COMPUTER APPLICATIONS TO SECOND LANGUAGE ACQUISITION

THESIS

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By

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This thesis is intended to give a panorama of technology in foreign language pedagogy. Although my field of study is French, the computer applications under scrutiny do not relate solely to the teaching of French.

This paper begins with a criticism of the rigid listen-and-repeat language laboratory concept while tracking the rise of communicative language learning theory; follows the microprocessor revolution in language consoles; documents the development of computer-assisted instruction; showcases software evaluations of computer-assisted language learning; explores telecommunications; discusses satellite dishes and other computer peripherals; presents the results of a survey of Texas universities; and concludes with the presentation of the evolving language media center.
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INTRODUCTION

This is the Age of Information: the technology of computers and microprocessors (devices which actually do the computing) is all around us. We laugh at the cartoon in which the mother explains to the father why he can't throw his adolescent son out of the house because he is the only one who can program the VCR. Truly, programmable VCR's became popular for their ability to capture TV programs, an ability made possible by microprocessors, that is, mini central processing units (CPU). Microprocessors are everywhere -- in our microwaves, our automobile engines and our Nintendos.

This technology of memory and process may still frighten people, particularly if a computer is involved -- a formidable piece of plastic furniture with a video screen and keyboard. However, the ubiquitous nature of computer technology forces confrontation at all phases of life, even campus life: many libraries, particularly university libraries, have computers available for student use in finding reference materials and books, not only for that location, but for an entire region. A librarian explained to me that students are initially intimidated by the machines, but once she sits down and guides them, they gain courage and can move quickly to using the computer successfully on their own.
This thesis is written as a guide to computer applications in second language acquisition and is intended to give a panorama of technology from language laboratory hardware to computer-assisted instructional software in foreign language. Although my field of study is the French language, the computer applications under scrutiny in the present study do not relate solely to the teaching of French. In order to review a broad spectrum of hardware and software, developments in technology of other commonly-taught second languages are considered. It is also common to find commercial programs written for more than one second language, the most common being, of course, French, Spanish and German.

This paper has a broad scope. Chapter 1 establishes the demise of the audiolingual methodology and in consequence the rigid listen-and-repeat language laboratory concept. Chapter 1 also tracks the rise of communicative language learning theory.

Chapter 2 follows the microprocessor revolution in language consoles, which have evolved from manual tape loading at the master console to routing the voice transmissions to the student deck via RAM (Random Access Memory) microprocessors.

Chapter 3 documents the development of computer-assisted instruction (CAI) available to language teachers
for use in computers. This CAI is known as CALL (computer-assisted language learning) in the foreign language field.

Chapter 4 showcases software evaluations of CALL, discussing programs which require a rather rigid format and high degree of computer programming to authoring languages which offer more flexibility and ease in use.

Chapter 5 explores telecommunications as a means of bringing the target culture directly to the student. A telecommunications network, such as the French Minitel network highlighted here, can provide the teacher some pedagogical tools as authentic documents in the target language or electronic mail boxes.

Chapter 6 treats satellite dishes and other peripheral devices of the computer: satellites can bring in television transmissions from all over the world and video technology can record pertinent programs for later use. Other devices, such as interactive video, can help simulate a natural environment of language.

In Chapter 7 I present the results of a mail survey made to Texas universities with a student population above 5,000 to document how the technologies discussed heretofore are currently being utilized.

In the Conclusion I discuss the shift in emphasis from a language laboratory as a static and rigid environment for learning to the evolving language media center. I hope to persuade educators to lose their inhibitions against
evolving memory and process technology: we as educators must prepare our students for their future, a future of ever-increasing technology. We must be willing to use these new tools in the classroom so that our students can put "hands on" and demystify the "Wizard" behind the computer monitor. Computer Science may belong to intellectuals but computers belong to the world. In the Winter 1988-89 issue, the Journal of Educational Techniques and Technologies quoted John Sculley, President of Apple Computer, Inc., on the preparation of students in the information age:

No longer "is it enough to transfer knowledge to students . . . we need to give them access to the unbounded world of knowledge. That means we must prepare all students not just professional scholars, to embark on a journey of learning and discovery."² The access he speaks of is the access that computers can give to knowledge, made available faster and more cheaply than has ever before been known -- the Age of Information, indeed.
NOTES


2 Gibson and Evans 24.
CHAPTER 1

THE COMMUNICATIVE REVOLUTION IN FOREIGN LANGUAGE METHODOLOGY AND THE DEMISE OF THE LANGUAGE LABORATORY

The demands for listening and repeating exercises in a language lab setting were influenced by the audiolingual method and the behaviorist theory of learning. According to behaviorist theory, learning occurs when behavior is positively or negatively reinforced according to a schedule of repeated behaviors. The audiolingual method stressed stimulus-response behavior: a model sentence was followed by the stimulus, a grammar transformation prompt; the response was a choral attempt by the students to execute the transformation; and the positive reinforcement was the instructor's repetition of the correct response. This method and the new technology of language listening booths went hand in hand. Today, foreign language educators find the methodology lacking: the construct breaks down at the response stage:

The student, alone and isolated in her booth, was supposed to repeat and repeat until she had "overlearned" the patterns, and made them a matter of unconscious habit. The lab was seen as a sort of tireless teacher's aide that could drill the
mechanical aspects of language, freeing the teacher for more creative activities. In fact, so closely was the lab bound to audiolingual practices, it probably had a lot to do with keeping the ALM alive for so long: even after the behaviorist principles had been subjected to serious question, there was an understandable reluctance to discard the texts, tapes and (especially) the expensive hardware that went with them.³

There were numerous limitations to this facet of language teaching history. The student had to try to self-correct -- many times without success, due to the inflexible program and speed of the tape. There was nothing "natural" (human) about the language used on the tape: all utterances were narrowly fabricated to force a response, one correct response. The student was a passive player in this language game of word ping pong since the instructor controlled the serve.

It has been pointed out by Kathleen Marshall Pedersen that so taken was the period with the new technology that few researchers criticized the effect of this "lockstep" approach of inflexible tape programming on student performance:

From its earliest use to its widespread dismantling in the late 1960s and early 1970s, the
failure of the language lab concept has been blamed on a lack of appropriate audio and visual materials [quoting Davies], oversell, [quoting Holmes and Kidd; McCoy and Weible], inflexibility [quoting Underwood], and negative reactions from students [quoting Rivers]. All of these explanations are partially accurate in describing the decline of the lab, but they fail to identify the major source of the problem: No research was conducted on how best to utilize the technology to enhance language learning.4

In the late 60's and early 70's, a new communicative theory rivalled the audiolingual in second language learning. The nascent field of psycholinguistics, the study of how language is generated in the human brain, was pioneered in the 1960's with the emergence of the theories of Noam Chomsky. His theories revolutionized the current concepts of language acquisition in children. Those concepts, in turn, affected the theories of second language learning. A key difference in learning a language from birth and a second language after early childhood turns on the differences between language acquisition and language learning. The distinction between learning and acquisition was initiated by Stephen Krashen in his writings of the 1970's:
According to Krashen, language learning is characterized by contexts in which there is a conscious emphasis on the structure of language through, for example, grammar translation or drill practice as one might find in traditional second language programs. Such an approach to learning is thought to engender in the learner an awareness of language as an abstract, rule-governed system. On the other hand, language acquisition is thought to be characterized by a relatively unconscious internalization of linguistic rules through a process of creative construction. It is this process that typically occurs when languages are acquired in natural or naturalistic contexts where real, meaningful communication takes place.\(^5\)

Pedersen discusses Krashen as well as Chomsky with regard to first language acquisition:

Some proponents of the Chomskyan theoretical school seek to differentiate between foreign language acquisition, an unconsciously manipulated nativelike knowledge that underlies and makes possible communication, and foreign language learning, a consciously monitored skill based on extensive practice of linguistic routines [quoting Krashen]. . . . As Bever summarizes the problem, "We do not know whether adults learn a second
language differently because they are introspective or whether adults learn a second language with a high degree of self-consciousness because they must do so in order to compensate for their inability to learn it in the natural way they applied to their first language.

... Today's learning theory predicts that the single most important factor affecting language learning is the student's level of engagement with the content material [quoting Rosenbaum].

These theories impacted foreign language teaching by shifting the emphasis from patterned responses to meaningful communication practice in the target language. For example, an instructor should explain to students how to "process" the grammar structures for telling the weather and supply a number of examples. The example below shows how a substitution drill can go wrong when it is not meaningful to the students. They insert the prompted words without realizing the linguistic consequences:

I: The weather is nice today. (snowing)
S: The weather is snowing today.
I: It's snowing today. (blue)
S: It's blue today.
I: The sky is blue today.

Gerry Strei stresses that tape exercises in a lab should be communicative drills, with emphasis on meaningful,
personalized responses elicited through the exercises. In this way, the student can "generate" grammar and be able to better internalize the patterns of a language rather than mindlessly repeat and transform grammar successfully, even though not comprehending the meaning of the utterances.

A more meaningful exercise on weather description would contain the same initial exposure to different structures of weather telling, referencing pictures of types of weather. Providing the students with a weather map for a region in the country of the target language, the instructor can then formulate questions to ask individuals about the weather in cities of that region. This kind of material engages students in a real-life situation where their ability to communicate is fostered by their meaningful inductions about the weather map. In other words, it is the students who generate their own language; the responses are not prompted by a teacher-directed prompt.

Today, the language laboratory remains a place where large lab consoles dictate the listening exercises:

Despite the development of sophisticated sound-management systems such as the ones offered by Tandberg (System 100, 500 or IS-0) and others, today's lab remains basically unchanged since the fifties, an extension of the pattern-practice drills conceived within the audiolingual method.
Lathrop P. Johnson and Andrea A. Dvorscak recommend the following list of criteria for preparation of audio materials so as to foster the communicative process:

1) Observe a strict time limit of twenty minutes per tape.

