987).

The Internet can facilitate an integrative approach to learning languages and using technology. It can be used to help create an environment where authentic and creative communication is integrated into all aspects of the course.

Electronic e-mail allows learners to communicate quickly and inexpensively over long distances without obstacles such as time zone differences, the time-lag of ordinary mail, or the long-distance telephone charges for faxes (Tillyer 1997).

Limitations

A lot of time may be wasted if learners are not familiar with the keyboard.

Working in isolation does not promote normal communication between the learners. Learners tend to revert to the mother tongue in discussing their strategies or responses.

Some CALL programs that deal with developing communicative interaction normally present

predetermined uses of language based on the writer's imagination of what would take place rather than what people really say in real situations. This sometimes creates confusion and frustration in the learner when a genuinely grammatical and appropriate utterance is rejected as being incorrect by the computer.

The time and effort required to develop CALL programs could be considerable, and thus their cost effectiveness becomes questionable.

Windeatt (1986) notes several ways that cloze exercises as they are typically implemented on computer may counter optimal reading strategies. For example, students working on cloze exercises on a computer treat text locally rather than globally, as they rarely scroll past one screen (when the cloze was presented on paper, they tended to read over the entire text). Moreover, they tend to pursue solutions one blank at a time rather than considering other blanks which might provide clues to the solution of the original blank (students working on paper moved quickly from blank to blank).

Most classroom teachers lack the training or the time to make even simple programs, let alone more complex and sophisticated ones such as "Dustin". This has left the field to commercial developers, who often fail to base their programs on sound pedagogical principles. In addition, the cost involved in developing quality programs can put them out of the market of most English teaching programs (Bush 1996).

Someone once described the Web as much like a huge, wonderful library. You enter the front door and there are all the books - piled in the middle of the floor. Another one, when asked whether she was doing

anything on the Web, replied, "Oh, you mean the World Wide Wait?". It is easy to understand that these two comments illustrate the need for easier access to information and faster ways to distribute it (Bush 1996).

4. IMPLICATIONS TO L2 TEACHING AND LEARNING

The Master- Pedagogue Model of CALL

Many approaches to language teaching assume a teacher is both proficient in the subject matter and intelligent about deciding how to present it, while also assuming a learner with no proficiency and no intelligence. Under such a model, nothing is learned unless it is explicitly taught; learners have to be given, since they can not take. Paradoxically, if one adopts an approach which respects the learner's intelligence, it may turn out that the learner wants and needs an unintelligent partner, a partner who will behave in a totally predictable and rule-governed way.

John Higgins (Higgins 1988) has become associated with the magister-pedagogue dichotomy, which is also related to this concept of learner responsibility. Higgins suggests that the pedagogue qualities of computers (slave-like, unimaginative) can be used to develop the opposite qualities in students, whereas a domineeringly proficient and intelligent magister would assume (and can actually promote) the absence of proficiency and intelligence in students.

Higgins is saying that learners exhibit intelligence and imagination when given control over their learning (on computers), while the reverse is true when their mode of learning controls them. The problem, as Higgins would point out, is that many

teachers fail to think pedagogically. According to Higgins, much misunderstanding of the role of computers in language learning arises from the magisterial rather than pedagogical thinking. Higgins (1988) sees the computer as "pedagogue" (p14) versus the more commonly shared perception of the computer as "magister" (p.12). He contends that the computer can best serve language learners in the more subservient role: the machine's inherent domain is as tool, as slave, as something over which students can exert a certain amount of power and control. The computer is something to think with, not answer to. The teacher's role in CALL activities is to set tasks and to "hover" (p.26) as nonmagisterially as possible while students work. The teacher does act as a guide, seeking to "detrain" (p.27) students who are likely to be accustomed to learning magisterially (Higgins 1988).

