Foreign Language Authoring Systems: Judith Frommer's MacLang Spoken Here

Good computer-assisted language learning software is effective in performing the routine aspects of foreign language acquisition. MacLang, a user-friendly authoring system for the Macintosh computer, provides teachers with a tool for preparing and tailoring computer exercises and activities specifically for their language courses. Usable with any Roman-alphabet language, Russian, and Greek, MacLang is capable of creating exercises in a variety of formats, including graphics and, coupled with an audio interface, can also generate listening comprehension exercises. MacLang's answer-processing system gives students intelligent feedback which leads them to self-discovery of the correct answer. In addition, MacLang includes options that allow students to control computer activity which enables them to make their language learning active, self-paced and individualized.

Many educators are fascinated by computers and use them without really knowing why; others are traumatized by them and refuse to consider using computers in spite of potential benefits. In both cases, technology is preventing the individual from assessing the pedagogical advantages of computers. Furthermore, a popular approach to computer-assisted instruction recommends that teachers adapt their courses to the capabilities of a given computer in order to get the most from the machine.

Popular fascination and approaches notwithstanding, if computers are to serve education, teachers should first analyze their courses and—given the capabilities of the computer—decide in what ways it can help them achieve their pedagogical goals. The teacher's question should not be: "What kind of impressive things can this computer do?" but "How can this computer help my students learn more effectively in the context of our learning situation?"

The context of the learning situation includes numerous factors which affect the decision to use computer-assisted instruction, and it determines the specific software. Course content, student priorities, faculty attitudes, and hardware configuration are factors that must be considered when planning for computer-assisted instruction.

A pivotal factor in the context of any learning situation is course content. Of the four generally-accepted types of educational software—drill-and-practice, tutorials, simulations, and games (Ariew & Frommer, 1987)—simulations are perfectly suited to chemistry courses. Simulations present a situation in which the student plays a role in what is happening on the screen. A scene or action is portrayed by graphics or by a computer-controlled videotape/videodisc player; at certain points, the student is called upon to make key decisions. The student's decisions or answers determine the content and the sequence of the student-computer interaction. In a chemistry course, the simulation involves the reactions of chemicals in an experiment, and student input is limited to choosing the type and quantities of chemicals

used. This type of simulation is effective and satisfactory because it reproduces exactly what the student would do in an actual laboratory.

Unlike chemistry, foreign language learning is not based on experiments with limited elements and predetermined reactions. A true foreign language simulation would involve the formulation of a reply in a given situation, that is, an intelligent reaction that currently cannot be executed by any computer.

To be sure, foreign language simulations—using videodiscs and multiple choice questions—have been done; they involve students who determine the sequence of events in a supposedly true story—all of which purportedly helps improve their comprehension while at the same time exposing them to authentic target language culture (Meléndez, 1980). Such simulations, however, while effective and entertaining, do not faithfully replicate the real life situation, as is the case with chemical reactions in the chemistry simulation; additionally, such target language simulations are less effective in promoting target language speech production than a good, interactive classroom situation.

Research is being done in using the computer to simulate human interaction and process natural language. While waiting for this potential to be realized, however, computers can be used now to do what they do best, namely, repetitive exercises. If computers handle the chores of repetition, teachers can be free to do what they do best, namely, human interaction.

Basic exercises and contextualized activities—with proper error analysis—provide an ideal computer component for beginning and intermediate language courses. By taking advantage of current technology to help students master basic target language listening and reading skills, the teacher can create an interactive language classroom in which communicative activities replace routine, repetitive drills and exercises.

Basic exercises and contextualized activities with proper error analysis may seem a somewhat retrograde approach. Papert tells us that the child should program the computer, rather than vice versa (Papert, 1980). Other experts tell us to replace dull, electronic workbooks with games that students will find more stimulating (Higgins & Johns, 1984); yet, no one has proved that students actually learn from games. In fact, a study of student response to computer-assisted instruction showed that the criterion college students applied in evaluating foreign language courseware was whether or not they felt that they were learning (Frommer, 1984). They were not interested in winning a game but in finding out how to say something correctly; they did not like unnecessary noise or decorative graphics.