2) Control the length of pauses for student responses closely. If they are too long, boredom results: if too short, frustration. It is unreasonable to expect students to repeat the correct answer after the speaker each time.

3) Have a clear organization on tape and worksheet, so that the students know where they are at all times.

4) Keep the directions compact but clear. Use the target language as much as possible.

5) Maintain a variety of activities throughout each tape.

6) The speakers should have clear, natural-sounding voices with a ring of cheerfulness. The speakers should be relaxed, since nervousness is audible on the tapes.

7) Strive for top-quality recordings. (One of our recording sessions had an air conditioner as a hidden participant. When the hum showed up on the tape, the students were severely distracted.) Beware of tape recorders with
"automatic level control," since they cause distortion after the pauses.\(^9\)

The importance of communicative, meaningful drill cannot be overemphasized: it applies to all modes of foreign language learning, whether in the classroom or in the lab. Listening practice is an integral part of foreign language learning. Where consoles are still used in listening practice, taped materials should meet guidelines such as the above.

However, as will be shown in later chapters, the most effective communicative learning does not take place through the language laboratory console: computers, through instructional exercises, interactive video and audio, telecommunications and satellite transmissions, can offer a wide range of experiences to a second language learner.
NOTES


5 Fred Genese, "Neuropsychology and Second Language Acquisition" p. 91 in Leslie M. Beebe (ed.), *Issues in*...


8 Blake 25.

Along with heightened social consciousness, civil rights marches and student unrest of the 1960's, came the space race and miniaturization in technology, technology which still impacts profoundly the way students learn today. The spatial limitations of the space capsule demanded this miniaturization so that more experiments, run automatically by computers, could take place in flight. Microprocessor technology was born out of this need for miniaturization and the desire to be able to use the powerful new computer information processing in space.

Microprocessors, made from silicon wafers with miniature circuits etched onto the wafer, are the devices which make computers and information-processing a reality. They are themselves computers and are manufactured for many uses. The most common of these are Read Only Memory (ROM), Programmable Read Only Memory (PROM) and Random Access Memory (RAM). ROM microprocessors are equipped by the manufacturer with an internal program which cannot be erased. ROM is used for a dedicated task, i.e., running a particular routine such as the operating system of a computer to start up the programs when the computer is
turned on. ROM is protected from erasure by system failure. PROM differs from ROM only in that PROM's programming can be altered. ROM and PROM can both be used as miniature central processing units (CPU); they can dictate routines for other microprocessors or other circuits to execute.

Random Access Memory (RAM) is a storage device which is built without programming, but which can store information. A computer program built by the user is stored on RAM. RAM can be erased and reused.

The information stored on ROM and RAM is measured in bits. A bit is stored as 0 or 1 (e.g., on or off) and so is binary (a system built on the powers of 2). Eight bits make a byte; a megabyte is 1000 bytes or 8000 bits. The information stored on RAM occurs in the active memory, the memory needed to process information. When the process is complete, active memory can be erased or it can be stored as archival information on tape or disk.

The microprocessor revolution has invaded the language lab. Language lab consoles which electrically directed the audio to the students by means of numerous switches are being replaced by microprocessor driven consoles whose technology is more reliable. However, it would be informative to look at this hardware technology historically in order to obtain a perspective on the rise and fall (and rise again?) of the language lab console.
In an effort to improve on the "lock-step" learning approach of the fifties, several manufacturers have developed new features for their lab consoles. The versatility offered is very high-powered; however, new technology does not necessarily mean instant successful learning or better pedagogical methods. This discussion will elucidate the strengths and weaknesses of the high-tech lab consoles.

Hardware evaluations are hard to find, harder than software evaluations. The following is a discussion of four pieces of lab console hardware, the Tandberg IS-10, the Educational Media's SStar system, the Sony 5510 and the SONY ZL-10. All of these consoles are driven by a microprocessor which allows for much more versatility in the use of the taped programs. All of these evaluations were found in the Journal of Educational Techniques and Technology (J.E.T.T.), a journal which premiered in 1987 and ceased publishing at the end of 1989. J.E.T.T., which began publishing in 1985, was the offspring of N.A.L.L.D. (The Journal of the National Association of Language Laboratory Directors), which had ceased publishing the year before. In 1989 J.E.T.T. ceased publishing and its offshoot is the I.A.L.L. Journal (the International Association of Language Laboratories). However, the technical orientation of the journal's articles has now shifted towards pedagogy. It is a pity that in such a technological era J.E.T.T.'s particular acumen is lost.
J.E.T.T.'s method of reviewing lab consoles was twofold: first it addressed a questionnaire to the manufacturer about the features of the console and asked for a list of dealers in order to obtain from them a list of the endusers (those who use the product). Then a questionnaire was sent to the endusers and the resulting statistics were reported in the journal. For each system surveyed, the journal gave the caveat that it was not identifying the "best" system for everyone; quite the contrary, the authors cautioned that the choice of hardware is that of the endusers. They had to be the ones to decide which piece of hardware best suited the matrix already in place, which suited the particular pedagogical methodology of the instructors, and which suited the budget best. The first evaluation of the four which will be summarized is the Tandberg IS-10.

The Tandberg IS-10 is manufactured by Tandberg Educational, a Norwegian company with experience since the late 1950's in the production of academic hardware. The "IS" in IS-10 stands for "Instruction System": 100 student positions can be configured in 10 different ways and up to four cassette recorders can be connected to a single IS-10 tutor. The tutor can also switch in video input from three sources. As with many consoles, the student stations can be monitored automatically for five seconds. The tutor can permit "live" testing by an instructor, i.e., asking the
student questions and recording the responses. The teacher can remote control student recorders individually. The student stations are equipped with functions for an LCD (liquid crystal display) real time tape counter, rewind (2 speeds), stop, fast forward, record, recap, play, set/clear bookmarks (this function allows the student to continue the exercise after setting a bookmark and returns to that location automatically for further review), wind (2 speeds), counter reset and volume control. The system is designed for group or individual learning.

Tandberg is looking towards the future:
System IS-10 recorders are computer compatible and will interface with any computer with RS232 communication ports . . . an interface card to enable the computer to talk to the individual tape recorder is needed.10

This interface capability sets the console up for interactivity with a computer; e.g., a computer can be easily connected to the console by way of an adapter and a few coaxial cables (electrical conduit). This allows a computer program to run the system, freeing the instructor to work with the students or to monitor their work.

The reviewers found that the endusers criticized the head sets for being "touchy and temperamental". The most impressive statistic was that half of those surveyed indicated that they planned to interface the IS-10 decks
with computers. It is an impressive statistic when the
fact that these endusers must have purchased the IS-10
because of its interface capability so that they could add
the power of the computer to their workstation.

Second on the list of evaluations is the SStar System,
manufactured by Educational Media (EM) in Oklahoma City. EM
has been in the language laboratory business for 12 years
and is continually updating the technology: older models can
be equipped with the latest feature; thus none becomes
obsolete and discarded.

The SStar System can support 12 programs and 244
students, which allows for even more variation than the
Tandberg IS-10. The SStar is a solid-state, microprocessor-
controlled system containing a CPU, RAM and a digital tape
interface (video tape is magnetic). J.E.T.T. asked EM if,
in the event the console were to collapse, the decks would
go to library mode and still remain usable. The answer was
yes.

The student controls are equipped on a similar basis to
that of the Tandberg with two salient exceptions: there is
no bookmark feature and the tape counter is not a real time
mechanism. The student decks can be interfaced with a
computer for control of student machine functions, although
the exact interface was not reported. The headsets are made
of plastic.
Educational Media sells directly to its customers and most endusers are in Oklahoma. The fact that the SStar is computer interfaceable was not listed as a high priority for the endusers; however, they did agree that its attractiveness lay in its efficiency as an instructional device rather than in its technical specifications. Perhaps its biggest selling point was that it had the lowest price of the four systems here evaluated.

The remaining two systems are manufactured by SONY of Japan, a highly respected name in electronics technology. For some time SONY has been a master of the commercial market and these two products reflect that mastery. The J.E.T.T. review was not conducted with a representative from SONY as were the previous two evaluations. Instead, SONY sent a brochure for both the LLC-5510 and the ZL-10, so the features of both machines are described from the company's printed material rather than by the company's spokesperson.

The LLC-5510 (Learning Library Console) Intermedia System has a touch screen, a CRT (cathode ray tube, such as a TV screen) monitor which displays menus of choices which are sensitive to the touch of a finger. The screen is used to designate the programs sent to the student console. Located to the right of the screen are the main switches for transfer, instruct, analyze, video monitor, volume and printing on a thermal printer (i.e., the ribbon transfers ink thermally so there is no noise). The Analyzer Set-up
allows for analysis of test results from the student recorders whose buttons also double for a 1 through 5 choice. The results of the testing can be printed with the thermal printer. Thus, true listening comprehension testing can be done easily and effectively through the console.

The master tape recorder is microprocessor-driven and the student recorder also has a microchip processor which allows for sentence repetition and the test analysis function.

One interesting optional piece of equipment is a Visual Display System (VID) for the "televising of photographs, charts, diagrams, opaque materials, transparencies, and slides. . . . The high-resolution CCD color camera provides . . . color definition. The zoom lens with six times magnification allows even small type in a dictionary to be projected with . . . clarity." 12

The benefit of this equipment is that it projects a readable image in normal room lighting conditions.

The LLC-5510 can transmit 4 audio sources and 1 video source simultaneously; thereby allowing five student groups to work concurrently. However, the console is not equipped with a real time counter, but rather with a dial counter, which is surprisingly out of keeping with the high level of technology of the rest of the unit.
The LLC-5510 can be interfaced with a microcomputer through a CAX-50 adapter. In the survey of endusers, 37% were planning to add this device. The headset was rated high for sound quality but had a factory defect allowing the left ear piece to break off easily. The enduser poll found thirty-seven percent were intimidated by the CRT touch screen, while sixty-seven percent found the touch screen was not intimidating. These statistics show that technology is not intimidating to those who wish to learn and use it. The features which impressed the most were the control software for running the programs through the console, the wide range of functions and the video capability of the system. The most often used feature was Library, a function which allows students to play tapes individually on the student deck.