Higgin's views are very much in keeping with humanist approaches to learning articulated in the psychology of Carl Rogers. Rogers postulates an "urge which is evident in all organic and human life-- to expand, extend, become autonomous, develop, mature-- tendency to express and activate all the capacities of the organism, to the extent that such activation enhances the organism or the self... it is my belief that it exists in every individual, and awaits only the proper conditions to be released and expressed." (Rogers 1961: 35)

One common misgiving one hears about CALL is the fear that the computer will turn out to be as much of a disappointment as the language laboratory (Higgins and Johns 1984). The language laboratory was oversold during the fifties and sixties, and the tapes available for it at that time were generally rather unimaginative and based on sentence manipulations.

The underlying learning theory was behaviorism and the underlying linguistic theory was structuralism, both of which were in the process of being challenged, and to a great extent, discredited. The great mistake, in retrospect, seems to have been installing the machines in large, unwieldy assemblages which were very expensive, and skimping on the costs of training and software development.

Lessons learned from the language lab

The cheap microcomputer is still not as easy to use as the cassette recorder, but it is rapidly becoming as familiar in the form of the games-playing machine. The lessons we can learn from the language laboratory experience are not to impose computers on staff who have not been prepared or trained to use them, to put more money and effort into developing software than into acquiring hardware, and to use small, flexible units rather than large, centrally-controlled installations. Computers then become aids under the control of teachers and learners; they are "slaves", not "masters" (Higgins and Johns 1984).

Asking the right questions about CALL

Three questions are often asked about CALL: Do students like it? Do students use it? Does it work? (Chapelle & Jamieson 1986). These questions address practical concerns, yet they are based on two faulty assumptions. First, they assume that students think and act in a uniform manner, even though teachers and researchers alike agree that students differ in their learning styles and strategies. Second, the questions presuppose that CALL is a single method of instruction, whereas it is actually a vehicle for implementing a range of approaches representing a variety of teaching philosophies. These points do not

deny the basic importance of asking questions about the value of CALL; instead they indicate the need to modify the questions: What kind of students like and use a particular type of CALL? Do those students who use CALL achieve greater success in the second language?

Implications to Methodology

Bedford (1991) argues that there is an urgent need for a methodology for curriculum development in modern languages which includes the use of Information Technology (IT) and that the curriculum development methodology adopted should be capable of transcending the limitation of working solely from within a particular language teaching methodology. Bedford defines methodology as "a systematic way of combining techniques and methods to solve problems. It is always based on a philosophy, and needs to address the views and objectives of those using it to fulfil a purpose. The purpose may be known beforehand, or may be an emergent property of part(s) of the methodology being used, according to the underlying philosophy" (Bedford 1991).

CONCLUSION

To be both economically and educationally feasible, a CALL methodology must meet the following minimum criteria. It must encourage maximum interaction between the learners, on the one hand, and between the learners and the programs on the other hand. The programs must focus on activities that operate beyond the word and sentence level e.g. anaphoric and cataphoric reference, interpretation of text, increasing the learners' reading speed and critical thinking. A computer lesson that does not go beyond the conventional pattern practice is not worth the

money spent on it. Finally, the entire CALL activities must be compatible with the pedagogical goals of the mainstream English curriculum.

References

Bedford, A.M.Z 1991. Methodology for CALL beyond language teaching paradigms. In Brierley, W. & Kemble, I. (eds.).1991. Computers as a Tool in Language Teaching. Ellis Harwood.

Bowers, R. (1995). WWW-Based Instruction for EST. In T. Orr (eds.) English for Science and Technology: Profiles and Perspectives (pp. 5-8). Aizuwakamatsu, Japan Center for Language Research, University of Aizu. In Warschauer, Mark (1996). Computer Assisted Language Learning: An Introduction. In S. Fotos (ed.). Multimedia Language Teaching (pp. 3-20). Tokyo: Logos International. Bowers, R. (in press). Web publishing for students of EST. In Warschauer, M. (eds.), Virtual Connections: Online activities and projects for networking language learners, Honolulu, Hawaii: University of Hawaii Second Language Teaching and Curriculum Center.