At the elementary, junior high, and even high school levels, students enjoy playing games on a classroom or language laboratory computer while other students are doing written work, but college students using computers demand pragmatic results; if the courseware does not help them learn, or, more specifically, does not help them get better grades, they prefer to spend their time on other priorities.

While course content and student priorities are important in the context of the learning situation, the importance of faculty attitudes and hardware configuration must not be overlooked.

The successful introduction of computer-assisted instruction into foreign language programs depends on the enthusiasm of instructors. In many colleges and universities with multi-sectioned language courses, it is difficult for department heads interested in using computer-assisted language learning to convince all instructors of the value of this technological tool. Even when instructors are willing to be involved, foreign language instructors usually are not familiar with computers; instructors—especially those unfamiliar with computers—need highly user-friendly software and hardware in order not to become overly frustrated and disillusioned.

The college administrator or computer specialists, rather than instructors, usually determine the type of computer that will be used at a given institution. Practical considerations—cost and existing computers—may influence the choice of computers for language learning.

The selection of software, on the other hand, is usually the responsibility of faculty who must be mindful of today's pragmatic, results-oriented college students. Such pragmatics demand that software correlate directly with course content; software should reinforce vocabulary and grammar concepts used in the classroom.

With few exceptions, commercially-available software programs created for specific textbooks are inflexible. As a result, teachers face the choice of either arranging their courses to fit the existing software or creating their own software programs. Unfortunately, the creation of software specifically tailored to a course demands knowledge, skills, and time that the average language teacher does not have.

A solution to this "Catch-22" situation is the use of an authoring system that simplifies computer use, thereby enabling relatively inexperienced computer users to prepare their own software (Zetterstein, 1985).

While planning to introduce computer-assisted language learning into my courses at Harvard, I discovered that no authoring system existed for the computer I wanted to use, namely, Apple's Macintosh. Thus began the development of MacLang as our authoring system is called. (Others involved in this project were Scott Bradner of the Department of Psychology at Harvard, who served as technical advisor, and Harvard student programmers, David Frankel and Scott Roy).

The Macintosh was chosen for two reasons: 1) it is particularly well-suited to foreign language applications because of its font capabilities, that is to say, characters of Roman alphabet languages are automatically provided for, and character sets for other languages can be easily created; and, 2) it is user-friendly; the Macintosh capabilities of window technology, pull-down menus, and mouse operation means users need only master a few mechanical maneuvers instead of the numerous commands and procedures of other computers.

In developing MacLang, we were concerned with avoiding the pitfalls inherent in much of today's educational software. Since MacLang aims to help both teachers and students—by providing learning opportunities outside the classroom—we wanted it to be more than an "electronic workbook;" we did not want MacLang to do little more than ask simple questions and tell the user if the answers are right or wrong without explaining why, and as such, no better—but more expensive—than a workbook with answer key (Ariew & Frommer, 1987). Additionally, we tried to make MacLang as flexible as possible. If an authoring system permits the creation of exercises in prescribed formats only, it is all too often of limited value.

Not bound by the inflexibility that comes with prescribed formats, MacLang allows the author (as the teacher user creating software shall be referred to) leeway in creating effective software. The capabilities of MacLang that are of particular value to software authors are multiple languages, multiple exercise types, question preparation options, multiple right answers, sophisticated answer processing, and audio/graphics options.

Multiple Languages

In any exercise, authors can use both English and any one of the following target languages: English, French, Spanish, German, Italian, Portuguese, Rumanian, Russian, or Greek. The Roman alphabet languages can be used interchangeably with English. When using Greek or Russian—to create or execute an exercise—it is necessary to depress the CAPS LOCK key to type English.

Multiple Exercise Types

There are six principal exercise types: vocabulary, complete sentence, fill-in-the-blanks, "paragraphs," multiple choice, and "jumbles." All of these exercise types can be used for a variety of objectives.

Vocabulary Exercises. These provide for simple translation from the target language to English or vice versa or identification of a target language word or expression based on a simple definition in English or in the target language. This format is especially useful with Russian and Greek, since in these two languages—in addition to learning new lexical items—students must master new symbols for expressing such items as well.

Complete Sentence Questions. These consist of short questions which students must answer with a complete sentence. This exercise type is particularly useful in practice with personal pronouns, negative expressions, and other instances where word order is important.