In an analysis of the sources used in this system, J.E.T.T. found "... the 'audio only' learning laboratory program may be a thing of the recent past. More and more endusers are adding other program sources or planning to add them in the near future."\textsuperscript{13}

The 5510 represents a traditional approach to language lab equipment when compared to its big brother, the SONY ZL-10 whose microprocessor sends digital voice signals to the student listening stations. "Analog" voice signals (sounds in their frequency state as on cassette tape) are converted to "digital" voice signals (sounds converted to 0 or 1 as on compact disks) and stored on RAM microchips. There are no
tapes in this system; the access to digital memory is much faster than tape. Many public announcements are made with digitized sound such as in airports and telephone information (e.g., 411).

However, there are limits to the amount of recording time available for each of two control units which can be purchased -- 32 minutes and 16 seconds on the unit with more storage capacity or 15 minutes and 16 seconds on the other. In addition, the total student response time is always limited to 8 seconds! This is clearly not enough to allow for a student to haltingly propose a response or correct a response already begun:

In researching the ZL-10, we enlisted the aid of students -- bright, articulate, motivated foreign language students -- who shared with us their reactions to the system. ... Although our sample was small, without exception, every student in it lamented that 8 seconds of total response time is not enough.14

The lack of time allotted for responses is a definite drawback to the design of the SONY ZL-10. Another drawback may lie in the cost of additional equipment (which is not required for the traditional console module) needed to interface the student stations with the master control, requiring one unit for every two student units. This could
increase considerably the cost of a laboratory servicing many students.

The benefits to the SONY ZL-10 are mostly mechanical in nature. There are no tapes to insert at the work station: the student merely sits down and accesses the listening program through the student control pad. The student may begin a program, repeat segments, return to beginning or end, and do all this in a library mode without disturbing other students. Another benefit may reside in the small number of moving parts of the system thus ensuring more reliability of equipment. All programs are controlled by the master unit which has an LCD counter. Another high-tech feature is that the program can be randomized, which is excellent for producing tests.

At the time of the article this system was currently being used in Japan at twenty-seven sites and in one U.S. installation in the Glastonbury Public Schools in Connecticut. Thus, there was no enduser survey. However, J.E.T.T. was allowed to gather teachers and students to test a system. A general consensus was that despite the high-tech nature of the system, the rigidity of the programming was not conducive to learning:

When we asked the students in our sample why they preferred to have grammar drill-and-practice with the teacher in the classroom rather than in the lab with technology, they indicated that no matter
how sophisticated the technology in the language lab, it could not respond to them as a human teacher could. Technology treats "everyone the same." No matter how many different examples and explanations, "they are always the same for all students."15

Thus, the echo of "lock-step" instruction is heard in this quote. The language lab experiences of the fifties and sixties teach us that this approach does not work. In the seventies and eighties language lab facilities have been dismantled, ignored, or relegated to limited use while new techniques were eagerly awaited. The early reaction cited to the SONY ZL-10 shows apparently that technology alone will not save the language lab. What is needed is a new methodology: one that will focus on the student's needs, not the educator's.

Once again Blake's admonition is à propos: the most important factor in student learning is the student's level of engagement in the material. This can be effected in many ways. One way is to allow the students to choose in which media to further explore their foreign language. At Houston Baptist University, the language lab was renovated in order to create a more comfortable, relaxed environment. It was redesigned as a kind of lounge and renamed the Language Center instead of the Language Lab, putting the emphasis on communications rather than on scientific experiment:
... and we had moved further and further away from repetition drills in all their variations as we adopted activities fostering more meaningful communication.

... We wanted the center to provide areas for individual listening and studying, group listening and conversation, group cultural activities, and individual and group viewings of slides, filmstrips and films and also to lend itself to foreign language club activities.¹⁶

Thus, Houston Baptist University adopted a "library" approach to the center, allowing students to check out audio and video tapes to use in the Center. The Center could be used on a required basis, with students using time cards to reflect the fulfillment of the weekly requirement; students would be free to walk in and use the facilities on a first-come, first-served basis. Their library is staffed by Teaching Fellows trained in the use of the audio-visual machines.

Anne L. Gibson and Gilda A. Evans of the Department of Foreign Languages and Literature at the University of Texas at Arlington are also proponents of the library lab concept:

A disagreement that needs to be defined in laboratory renovation is whether the lab should be "library" (students come voluntarily and work with the materials and technologies independently) or
"teacher-directed" (a teacher operating from a laboratory console directs and monitors students as they work with assigned materials and technology). Considerable discussion of contemporary language learning theory convinced us that we needed to move away from a strict teacher-directed approach. . . .

[For self-paced language acquisition in a "library" concept laboratory, students could take full advantage of computer-assisted instructional courseware, check out video films in the target language, and listen to audio cassette tapes. More importantly, perhaps, they could pace their own learning.]

Technology now exists which can bring meaningful language learning and language acquisition to the Learning Library Center. Language acquisition can only occur when a student has reached that "threshold" experience where learning gels into an understanding of language and processing of grammar and vocabulary becomes automatic. Thus, language acquisition, as a self-paced activity, cannot be controlled; it can only be allowed to develop in a congenial environment.

As well as video and audio tapes, the Language Center environment might include computer-assisted instruction (CAI), discussed in Chapters 3 and 4. Computers can be used
individually or in groups when they are connected in a Local Area Network (LAN). This would allow the computers to be used not solely for CAI but perhaps for telecommunicating to other students in the target language, as discussed in Chapter 5. In addition, satellite dishes offer live programming from countries whose languages are taught. Peripheral devices offer new ways for students to "interact" with native speakers of the language, as discussed in Chapter 3.

Instructors and educators have so many choices today that only a lack of imagination prevents new exploration: "If the language lab is to survive and play a significant role in the educational process during the years ahead, it . . . must undergo a transformation from a monomedium audio lab to a multimedia resource center."18 It is the configuration of such a multimedia center which is the subject of the conclusion of this thesis: what is the best fit for technology and media in this configuration? It is not intended that every technology mentioned appear in the "model" multimedia center; each institution of learning must balance its own priorities. Foreign language technology has much to offer to foreign language educators, though it seems little is currently used. The information in the next chapters should help to demonstrate and explain some of the uses of this technology for foreign language educators.
NOTES


11 J.E.T.T. 40.


13 J.E.T.T., "The Sony 5510" 44.


15 J.E.T.T., "The Innovative Sony ZL-10 Learning Laboratory" 46.


CHAPTER 3

THE DEVELOPMENT OF COMPUTER-ASSISTED INSTRUCTION IN FOREIGN LANGUAGE LEARNING

Much as cassette technology made listening devices easily portable, personal computer technology has made information-processing portable and more affordable to individuals in their homes. Personal computing in the home is no longer rare since many parents purchase computers for their children as well as for themselves. Most of these home computers have one program tool in common: a word processor. Truly, the term "computer literate" can apply to a whole new generation growing up with exposure to the machine either at home or at school. As noted by Solveig Olsen:

We live in a time of changing technology, and the rate of change is accelerating . . . . Technological progress may pose a threat, but it also offers an exhilarating opportunity.\textsuperscript{19}

Do educators then need to concern themselves with the question of the intimidating power of the computer? Not if the power of the computer is harnessed properly -- in the hands of people knowledgeable about the benefits which are derived from computer-assisted instruction (CAI) and who can
lead a student compassionately through the acquisition of computer techniques needed to use CAI.

This chapter is dedicated to the formation of a cadre of such experts. It gives resources which are of interest to instructors interested in pursuing CAI, as well as give parameters for software evaluation and examples of software already evaluated. This chapter discusses the computer's most advantageous physical placement and pedagogical role in instruction and looks at the past and present developments in computer-assisted instruction. We need not ask "Should computers be used in instruction?" but "How best can we use computers in instruction?"

A computer is a tool: "[A] computer aiding brain power is analogous to a lever assisting human muscle."\(^{20}\) It can never replace the teacher, for it is the teacher's expertise which controls the curriculum. However, a computer can take over certain tasks for the teacher. For example, on an administrative level, a computer program for test correction can be an ultimate time saver while offering complete accuracy of results, assuming that all the data have been entered correctly and the program reflects the correct mathematic manipulations desired by the user.

In foreign language learning, the computer is commonly used pedagogically as a drill master, a tutor, a word processor, a test giver and a simulator. It can also provide games for the enjoyment of the students; however, I
consider this latter a marginal pedagogical use and will not address this topic in the following discussion.

As a drill master the computer can present lessons on specific grammatical points such as verb conjugations, use of pronouns or adjective agreement. Drills are more effectively used for elementary level students.

There has been debate over the validity of using the computer as a drill master. Many teachers of second languages do not believe that language learning is inherently based on an ability to restructure grammar. However, Christine Paulston posits that language learning is a "concatenation of two separate areas, the system of language and the process of learning . . . . [There seem to be] at least two levels of language: mechanical skill and thought." So for all those who ascribe to the mechanistic character of grammar and the place it holds in the elementary level of second language learning, the computer as drill master can be of great use.

The greatest proof of the ability of CAI to enhance student performance lies in statistical studies such as that of Robert Fischer who studied the performance of students on a CAI drill and practice program covering regular verbs, irregular verbs, adjectives and vocabulary in French. He found "... that the subjects of the experimental group significantly outperformed the subjects of the control group in all areas." As more and more research is done on the
effects of CAI on language learning, I believe that the consensus will be that CAI is salutary to learning.

As a tutor, the computer can run drill programs which allow branching (providing more than one screen alternative when the previous problem is not solved correctly); branching means the computer automatically pulls up a similar problem of the same grammatical structure for continuing the exercise, rather than going directly to the next screen containing a new grammatical problem. If branching is not a part of the program, the program is not a tutorial. Tutorials can be used at any level for which they are designed.