Bush, Michael D. (1996). Language Learning via the Web. Brigham Young University. Paper presented at the Symposium of the "Computer Aided Language Consortium (CALICO), Albuquerque, NM, 29 May 1996.

Chapelle, C. & Jamieson, J. (1986). Computer-Assisted Language Learning as a Predictor of Success in Acquiring English as a Second Language, TESOL Quarterly, 20: 1, 27-46.

Coleman, J.A. 1991. Interactive Multimedia. In Brierley, W. & Kemble, I. (eds.).1991. Computers as a Tool in Language Teaching. Ellis Harwood.

Craik, F.I.M and Lockhart, R.S. (1972). Levels of

processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior* 11: 671-684.

Dhaif, H. 1990. Computer Assisted Language Learning: A Client's View. *CALICO Journal*, June 1990.

Dhaif, H. 1989. Can Computers teach Languages? *English Teaching Forum*, July 1989.

(Untitled) 1995. Internet Idioms. (p.49). *Forum*, Vol. 33, No. 4, Oct 1995.

Fox, J.D.1989. Can computers aid vocabulary learning? In Cameron, K.C (ed). *Computer assisted language learning- program structure and principles*. Oxford: Blackwell Scientific Publications.

French, J.R. 1991. Machine Translation. In Brierley, W. & Kemble, I. (eds.).1991. *Computers as a Tool in Language Teaching*. Ellis Harwood.

Higgins, J. (1987). Artificial Unintelligence: Computer Uses in Language Learning. *TESOL Quarterly*, 21 (1) 159-165. University of Bristol.

Higgins, J. and Johns, T. 1984. *Computers in Language Learning*. Reading, MA: Addison- wesley.

Higgins, 1988. *Language, Learners and Computers: Human Intelligence and Artificial Unintelligence*. London and New York: Longman.

Hill, B. (1988). Developments in interactive video. *Die neueren Sprachen* 87, 591-9. In Kenning, M.M. (1990). *Computer-assisted language learning*. *Language Teaching*. The international abstracting journal for language teachers and applied linguists. CUP.

Johns, T. 1991. From Printout to Handout: Grammar and Vocabulary Teaching in the Context of Data-Driven Learning. In Johns, T. and King, P. (eds.). Classroom Concordancing. ELR Journal, Vol.4. Centre for English Language Studies, The Univ of Birmingham.

Johns, T. 1991. Should You be Persuaded: Two Examples of Data-Driven Learning. In Johns, T. and King, P. (eds.). Classroom Concordancing. ELR Journal, Vol.4. Centre for English Language Studies, The Univ of Birmingham.

Kemble, I.R. 1991. Lexicography. In Brierley, W. & Kemble, I. (eds.).1991. Computers as a Tool in Language Teaching. Ellis Harwood.

Kemble, I.R. and Brierly, W. 1991. Word Processing. In Brierley, W. & Kemble, I. (eds.).1991. Computers as a Tool in Language Teaching. Ellis Harwood.

Kenning, M.M. (1990). Computer-assisted language learning. Language Teaching. The international abstracting journal for language teachers and applied linguists. CUP.

Kettermann, B. 1998. On the Use of Concordancing in ELT. (Downloaded from Internet)

Knowles, F. 1990. Language and It: rivals or partners?, Literary and Linguistic Computing, 5,1.

Kowitz, J. and Carrol, D. (1991). Using Computer Concordances for Literary Analysis. In Johns, T. and King, P. (eds.). Classroom Concordancing. ELR Journal, Vol.4. Centre for English Language Studies, The Univ of Birmingham.

Minnerup, G. 1991. Desktop Publishing. In Brierley, W. & Kemble, I. (eds.).1991. Computers as a Tool in Language Teaching. Ellis Harwood.

Mirescu, S. (1997). Computer Assisted Instruction in Language Teaching. Forum, Vol. 35, No. 1, Jan. 1997.