Fill-in-the-blanks. In this format, authors can ask questions consisting of a single sentence with a single blank. This exercise type is particularly well-suited for the practice of verb tenses, prepositions, or conjunctions. It is also possible to omit part of a word, allowing for completion as in the case of verb endings in Romance languages or the prefixes/suffixes in German.

Paragraph Exercises. MacLang accepts up to 20 blanks in any one question and can have any number of questions (determined by available memory). The author can input any length text with as many as 20 blanks for students to fill in. The paragraph format offers students opportunities for doing contextualized activities with greater learning significance than simple, computer drill-and-practice exercises.

Multiple Choice Questions. Any number of possible answers may be presented from which the student can choose; there is no limit to question or answer length. However, it is necessary for students to respond using the letter of the answer they choose; they cannot use words or sentences. Since question length is unlimited, authors can input a text and use this format for reading comprehension activities as well.

Jumbles. In this type of exercise, students are asked to rearrange the words in a sentence or in a paragraph. This format is useful in helping students learn appropriate sentence structure, and it can be instrumental in improving their reading comprehension in the target language as well.

Question Presentation Options

Questions can be presented in the order in which they are entered into the exercise by the author or in random order depending on the exercise type. Paragraph questions would normally be presented in order because they would loose their significance if presented out of order. On the other hand, random order—with order of presentation different each time the exercise is done—is appropriate for short fill-in-the-blank questions or vocabulary exercises. It is also possible to present questions in reverse order.

Authors can select the number of tries students will have to reach the correct answer. This depends, of course, on the difficulty of the material and the aim of the exercise. For example, one try is sufficient for most students in the case of simple grammatical manipulation, but three tries are more appropriate for more difficult situations such as choosing a verb tense based on the context and conjugating that verb at the same time.

Multiple Right Answers

MacLang exercises are capable of recognizing more than one right answer. This is important since there are many cases in which more than one correct answer is possible.

Answer Processing

Since the principal aim of MacLang is to provide students with feedback that will help them learn, it includes features designed to lead the student user to self-correction of mistakes. MacLang is an intelligent helper instead of an electronic workbook that only tests and tells whether or not answers are correct or incorrect. Its capacity to store, recognize anticipated wrong answers, provide specific error messages, and give right answer explanations—these make MacLang not only an intelligent helper but a sophisticated one as well.

When creating MacLang exercises, authors anticipate wrong answers that they think their students may make and provide corresponding error messages that will flash on the screen immediately when the student user responds with one of the anticipated wrong answers.

If the error message contains an explanation of why the answer is incorrect—and suggestions for arriving at the correct answer—the student should find the correct answer by him or herself. In the event the student is unsuccessful after a predetermined number of attempts, the right answer appears on the screen with—if the author has provided it—an explanation to help the student user understand why the answer is correct.

The quality of all MacLang exercises depends entirely on how much time, effort, and thought the author spent in creating the exercises. However, MacLang has been designed to make the technical aspects of authoring easier.

For example, authors are spared the tedious task of entering the same message again and again for the many errors that repeatedly reoccur. MacLang's "standard message" feature requires that the message be entered once and assigned a number. Thereafter, the author uses only the assigned number instead of being obliged to retype the entire message every time it is applicable.

With MacLang's language-specific checking option, one element of an answer—such as accents in French or capitalization in German—can be verified automatically. It is also possible with MacLang to remove all punctuation from answers so that authors need not take misplaced periods or commas into consideration when anticipating wrong and right answers or in preparing error messages.

In its treatment of unanticipated wrong answers, MacLang automatically records all unanticipated wrong answers in a file that can be accessed by the author who, if he or she wishes, can direct MacLang to transfer the unanticipated wrong answers to the anticipated wrong answer location of the particular question and provide an appropriate error message; an author can also decide that the unanticipated wrong answer is inconsequential and discard it. If, by chance, the unanticipated answer turns out to be a correct answer that the author overlooked in preparing the exercise, it can be added to the pool of right answers. The instructor who regularly updates the anticipated wrong and right answer files can, in time, create well-developed exercises.

Audio and Graphics Options

The audio and graphics options that can be integrated into any MacLang exercise format add to this authoring system's usefulness. The audio option enables students to improve their listening comprehension skills, while the graphics option permits greater contextualization of exercises.