Additionally, the computer can offer "help" screens (touching a key or entering the word "help" drops a window down into the screen with information to aid the student in answering), and, more importantly, it can offer "prompt" messages for certain wrong answers ("Check your spelling", "Check your word order").

As a word processor functioning in the target language, the computer can offer mechanical ease and encouragement in writing, with reference programs if they have been attached to the word processing program. In a LAN setting, the student's efforts may be shared. Composition programs are necessarily more suited for third and fourth year students.

The testing function of the computer can be used for any test where a written record is required. A computer can
keep track of errors and keep statistical records on the errors. For example, computer accounting for placement exams should be of particular interest to any foreign language department which deals with a large number of students since it would provide a more efficient use of time in grading and tabulation of results. Also, the questions can be mixed or randomized providing security of the testing.23

A computer can "simulate" a particular reality. Computer simulations exist frequently in the sciences. For example, in experimental simulations, the student is presented with a set of factors (such as physical properties of planetary motion and gravitational fields) and a situation (such as two planets moving towards each other). Using the computer to input variables (such as planetary speed), the student can observe the phenomena which occurs as a result of his or her manipulations (such as the course of the planets).

Computer simulations in language learning usually involve cultural situations in which the student must react according to the most appropriate behavior and language. These cultural situations are best handled with a video or audio context using "natural" (human) language. As yet, simulations are not as prevalent as are other forms of CAI; no doubt this is due to the work and cost involved in
writing scripts and filming scenes using actors speaking the
target language.

When software for education was first written, most
packages were written by a computer programmer using a
computer programming language such as Fortran or PASCAL.
BASIC was created as a programming language designed to be
easier to write than other logic-based languages. Most
often this early educational software was marketed by
publishers. Now, software is generated not only from
publishers, but from individuals or associations in the
education field. The first software was for mainframe
application, of which PLATO is an example, developed by the
University of Delaware in 1974 for drill and practice
exercises in music dictation programs.

The next development in software occurred as a result
of the demand for computer languages that would be easier to
program than the generic, logic-based languages. Thus,
educational programming languages such as PILOT for the
IBM/PC or SuperPILOT for the Apple were invented. However,
easier program writing meant losing some advantages of
generic languages: "Educational programming languages,
which both simplify the process and provide enhancements
like sophisticated answer judging, sacrifice some
flexibility to obtain these benefits." Answer judging is
an extremely important diagnostic tool for student
comprehension of the grammatical task to master. For
example, if on three successive attempts a student keys in three different answers, each time getting closer to the correct answer and each time the computer prompting the same response, i.e., "That is the wrong answer. Try again.", the result is a very frustrated student. To maximize pedagogical value, the program should be designed to accept multiple answers/errors, and the ability to branch should be used to route a common error to screens which tutor this error.

The next development was authoring languages such as DASHER, which creates mechanical drills (e.g., substitution, transformation, fill-in-the-blank) for elementary German, Spanish and French by mere insertion of the text. Joel Goldfield explains that

> [t]he commands in authoring systems are typically "high level", that is, each command does some complex display, answer judging or branching operation particularly useful for instructional purposes. General purpose programming languages like PASCAL or BASIC, in distinction, provide unspecialized commands.25

There is no actual programming involved-- an authoring language allows the instructor (the "author") to use a program to build a CAI exercise. The capacity to use high level commands makes a programming language more efficient to its specific application, and thus less time consuming in
the construction of the instructional program. An educational authoring system is "... a preset format into which an author without programming skills can insert content." Typically, there are two programs, one in which the author inputs the content of the exercise and the acceptable answers, and the second which determines the number of tries the student will get, the length of time the student has to answer, and other pedagogical parameters. There is, however, a loss in flexibility with authoring languages in answer judging or number of tries for each answer, in that the template (the master form for all the exercises) for a particular exercise is determined by the authoring language.

Apple and IBM are the two information-processing giants which are currently the most powerful in the educational software field. Apple, Inc. has always been committed to producing first-rate educational software while IBM is a relative newcomer. However, there are today more options for software selection than ever, which is not surprising in this fast-moving field. Patricia Cummins in her article "CAI and the French Teacher" cautions that persons interested in improving their knowledge should find out something about computers before starting on a project. She gives solid advice to novices, teachers with some knowledge and teachers with a lot of knowledge. Above all, one must stay current with the field, to which end she has compiled

Although it seems that the acronyms CAI and CALL can be used interchangeably, Nina Garrett defines them as two different, though closely related, terms:

Strictly speaking, CAI might refer to instructor's activities in which the learner does not directly participate, and here the computer's assistance can certainly be valuable. Computer grading programs save an enormous amount of time and computer-generated materials that can be reproduced for class use are of crucial importance wherever the teacher wishes to supplement commercial materials with custom-made ones, especially in the teaching of languages for which few published materials exist.

The complementary strict interpretation of CALL would then refer to any application of the computer that directly engages the learners. In much of the literature, however, CAI and CALL seem
to refer interchangeably to materials for student use . . . . 29

The amount of engagement of students in CAI or CALL materials should be highly considered by those intending to use such materials. I will pursue this directive further in my discussion.

With advances in computer programs, there can never be enough reviews of software. There is a plethora of software available and the decision to buy a certain type of software can determine the kind of hardware needed to support it. If the hardware is already in place, there may well be software which can outperform the existing software already in use. Reading about software in a journal is one way to avoid time spent and possible costs incurred in previewing software from the vendor.

Before deciding on a particular software, however, Cummins stresses, as do many other educators in the field, that the goals of the instructional program must be firmly established. Cummins specifies questions to ask:

What are the goals of the program? Why would you want to use this software? What language skills does the program treat? . . . Is the software pedagogically sound? . . .

What equipment is required? What computer type, operating system, memory requirements, . . .

What language level is targeted?
Structure: Do the formats of the units create the proper structures for the types of exercises involved, e.g., drill-and-practice, test, culturally-based simulation, game? . . .

Ease of Use: Do the "mechanics" of running the program detract in any way from the learning process? Does the program progress flawlessly and smoothly? . . .

Tutorial Elements: Do introductory materials or tutorials include clear statements of principles and sufficient examples? . . .

Accuracy and appropriateness: Are the linguistic and cultural elements appropriate for the level targeted? . . .

Student responses: Does the student have more than one chance to answer? . . .

Diacritical marks: How are diacritical marks generated? . . .

Screens, graphics and sound: Are screen displays uncluttered, with clear separations between lesson elements . . .?

Does the package include record keeping?

Is editing available? Is an editing module included in the package (or otherwise available) which allows teachers to modify the program or make their own exercises? . . .
What sort of documentation is included? Cummins' article also included a "Software Evaluation Sheet" outlining categories touching on the above questions and allowing for ratings in each category. I encourage the use of such evaluation forms and the sharing of evaluations among all CALL users and potential users.

As mentioned above, software inability to display diacritical marks is a crucial question for CALL users. The computer's inability to produce diacritical marks prevented CAI use in foreign language learning for years. Through the computer keyboard, one could only access a certain character set, called the ASCII code, which was based on the English characters and numbers, plus a few symbols. With the introduction of the extended ASCII character set, a larger number of symbols including the diacritical marks of all languages became available for computers designed to access the extended character set. However, teachers of Russian (demanding a different alphabet from the Roman) had to wait until programmable Russian character sets were available. Now other non-Roman alphabets such as Hebrew and Greek are available.

IBM and Apple computers provide the easiest access to the extended code. With IBM, the "alt" key in conjunction with a number provides the letter with the diacritical mark. With Apple, the "/" followed by the appropriate key renders the letter and diacritical desired. Ease of access to the
extended character set is essential to effective CALL and word processing in a foreign language.

The key distinction of the use of the terms CAI or CALL is based on the amount of student participation in the computer-assisted learning. If the materials are generated for instructional use and the students do not touch a keyboard, the instructor is using CAI. If the students interface with the computer, they are using CALL. The difference lies in the focus of the learning. In CAI, the focus is from the teacher to the learner. In CALL, the focus is on the learner; the teacher becomes a facilitator who assists the students through difficulties at the keyboard. In some cases, the teacher may not even be present as in a learning lab center where a monitor may aid the students in handling the mechanics of the keyboard. The students then must interact with the program on their own using their own deductive and inductive reasoning to complete the task successfully.

The amount of student interaction with CALL is an important issue in determining the amount of student interest which can be generated by the use of computer programs. One writer sees the lack of student control in CAI as instruction "... based on a behavioristic model (as with the audio-lingual method)," where "student access to hardware and software is not essential." It is also cautioned that
For teaching to conform to individual learning in a technology-assisted lesson, learners must receive the control afforded by access to hardware, and, in the case of CALL, by the appropriate user-friendly software. For CALL to be effective, the software must be user-friendly, that is, the ease of use should be considered as well as the appropriateness of the learning task. If the program is inscrutable, negligible educational value will arise. User friendliness means that the student can easily figure out the next step in an exercise given only what is shown on the screen by the program. In the next chapter I discuss CALL software according to these criteria of user-friendliness and appropriateness of learning content.
NOTES


26 Culley 136.

27 Culley 136.

28 Cummins 396.


31 Cummins 398-399.

32 Cummins 399-400.

Effective computer-assisted language learning (CALL) is characterized by a maximum of student interaction with computers equipped with user-friendly software. The software evaluations which follow critique software on the basis of two criteria for effectiveness: ease of use and appropriateness of content. These software evaluations represent only a portion of what has been on the market. I chose 1985 as the earliest date for a review in order to avoid discussing software which may have lost its viability. I have sought to include software which provides examples of the computer's versatility in drills, word processing, translation, composition, authoring programs and simulations, and where possible I present more than one evaluation of each item. Consequently I have not limited the reviews to CALL for the French language, but instead have sought to provide for as wide a scope as possible for the demonstration of the versatility of CALL. Unfortunately, most is targeted for an elementary level, the first year of second language learning at the university level.
I also present problems which each piece of software presents. Certain problems are shared; it is important to be aware of the common problems in making an informed decision for a particular software. Nina Garrett's work figures prominently in my compilation. The organization of the evaluations is based on the computer's role as drill master, tutor, word processor and simulator.