Nunan, D. (1985). Content familiarity and the perception of textual relationships in second language reading. RELC Journal 16, 43-50. In Stevens, V. 1991. Concordance-based Vocabulary Exercises: a Viable Alternative to Gap-fillers. In Johns, T. and King, P. (eds.). Classroom Concordancing. ELR Journal, Vol.4. Centre for English Language Studies, The Univ of Birmingham.

Quirk, R., Greenbaum, S., Leech, G. and J. Svartvik (1985). A Comprehensive Grammar of the English Language, Longman, Harlow.

Reis, L. 1995. Putting the Computer in its Proper Place-- Inside the Classroom. Forum, Vol. 33, No. 4, Oct 1995.

Richards, Jack C. (1976). The role of vocabulary teaching. TESOL Quarterly 10, 1:77-89.

Rutherford, W.E. 1987. Second language grammar: learning and teaching Longman.

Schank, R.C. and Cleary, C. (1995). Engines for Education. Hillsdale, NJ: Lawrence Erlbaum Associates. In Warschauer, Mark (1996). Computer Assisted Language Learning: An Introduction. In S. Fotos (ed.). Multimedia Language Teaching (pp. 3-20). Tokyo: Logos International.

Sela, O. (1997). Using E-mail in the EFL Classroom.

Forum, Vol. 35, No. 1, Jan. 1997.

Rogers, C. (1961). On becoming a Person: A Therapist's View of Psychotherapy, London: Constable. In Stevens, V. Humanism and CALL: A coming of age. Sultan Qaboos University, Oman.

Stevens, V. (1988a). Self-access language learning materials at Sultan Qaboos University. The Journal of Educational Techniques and Technologies, 21: 2/3, 2-4.

Stevens, V. 1990. Text Manipulation: What's Wrong with it Anyway? CAEL Journal, Vol.1. No. 2.

Stevens, V. and Millmore, S. (1987). TEXT TANGLERS. Stony Brook, NY: Research Design Associates.

Stevens, V. 1991. Concordance-based Vocabulary Exercises: a Viable Alternative to Gap-fillers. In Johns, T. and King, P. (eds.). Classroom Concordancing. ELR Journal, Vol.4. Center for English Language Studies, The Univ of Birmingham.

Stevens, V. 1991. Reading and Computers: Hangman and Cloze. CAEL Journal, Vol. 2, No. 3.

Stevens, V. (1991). Classroom Cocordancing: Vocabulary Materials Derived From Relevant, Authentic Text. English for Specific Purposes, Vol. 10, pp. 35-46.

Taylor, M. and Perez, L., 1989. Something to Do On Monday. La Jolla: Althestan.

Taylor, R.L. (1995). Revisiting McLuhan's Thesis: The Medium in the Message. Forum, Vol. 33, No. 4, Oct 1995.

Tillyer, A. (1995). "Modem" Times: How Electronic Communications are Changing Our Lives. Forum, Vol. 33, No. 4, Oct 1995.

Tillyer, A. (1997). The infiniNET Possibilities. English Teachers on the internet. English Teaching Forum, Vol. 35, No. 1, Jan. 1997.

Underwood, J.H. 1984. Linguistics, Computers, and the Language Teacher: A Communicative Approach. Rowley, Massachusetts: Newbury House Publishers, 1984.

Warschauer, M. 1995 (eds.), Virtual Connections: Online activities and projects for networking language learners, Honolulu, Hawaii: University of Hawaii Second Language Teaching and Curriculum Center.

Warschauer, Mark (1996). Computer Assisted Language Learning: An Introduction. In S. Fotos (ed.). Multimedia Language Teaching (pp. 3-20). Tokyo: Logos International.

Windeatt, S.(1986). Observing CALL in action. In G. Leech & C. Candlin (Eds.), Computers in English language teaching and research (PP. 79-97). New York: Longman.