Audio Option. MacLang makes it possible to interface the Macintosh 512K, or MacPlus with the Tandberg 530 or 812 audio tape recorders. Students listen to a computer-controlled tape and answer questions about the tape content. A tape segment—determined by timing—can be replayed up to three times if the student is unable to correctly answer questions about the tape content. If the student's answer is still incorrect after three attempts, the relevant text can be made to appear on the screen.

Graphics Option. Any MacPaint or MacDraw document can be used in conjunction with a MacLang exercise. If the author supplies the title of the document when creating a question, the document will be automatically displayed when the student does the exercise.

With MacLang, authors enjoy flexibility in the creation of exercises. At the same time, student users of the exercises do not get the locked-in feeling—a major objection of students who use computer-assisted language learning (Frommer, 1985).

As opposed to the traditional, teacher-directed classroom, computer-assisted learning should offer students opportunities to make decisions that control learning rate and sequence. MacLang has four features or functions that enable the student to individualize his or her learning.

The Help Function

In the introduction to each exercise, authors should include specific instructions for execution of the exercise and complete explanations of the grammar point on which the exercise is based. The student has the option at all times when doing a MacLang exercise to consult the exercise introduction; he or she can refer to it while answering questions and, thereby transform the exercise from the realm of simple drill-and-practice to the reality of a tutorial.

The Quit Function

A Quit Button on every screen permits students to exit an exercise at any time. This exit option can give students a sense of being in control rather than being controlled by the machine. In this sense, the learning experience is more active since students know they have the power to act instead of waiting passively for the machine to tell them what to do.

Self-Directed Branching

Branching in the strictest sense is not a part of MacLang. The program does not divert the student from one exercise to another depending on user performance. Instead, students —by being able to exit at will and able to select the order in which they proceed working through an exercise (there can be as many exercises as disk storage permits)—determine the path their learning takes. Conventional branching involves complicated programming and appears sophisticated; in fact, it contributes to the computer controlling the user not vice versa.

Number of Tries

Authors who insist that their students assume full responsibility for their learning can choose not to select the number of tries students are permitted, but will leave that decision up to the students. This permits students to decide how they would like to do an exercise—often determined by time constraints and mood.

For example, if students have a great deal of time and are learning a grammar point for the first time, they may want to take four tries to find the right answer; on the day of an exam, however, students may want to test themselves by opting for only one attempt at the right answer.

MacLang can keep track of the number of tries and the number of incorrect and correct answers given in a specific exercise. It does not, however, calculate scores in the form of percentages, like test grades, for example.

At the end of an exercise, the student can see his or her record of correct and incorrect attempts on the screen. The author can also consult a file in which the records of all students who have done the exercises are listed. This will indicate who is learning the material easily, who is having difficulty, and which points are causing more problems than others for the class as a whole.

Implementation of MacLang at Harvard

began on an experimental basis last year, and, thus far, student user reaction has been extremely positive. Although the stock of exercises is still limited, currently, MacLang is required in three intermediate French courses. Despite the inevitable glitches inherent in the introduction of any new medium into the curriculum, student reaction to computer-based language learning has been positive.

It is too early to make any conclusive statement about the effectiveness of computer-assisted language learning, particularly since no controlled study has been undertaken. Be that as it may, student enthusiasm and a tendency toward higher quiz grades among students who use the computer regularly suggest that MacLang may be accomplishing its goal of helping students learn a foreign language.

References

Ariew R. & Frommer, J. (1987) Interaction in the Computer Age. *Interactive Language Teaching* (pp. 336-368) New York: Cambridge University Press.

Frommer, J. (1984) Report on a study of student response to computer-assisted language learning. Unpublished manuscript.

Higgins, J. (1985) Can computers teach? *English Teaching Forum, 23,* (3), 34-37.

Higgins, J. & Johns, T. (1984) The computer in the classroom. *Computers in Language Learning* (pp. 35-86). Massachusetts: Addison-Wesley.

Meléndez, G.S. (1980) Interactive instruction in Spanish interfacing the microcomputer and videodisc. *MICRO, 1,* 11-12.

Papert, S. (1980) *Mindstorms.* (p. 5). New York: Basic Books.

Zetterstein, A. (1985) Authoring systems—the key to future expansion CAI. *System, 13,* (2), 133-136.

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