The most commonly used CALL remains the drill. The following four examples of CALL software packages contain drill exercises. Some drill exercises are more successful than others, as will be seen in the various reviewers' comments.

**Practicando Español.** Conduit, The University of Iowa; for use on Apple. This courseware is presented here since it is listed in the survey returns which I received as a result of the questionnaire I sent to various Texas universities in the fall of 1990. Chapter 7 discusses this survey. **Practicando Español** was reviewed by Mary Gay Doman in the December 1987 issue of the *CALICO Journal*. According to Doman the package is intended for first year college use or vocabulary review at the end of the second year. "This is a purely mechanical drill and practice package . . . . None of the forms are presented in a sentence context in which meaning can be reinforced."³⁴ Far and away this is the most common disadvantage of pure drill, that is, the lack of communicative context. However, software developers
have begun to offer instructions to the user whereby the software can be customized. There is an editor provided with the package with which instructors can customize lessons, making it adaptable to specific courses and levels. Doman notes that there is "a flaw in the program for the verb drills edit mode that prevented writing the edited files to the disk. This must be corrected." A flaw such as this does not make the package user-friendly to the instructor; however, Doman is satisfied with the ease of use for the student: "Commands available during the drills (but not continuously displayed on-screen) give the learner substantial control." She is also satisfied with the content, finding only one content error. Her summary recommendation is that

[While this writer's preference is for programs that provide more meaningful practice, avoiding translation and reinforcing both vocabulary and verb meaning in context, there is a place for an efficient and adaptable drill program like this. . . .]

On pratique le français is the French version of CONDUIT's Practicando español. Reviewed by Kathleen Marshall Pederson for the French Review, it is a vocabulary and drill program which she used in both the second level of college French and all levels of high school. She recommends its use for tense reviews and to fill in
vocabulary gaps at the college level. She touts the program for running easily and being self-explanatory. "In short, the program is highly recommended for its pedagogical soundness, wide-ranging utility, flexibility and accuracy."  

William Klemme also reviewed *On pratique le français* for *Modern Language Journal* and was impressed by the system's ability to analyze erroneous responses so that the student may know if the inaccuracy is due to a pronoun, a verb or its auxiliary. Further, he states:

> These materials of instruction are more than an electronic workbook: their interactive and randomizing nature almost guarantee a different lesson each time, something a textbook or a teacher cannot do as effectively. I definitely recommend this package . . . .

**Bataille de Mots.** Gessler Educational Software, 1984, by Dr. Janice Davidson and Richard Eckert; for use on Apple II+, IIe, IIc (48K), IBM PC (64K), Commodore 64. **Bataille de Mots** comprises French vocabulary drills and the game *Bataille de Mots* (Battle of Words) for use on the Apple II series, the IBM PC and the Commodore 64. It is aimed at novice-level French in elementary school or secondary school. The student uses a joystick and a keyboard. The vocabulary exercises use a fill-in-the-blank format but the sentences are criticized for using vocabulary above the level being taught. The student is always given the same
prompt for every wrong answer, which is not helpful. The Bataille de Mots game is based on English/French equivalents, encouraging students to translate directly. The technique of direct translation has been criticized by proponents of communicative language learning. Despite its faults, Susan Campanini who reviewed this program for Foreign Language Annals recommended it for user-friendliness, excellent graphic representation of vocabulary, and student exposure to lots of contextualized vocabulary.

James Becker also reviewed Bataille de Mots for the French Review finding it "simple to use and the branching is not confusing." He found the improvements to the programming of this version (as compared to the 1984 version) commendable. He rates this software "in the top ten for French."

Conjugate! Spanish Version 1.10, Macademia Software, 1987; for use on APPLE MACINTOSH and MACINTOSH II on one machine at a time. This program is presented here because it was listed by respondents to my questionnaire as being currently used by Texas universities. The following review by Robert Hart was for Foreign Language Annals and is excerpted here.

Conjugate! Spanish is a drill program for Spanish verb forms. (The level is not specified; if all forms are available, it would be useful to any first year college or
all high school students.) For use on the MACINTOSH and MACINTOSH II the program makes use of graphics display, mouse-driven cursor and windows. A dictionary is available through the window for referencing during a program. The dictionary can be edited by the user which is a nice feature. Another good feature is that the program monitors student errors and reinserts missed problems. Hart was impressed with the interactivity of the program, but criticized the program for its lack of meaningful context around the targeted grammatical restructuring.

The first four software programs mentioned as drills could all be criticized from the same pedagogical point of view. Drills can be useful but they are usually bereft of context and teach a mechanical skill which does not necessarily lead to competent communication in the target language. All four programs were created for a generic market and because of their projected use in an unspecified environment, their exercises can be inflexible and trivial. The following software programs offer a different approach to language learning.

Utilisons l'ordinateur is software to accompany Allons-y!, a college textbook, by Jeannette Bragger and Donald Rice, Heinle and Heinle Publishers, 1985; for use on APPLE II, II+, IIe and IIc, or the Franklin Ace. "This package is the first commercially available computer-assisted language instruction (CALI) program to be totally integrated with a
college language text, . . . ."44 The program reinforces grammar and vocabulary already covered in the textbook through "tutorial reviews of structures already taught in class, reading practice, structural drill and practice, vocabulary games and personalized questions."45 The advantage of fully integrated instruction is obvious. The manual accompanying the program was easy for students to follow in getting started at the computer. There are two criticisms: the lessons need more interesting display techniques and the reading passages were introduced word by word to the screen, rather than presented in their entirety. On the whole, Utilisons l'ordinateur received a highly favorable review.46

Juegos Comunicativos: Spanish Games for Communicative Practice for the Apple IIe, IIc, II+. Designed by John Underwood; programmed by Richard Bassein. Random House, Inc.; 201 E. 50th St.; New York, NY 10022. Juegos Comunicativos is presented here because it is a departure from the standard drill programs: the juegos (games) use structures and vocabulary to solve a problem. This package uses artificial intelligence (a sophisticated programming technique allowing the program to make an "if/then" decision on student input) to judge the correctness of the student response. There is no one "correct" response and differing answers are accepted. However, Marie Sheppard, the reviewer, noted that not all possible answers are accepted.
For example, the personal pronoun must always be used, a non-standard Spanish construct. Another problem exists in the computer's analysis of wrong answers and the feedback given for answers in that the feedback did not always match the structural problem. A strength of the program is the help screens which show a variety of vocabulary surrounding each problem. Sheppard, concludes with these words: "Nevertheless, the result is limited communication with a limited machine." \(^{47}\)

However, Juegos belongs to the second generation of generic language programs and is the wave of the future. In the words of its creator, John Underwood,

JUEGOS actually consists of two rather separate components: a language-independent parsing program, and a set of language-specific data files in which word classes, morphological rules and syntactic patterns are all specified for any particular environment. [Emphasis added.]\(^ {48}\)

This program can respond to a variety of responses, confined to a particular environment. It can do this because it uses a technique called "parsing". (Parsing a sentence means identifying its structure, a process that on a computer requires storing the words according to their parts of speech and specifying rules for forming possible sentences.\(^ {49}\)) The program parses each response from the student for accuracy. The program then semantically decides
whether the student input is responsive to the situation posed in the exercise. Although programs of this type are rare, their development should be encouraged: computers using artificial intelligence (programs which imitate human thought processes) may be able to offer a highly developed technique of "talking" to us in grammatically and syntactically correct language, and in so doing, may unlock linguistic keys for us.

Le Français par ordinateur. Arlene Krane, et al., Heath and Company, 1984; for use on APPLE II+, IIe and IIc. This package comprises tutorials, drill and practice, simulations and games thematically aimed at the beginning French student. The reviewer, James Becker, finds the high-resolution graphics, music and self-scoring enhance the learning experience. The program is user-friendly: a reset key lists the activities menu. Content is good: the use of English is controlled. Most importantly, all "three programs demonstrate the effective use of graphics and animation to contextualize . . . ."50 Becker found the exercises interesting for students for their variety of activities and recommends a color monitor to enhance the simulated French atmosphere of the graphics as they work (for example "En Ville" stops in front of specific town buildings).

Thus, as with both Juegos Comunicativos and Le Français par ordinateur, which use the graphics capability of the
computer, drill and practice can become a contextualized, almost "immersion" experience for the student. However, thus far, only commercial packages have been discussed. There is yet another alternative to computer use in foreign language, that of authoring languages which allow the instructor more flexibility in creating language exercises. Answer analysis by computer program can be effected better by the author of the exercise than by writers of commercially produced programs who are often criticized for their lack of instruction in the pedagogical content of the exercises. Authoring languages can offer the educator the means to provide for acceptable alternative responses as well as provide guides to the student for corrections to an invalid response. The following evaluations are of authoring languages.

DRILL was developed at Dartmouth College and is currently distributed by Kinko's Academic Courseware Exchange for use on MACINTOSH hardware. A. Vanneste describes DRILL as having three parts: a manager (for the author's use), a driller (for the student), and an analyzer which tabulates student right and wrong answers. Students may choose the number of tries for each correct answer. Vanneste was impressed with the immediate response of the computer; students "generally prefer doing DRILL exercises to doing traditional exercises on a sheet of paper." The exercises available are question and answer, fill-in,
multiple choice, identification, matching, true/false, and offer the possibility of CLOZE exercises. As with most MACINTOSH programs, one must utilize the keyboard and mouse. DRILL allows the students to move on if they cannot arrive at a correct answer by "clicking" (the mouse) at the "Go On" box. In programming the exercise, the instructor may choose to require a correct answer or not, although this option is not offered to the student. DRILL cannot be interfaced with graphics and there are "bugs" in the text display. The program is basically an electronic workbook for elementary learners but "provides an easy 'as is' introduction to courseware development" which can be taken to as high a level of instruction as the author desires. The program is not language-specific and can generate any exercise by typing ".question" before each question and ".answer" before each answer. DRILL generates any drill with one response, but it does not have answer-judging capabilities. Karen Kossuth touts its author-friendliness: a half hour orientation is all that is needed if the author is familiar with MacWrite. I, however, do not recommend an authoring package which allows for only one answer (fill-in-the-blank, multiple choice, true-false, etc.).

DASHER is a foreign language authoring package, similar to DRILL, containing no drill materials. As explained by James Pusack, symbols appear in an invalid answer and "point to" the invalid parts. Thus, if a word is mistyped, the
student can easily correct the error. However, DASHER cannot help the student by explaining an error. "This system, like many others, relies on a preponderance of correctness in the student answer."54

MacLang is an authoring language developed by Judith Frommer on the MACINTOSH handling English, French, Spanish, German, Italian, Portuguese, Rumanian, Russian or Greek. Merely depressing the CAPS LOCK key returns the keyboard to the Roman alphabet. The author can choose vocabulary, sentence completion, fill-in-the-blank, paragraph, multiple choice or jumble exercises. MacLang's greatest attribute is that it will recognize more than one correct answer, can be programmed not to take punctuation into account and can store all wrong answers in a file if the instructor wishes to review unanticipated answers which could be correct. With the proper interface, MacLang can use the audio and graphics options of the MACINTOSH.

An important feature in flexibility is the option to have the student, at the outset of the exercises, decide how many times to attempt a problem.55 Karen Kossuth lists the possibilities for three kinds of error messages with MacLang:

1) System messages, which are praise for right answers, generic feedback for wrong answers, a "try again" message, "give up" (display the correct answer), and admonishment for using the wrong language . . . .

2) Standard error messages,
which are triggered by errors characteristic of a particular language, such as gender and certain spelling problems. 3) Custom error messages, tailored to anticipated errors. [Emphasis added.] 56

For a dedicated instructor, customized error analysis can go a long way towards avoiding common second language errors, for example, reminding French students that "je" is not capitalized.

Kossuth also praises MacLang for being "the easiest authoring program I have ever used." 57 However, she also finds typos and execution problems ("The opening screen in the examples flashes by too fast to read." 58).

According to a J.E.T.T. article, MacLang has been touted by others for its ease, flexibility and cost:

... MacLang was available for a nominal fee from Harvard University. MacLang is an extremely flexible program. ... Creating programs on MacLang follows a simple menu-driven procedure. The instructor makes initial choices regarding exercise format and language. ... MacLang's authoring process itself consists of three parts: writing the questions, entering the correct answers, and entering cloze answers or anticipated answers. ... 59
MacLang seems to be the state of the art in educational authoring languages. For a creative author, writing exercises for any level is possible.

Drills and electronic workbooks are appropriate for elementary levels of second language learning. At a higher level of learning (third year or fourth year secondary school and second or third year college) the word-manipulation phase for meaningful communication begins: CALL also exists which can provide the means for word-processing exercises. Word processing, which cannot truly be considered as CALL, is also introduced here in ways to enhance composition. The following two reviews are of this category.

**système-D: Writing Assistant for French.** Heinle and Heinle, 1987; for use on IBM PC-XT, -AT or compatibles, or PS/2 and a hard disk is required with 512K memory. (Note: a large memory capacity is necessary to run this program due to the size of the dictionary included, as opposed to the previous authoring languages.) Nina Garrett praised this word processing program:

*système-D* is arguably the most ambitious, innovative, and sophisticated foreign language microcomputer software on the market. It provides a richly supportive environment for composition-writing in French (companion programs in German and Spanish are being planned), combining a
dedicated word-processor with a tightly interconnected set of reference materials for quick access while writing.60

With this program, the student can create in the target language while being able to access a large reference file merely by using a field already on the screen. After the referencing is finished, the student returns to the work in progress. This technique is fast and efficient, making the task of writing easier.61 Virginia Scott writes that [t]he work involved in correcting errors can be drastically reduced since teachers can signal errors on a composition and direct students to edit or re-write their work using the references in système-D for self correction. For example, if a student makes frequent errors with direct and indirect object pronouns, the teacher can direct the student to review those structures within the grammar index of système-D during the re-writing process. Ultimately, then, système-D is a new and challenging writing experience for students and teachers.62

I would highly recommend this program since both reviewers found it exceptional.

Other word processing programs are available on the commercial market which can readily be used for foreign language word processing. One such is Microsoft Windows.
version 2, which runs on IBM PC or XT machines, and the reviewers Susanne and Kenneth Hintz recommend a hard drive for satisfactory results. To obtain the diacritical marks desired, it is necessary to configure the program for the country desired. This is done upon installation of the program. Thereafter, the keyboard reacts like the keyboard of the foreign country. The software itself will program any printer for the diacritical marks. [Author's note: If you do not wish to adapt to a foreign keyboard, the extended ASCII code for diacritical marks is available on any PC keyboard by holding down the "alt" shift key and typing the corresponding ASCII character number on the ten-key pad. For example, "alt" + 130 = é.]

The computer-driven simulation provides the closest pedagogical environment to full cultural immersion that can be produced today. Montevidisco is an excellent example of such a simulation. Developed at Brigham Young University, the simulation is run by a computer with a color monitor which also interfaces with a video disc. The scene is set in a Mexican town. The scenes are branched and the branching is dependent on the answer to the question posed by the actor on the video disc. Once the actor has posed the question, the video disc stops the action (interactive video). The student is required to answer the question in a microphone connected to a cassette player. The branching allows for 1100 choices, permitting a student to visit the
town again.\textsuperscript{64} As Larrie Gale writes: "[o]ur interactive videodisc work and especially 'Montevidisco' has attracted international attention . . . in excess of 300 . . . visitors have reviewed our work here."\textsuperscript{65} Explaining the interest in the project, Gerald Culley states that the "authors were impressed by research in cognitive development which suggests that real learning of language comes from interaction with the real world."\textsuperscript{66} The benefit of the project was that this research into cognitive development produced a viable teaching tool which avails itself of current technology to produce a foreign language teaching tool approximating a real and believable cultural situation.

\textbf{Scénario: Professional Version}, version 1.5, and \textbf{Scénario Toolbox}. Tech-byte, Inc., Canada; for use on IBM PC or compatible, and color monitor is highly recommended. Scénario: Professional Version (Scénario) and Scénario Toolbox (Toolbox) are two programs which work separately but allow authoring of simulations.

Scénario offers sophisticated answer judging, branching, performance tracking, and interactive videotape and disc options, allowing for the creation of truly interactive lessons. . . . In contrast, Toolbox includes only the text, musical and internal graphics capabilities of its parent program, though it adds a rudimentary speech
synthesis facility based on the SmoothTalker English-language text entry software.67

Joel Goldfield is enthusiastic about Scénario/Toolbox but notes a pedagogical limitation: "it is impossible to superimpose more than one computer image or remove any superimposed computer image while the video (tape or disc) is running."68 This means a "pointer" cannot be used to indicate objects as the word comes through the audio portion. This is a small flaw compared to the potential of this powerful software, for the vehicle can be used for any natural language and thus can service any learning level.

However, developing simulations should not be taken lightly. Here are some cautions from Gerald Culley:

Simulations are notoriously difficult to design. If a user is to be given real choices at various stages, the program will have to contain many branches. The working out of the branching structure required incorporating the equivalent of an elaborate flowchart into the script. No less important was the need to ensure that any given path through the adventure would be consistent and would make sense.69

Despite the difficulties posed by creating a simulation, the benefits reaped by students able to learn by this method far outweigh the expense and the time. MacLang and Montevidisco were both developed with grant monies. No project in CALL
Patricia Cummins offers avenues to find funding in her article for *French Review*, for those who are interested in piloting CALL projects.

This chapter has presented a diversity of software programs to demonstrate the versatility of the computer; still, the rapid changes in technology are confusing and give many foreign language educators pause for thought. However, a wait-and-see attitude only delays implementation of tools which are designed to enhance educational progress. The software reviews herein also point out that software is not perfect; yet, waiting for perfection in software (or anything) is futile. The Lab Director of the language learning center is an appropriate person to be designated to handle some of these problems: to work the "bugs" out of the software, to stay current in the CAI field, and to provide a comfortable learning environment for students using computers or any other learning center equipment.

In this chapter I have furnished guides to follow in the search for information about CAI and CALL, guides which should be of use to anyone interested in expanding their horizons in CAI and CALL software.
NOTES

35 Doman 79.
36 Doman 80.
37 Doman 82.
42 Becker 979.
45 Pedersen 62.
46 Pedersen 61-64.


49 Underwood 202.

50 Becker 314.


57 Kossuth, "MacLang" 87.

58 Kossuth, "MacLang" 87.


61 Garrett 161-165.


68 Goldfield 301.
69 Culley, "From Mainframes to Micros, Developing Courseware" 143.

70 Trufant 27.

71 Cummins 394-396.
CHAPTER 5

TELECOMMUNICATIONS

In our fast-paced world, the life-span of an interesting reading passage in a foreign language is very short; topical reading becomes quickly dated. The need to remain au courant has publishers revising textbooks constantly and printing revised editions every two years. Telecommunications (information passing back and forth through phone lines) can enable the educator immediate access to documents authentiques; that is, documents authored by native language speakers which are not cleaned of slang, idioms or complicated style such as pedagogical texts written by educators and aimed at a certain level of language competency. The proper choice of authentic documents will not discourage novice readers where themes are common to their experience and when these documents are introduced properly for their context. For example, accessing news from the country of the target language can be useful in creating reading comprehension texts for third or fourth year students. Computer networks enabling telecommunications to other countries can be one way of obtaining texts about current events and phenomena.
To convert most computers to telecommunications, the computer must be cabled to a telephone line, which is then connected to an external modem or an inside "card" modem. A modem translates the digital signal of the computer to the analog tones of phone lines and vice versa. [Whether your computer requires an inside or an outside modem depends on its model and age.] Calls are made by a program which dials out on the phone line connected to the computer through the modem. Popular telecommunications programs for PC's are Procomm, Qmodem, Smartcom, and for MacIntosh, Red Ryder.

After the computer is configured for telecommunications, access to documents in the target language becomes available through a network. A network links computers and other communications devices together, allowing the users access to services such as computer databases, bulletin boards, news and games, to mention just a few. DataPac (a Canadian system) is discussed further in the present study.

There is a second major benefit to pedagogy which telecommunications offers: electronic mail (Email). Electronic mail does not ring like a telephone when it comes in; instead it is stored in temporary computer memory until the information is called for. Read Gilgen recommends Email because "you can send the message any time of day, it will get 'mailed' and received at the destination computer almost instantaneously, it eliminates 'phone tag'. . . ."
Telecommunications links between universities makes resourcing of expertise in CAI convenient. Bulletin boards provide a location where one user could leave a question which could be answered by another user. At the very least bulletin boards provide a "meeting place" for people of similar interests.

On most network services Email is deposited in "mail boxes". There is a pedagogical use for Email in second language acquisition when the students of two countries can communicate directly with each other. A new offering in telecommunications for pedagogical use is the Minitel, which is being presented at professional conferences nationwide, most recently at the 1990 convention of the American Association of Teachers of French (AATF) and again at the November ACTFL conference in Nashville. The following discussion is based on the presentations and literature I obtained through the presenters at the AATF conference: Odile Challe (Univ. de Paris-Dauphine), Philippe Meyer (U.S. Videotel, Houston), Terry Ribb (Minitel Services Co., New York), Jean-Michel Cabanis (Bureau d'action linguistique de l'Ouest, San Francisco), Adam Steg (Services culturels français, New Orleans), Townsend W. Bowling (University of Texas, San Antonio) and Joel Mayer (Douglas MacArthur High School, San Antonio).

Odile Challe emphasized the great success of Minitel in France because of its successful integration into the French
way of life. The fact that French public utilities such as the telephone are operated by the national government gave the Minitel a virtual monopoly on distribution of its new technology: the French people are exchanging their old telephones for the new model which includes a Minitel terminal -- for free! There is no charge for the nonintelligent Minitel terminal; the charges are set by the cost of services used on a per minute basis.

The Minitel network is rapidly expanding to the other European Economic Community countries. With almost 5 million Minitel terminals in France, over 10 million French people (approximately one-half of the population) are benefiting from the Minitel services which include: 1) an electronic telephone directory; 2) the news; 3) commercial functions (banking, shopping, etc.); 3) games; and 4) electronic mail. All these functions will be reviewed in this chapter for the purpose of assessing their pedagogical value.

In adapting the Minitel for American use, the French had to market their idea as a product, not as a public utility. They also discovered that the Minitel had to compete with telecommunications networks already firmly established here. It should be noted, however, that Minitel offers Americans a less business-oriented network and offers educators the way to bring students into close contact with students of another country.
The entities through which one can secure the Minitel services are: U.S. Videotel (Houston) 1-800-477-5000, CTL Communications (New York) 1-212-477-2424, Newcom Link (New York) 1-212-832-8311, and Baseline (New York) 1-800-CHAPLIN. Baseline is tailored to specific audiences.74

One of two options is available: 1) renting a Minitel terminal which is simply a dedicated communications device and has no memory or function beyond communicating with the Minitel network (it is small and the video is only capable of black and white images); or 2) securing emulation software (that is, software written for other computers which "emulates" the Minitel software) for the following computers: IBM compatible, Macintosh, Apple or Commodore. There are a few advantages to the emulation software that the standard Minitel does not provide: e.g., the output can be sent in color to a large screen TV set or video projector; Minitel screens can be saved on computer disk for later editing and printing off-line (such as in the classroom); the Minitel data can be integrated with other data manipulation software such as word processing; and Minitel data can be shared with other computers.

However, since installation of the emulation software must be configured to the hardware of the host computer, installation of the emulation software should be done by a person with knowledge of the specific computer hardware and its possible needs for additional hardware or memory to
enable telecommunications, as well as a knowledge of the configuration of the host computer. There is a nominal charge for the emulation software from Minitel.

The total cost of telecommunicating to France via Minitel varies according to the company which provides the network. There may be a subscription fee to the network as with U.S. Videotel. The cost of the call to an access line, a telephone number which enables the computer to access the U.S. network providing Minitel services, must also be considered where the closest access phone number is a toll or long distance charge. U.S. Videotel operates only from the Houston and Dallas/Fort Worth areas. MSC (Minitel Services Company) can be reached through the existing INFONET network; however, remote areas must still call long distance to reach an access line. NEWCOM LINK offers a 900 number accessible from anywhere in the U.S., charging $.95 for the first minute and $.30 for each additional minute. MSC also has access lines available throughout the US but these are concentrated in the major metropolitan areas. It is suggested in U.S. Videotel's pamphlet "Minitel: a new tool for information services" that the interested party look into the long distance rates of all carriers in order to secure the least costly rate to the nearest access line.

The previously mentioned 1990 AATF convention workshop on the Minitel was sponsored in part by U.S. Videotel, MSC and the French Cultural Services, all of which provided the
on-line time for hands-on experience by the members of AATF. Minitel terminals were provided, as well as a MacIntosh, and Apple IIe and an IBM. The attendees were led through all the steps necessary to reach the menu choice of the "French Connection" which is the "gateway" to the Minitel services in France.

Once the user has chosen the French Connection, another menu appears from which to dial a service directly by number or choose a guide, the Minitel Guide des Services (MGS). The MGS acronym accesses the services guide in French and MND accesses the same guide in English. The guide does not provide a complete list of all services, but gives all the services of a specific type when the user keys in a descriptive category into its first command line. The individual service listings give the per minute price (as a "P" level, e.g. P3), as well as a short description of the service. Use of the guide costs 17 cents per minute. In order to make a call to a service it is necessary to return to the first menu of the French Connection and enter the specific call name of the service. Only after the user executes this call name is the charge for the service initiated. A full list of the services is available from U.S. Videotel, but the following is a description of a sampling of the Minitel services, that have pedagogical uses, and which are listed in U.S. Videotel's "A Synopsis of
FIFTY FRENCH SERVICES, From the 1,300 French Services Available Through The Videotel Network:

THE NEWS: the French Press Agency ("Agence France Presse"), French News (Le Monde database), Le Nouvel Observateur, and L'Equipe (sports news). Selections from these agencies can be used as "authentic documents"; that is, not teacher- or textbook-prepared materials, but natural language reflecting communication in a real-life situation.

THE COMMERCIAL FUNCTION: plan a French gourmet party with French Gourmet Advice, order wine directly from France with Coopvin or Bacchus, order French fashion through La Redoute Catalogue, buy a French book through Télé-librairie, make your fortune on the Paris Stock Market, open a bank account with Banque Nationale de Paris or Crédit Lyonnais. Some of these services offer catalogues or propaganda through the mail: this kind of advertisement is very easy for students to understand and provides new avenues for vocabulary building and cultural enrichment.

THE GAME PLAYING FUNCTION: follow horse racing in the periodical Parisien Libéré as well as read articles; play bridge with BRIDGE PLAYER through On-Line Magazine; the newspaper Le Nouvel Observateur also offers movie and book reviews, tests and games. Some games are interactive, calling for input from the user. Panelist Joel Mayer treated his French students to three turns on a game similar to Space Invaders ("Planète Maudite" on the LUI service at
As space travelers the players were presented with problems and had choices dictated by the game, each choice having a consequence. For Mayer it was a huge success in terms of student enjoyment and of their acquisition of space terminology in French.

**ELECTRONIC MAIL:** CHATLINE, ENGLISH SPEAKING CHATLINE, BDE (Bureau des Elèves) and POSTEX all offer the chance to talk to other users of these telecommunications services. CHEZ has 31,000 mail boxes (Boites aux Lettres or BAL). With POSTEX you create your own mailbox with a unique password ("pseudo") and even send the same message to a group of people who are on the service. There is also "live" CHAT where you can "converse" online (while the meter is running) in French behind a pseudo.

Email has become one of the most popular services among the French youth. It seems that hidden behind a "pseudo" flirtations can be conducted with anyone at no risk. U.S. Videotel is now marketing a similar concept for their American network called YAK. The anonymity of CHAT, for example, has allowed for more "personal" mail, what the French call "messageries roses" (pink communications), and for what can be found in the "personals" of classified sections.

There are two advantages to the electronic mail function: 1) First, it eliminates the problem of time zone changes between countries in that the message is stored in
the receiving computer until the information is called up to the screen. One can send a message whenever it is convenient and receive it in the same way, much as telexes are sent and read. For any educator involved in exchange of students from country to country, electronic mail can eliminate phone calls during peak cost hours; 2) Secondly, electronic mail can put foreign language (FL) students in contact with students who speak the target language in their own country. Bureau des Élèves (BDE) offers general social events, free classified ads, student Email, information on French schools and Universities, a schedule of holidays. BDE is a good place to start looking for classroom exchange.

Another presenter at the AATF conference was Jean-Michel Cabanis of the French Consulate in San Francisco, who presented "Jeu de Miroirs" (Mirror Game), a demonstration of the successful use of electronic mail in sister city exchanges between the United States and France. This project sought to bring not just language but culture to students in order that they might discover their own image in the face of the "Other". Sponsored by the Crédit Agricole of San Francisco, and with the cooperation of the Journal Français d'Amérique, the Bureau d'action linguistique de l'ouest des États Unis (Jean-Michel Cabanis) and U.S. Videotel, a budget of $28,000 was used to promote interaction between university students from 10 départements in France and students of 12 high schools in the western
United States from the first of April to the 30th of May 1989. The purpose was for each group of students to construct a "robot portrait" of the corresponding culture, that is, to build an archetypical image while referencing newspapers and magazines, and then communicating this as a group project through the Minitel. Both American and French students did a lot of research; Americans communicated in French and the French in English. The experiment was an overwhelming success: students motivated only by the direction of the teacher became self-directed; the will to communicate supplanted the will of the teacher. Of course, all exchanges were in French and although the French was faulty at times this did not prevent successful communication.

Presenter Joel Mayer used CTL to access Minitel services, so the services he uses differ slightly from those available on U.S. Videotel. He left a message in CHAT Email to the effect that a French class in San Antonio was looking for an English class in France. A teacher in Arras responded. "Finding the contact in the first place is the hard thing," he said in our August 10, 1990 interview. He then used the regular mail to encourage his students to communicate in English on paper and later on cassette tapes (some complete with rock music) and the French students reciprocated in French. He explained that he chose an English class in France so that the American students would
receive French letters and the French would receive English; this ensured the authenticity of the documents to be read.

Mayer profited by other applications than Email of the "French Connection". He explained that the benefits of using telecommunications are same-day results, the immediacy of the link to the target country, and the authentic aspect of obtaining natural language from the target country.

He used his Apple computer in class with a large TV monitor that the students could read as the material came onto the screen. He found excerpts from "France Presse" which were short and suitable for the competency level of his students. "France Presse" is not as erudite as Le Monde. Even his second year students were able to understand France Presse because he chose topics that they already knew something about, e.g., the San Francisco earthquake and the world series of soccer, and he would encourage them to guess from context. Paris Match he touted as easy to understand because of the print all in capitals. From Le Monde he pulled the weather forecast to teach regions and the metric system as well as the vocabulary attendant to weather description. Playing with train reservations on the SNCF screen or planning a route from place to place in Paris also proved fun in plotting a journey from one place to another. (Any reservation made automatically deletes itself in 24 hours if payment is not made.)
In December of 1989 an international forum sponsored by Le Nouvel Observateur, the European Community and the Vatican asked for an exchange of stories about Saint Nicholas, who is really legendary (based on the life of the saint) for Europeans and not the jolly old St. Nick of the American myth. The initial invitation to participation broadcast on the Minitel French network contained an address from the Pope in French. The computer presentation was fabulous according to Mayer: the first screen was a graphics display of St. Nicolas in resplendent cardinal dress. Each subscribing group then exchanged stories, so his students received electronic mail from all over Europe (France, Luxembourg, Italy, the Netherlands and Germany) and all in French.

Albeit through CTL, Mayer's connection was always to France; he could also access Canada through a network other than CTL and is planning to look into this possibility because of the lesser cost. There is more than one Canadian service for French language seekers, but the Canadian online multimedia bibliography databank, Services Documentaires Multimédia Inc. (SDM) came to my attention at the AATF New Orleans convention. Increasingly, the French voice of our neighbor to the north is being heard, especially politically. Of course, the standard for French pedagogy has always been the French of France; however, as the world in general has become smaller in terms of the capability to
bridge distances telephonically and to cover great distances swiftly, French pedagogy has turned outward to the larger Francophone world to rediscover the nuances and lovely differences in the French spoken, for example, in Haiti, Algeria, Southeast Asia, and Quebec. It is regrettable that students are not more exposed to these differences, for those same differences teach them the relativity of culture.

The connection to Quebec is made through an American network such as TELENET or AUTONET to DATAPAC, the Canadian system. There is no subscription fee nor monthly charge and the per minute charges range from $.48 to $1.33. It is possible to access DATAPAC by public dial. This Canadian databank is a reference tool for information, documentation and pedagogy. It is a library list of books, authors, periodicals, newspapers, audiovisual documents, computer programs and game materials for all ages, all in French. To find the desired information, the user must learn a specific Boolean request language for which there is a free handbook available. The handbook contains a tutorial on the Boolean commands which is easy to follow. By making online requests, one can obtain a list of all the materials available in Canada on the subject and media fields in which one is interested. It is possible to request material suitable for certain age groups as well as subject and media. Thus, a teacher can supplement the daily classroom experience in French. A booklet containing price lists for
all the databases also comes as a part of the documentation from SDM. The book also contains an order form which can be used to receive materials through the mail.

Whether an instructor uses telecommunications in the classroom or as a library source, the benefits of obtaining culturally relevant instructional material from an authentic source cannot be denied. It is this search for authenticity which inspires the discussion of satellite transmissions and interactive video in the next chapter; here are tools which can go beyond the text of a language to inundate the student with the sounds and actions of a culture.
NOTES

73 Gilgen 57.
75 Minitel: a new tool for Information services unpaginated.
CHAPTER 6

SATELLITE DISHES, INTERACTIVE VIDEO AND HYPERMEDIA

A satellite dish is yet another medium by which the American student can be exposed first-hand to the culture of the language studied. Most of the telecommunications satellites of the United States are synchronous with the Earth's orbit, which means that they are geostationary in our skies, allowing ease in "focusing" the satellite dish on one "fixed" satellite at a time. For some time Americans have been able to watch the news as it happens in other parts of the world.

Seeing live or video-taped transmissions in the target language provides a near "immersion" experience for students. Enthusiasm for second language learning can be generated from such programs. Kjell Johanssen, Lab Director of the Foreign Language Lab at the University of North Texas, is in the midst of a lab conversion and feels there is much benefit to be gained in using a satellite dish:

We will have a smoothly functioning language lab that will provide through the satellite dish antenna a world accessible to students in a way that it is not now and has never been before. 77

Many major broadcasting companies transmit to satellites. TV5 EUROPE has been distributing French
language programs since January 1984. Five groups formed TV5, TF1, Antenne 2, FR3 of France, RTBF of Belgium and SSR of Switzerland. TV5 broadcasts can be "captured" by a dish antenna of 8-12 feet; a C-band receiver is needed to convert the satellite frequency to television standard frequency; and the dish needs to focus on satellite ANIK D-2, Channel 17. Most satellites operate on C-band but there is a trend toward Ku-Band and Ka-Band which operate on higher frequencies, thus allowing more channels to be received to the dish. Other satellites carrying foreign channels are Galaxy 1 for Spanish transmissions from Spain and Westar 4 for Mexico's leading network. Anik D-1 also carries Canadian programs from Montréal.

Programs from TV5 and other broadcasts from Europe and the Southern Hemisphere can be brought into television monitors (with enough cable). These programs can be converted to video tape for pedagogical use in the classroom or for use in the language learning center by groups or individuals depending on the number of monitors available. However, as Suzanne Lindenau sounds a note of caution about "authenticity" in TV programs:

Hearing and seeing the target language spoken by native speakers in foreign language television programs may give viewers an authentic look at culture in terms of verbal and nonverbal communication dynamics. There is always, however,
the question of just how culturally authentic
television programming is; just how culturally
authentic is Chinese culture portrayed in
imitation American game show formats?\textsuperscript{80}

Thus, it is important to obtain and read the program
guides for the various satellite broadcasters and to be
selective about the programs to be viewed. Are the students
at a level to understand what is said even if the context of
the show is obvious? Television viewing is a passive
activity and this passivity should not be encouraged. There
should be a pedagogical format devised before the
transmission is aired to a classroom, such as questions
prepared for discussion afterwards. If the programs are to
be viewed on a stop-in basis in a lounge or library
situation, then some news programs should be aired as well
as the game shows. Soap operas, on the other hand, might
well serve as great motivating tools for learning vocabulary
for the romantic situations which textbooks always fail to
cover and which students are always curious about.

One way to incorporate these video-taped segments into
the curriculum is by combining the video with the computer
by peripheral devices (for example, attaching a VCR to the
computer and having a computer program run the sequence of
video frames). Interactivity means the ability of a
computer to orchestrate many functions, such as graphics,
audio, and text at one time. In such a way, a computer
program can "drive" the computer and all peripheral devices (such as tape or video players) linked to it. The term "hypermedia" designates the computer as the source for the audio, video, text and sound: as one enthusiast says "... hypermedia can open windows and take the 'reader' out into the world." Just such an insightful statement was made by Kjell Johansen vis à vis the satellite transmission.

Interactive video and audio has been demonstrated in Chapter 4 in the evaluation of the Montevidisco simulation. The following are two further examples: the first of interactivity and the second of hypermedia. François Marchessou of the University of Poitiers describes the CLIP-VAO authoring system of his colleague J. P. Courjaud, developed at Poitiers, as the answer to creating an active video viewing experience for students. A video segment is teamed up with a computer program which is engaged on the insertion of the video into a VCR linked up to the computer terminal:

Each pause consists of a predetermined freeze frame, at which point the computer stops the video action, provides comments on the scene the student is watching, asks questions about the vocabulary and structures used, the register of speech, non-verbal indicators, and so on.

The video is shown once in its entirety and at full speed. Then the computer takes over and shows the video at
a slower speed for easier comprehension, stopping at the preprogrammed frames to ask the questions the teacher has devised for the lesson. These interactive videos constitute the comprehension and vocabulary learning for the course. Marchessou shows himself to be very aware of the intimidating power of computers. He writes as many words on how to introduce the students to the system as he does explaining what the system does. For example, he stresses that the first session with the interactive setting must be "... a hands-on demonstration in order to show students that they can handle the whole interactive video process from beginning to end by using a few simple functions." The students work in groups to foster good peer learning habits: "... systematic sharing of responsibilities with one student handling the dictionary while another enters responses into the computer . . . ." Marchessou also notes that teaching through video allows the teacher to point out cultural differences by asking questions about actions as well as words. This technique might well be more efficient, flexible and less expensive than video-enhanced CAI or CALL and deserves great consideration in the budgets and renovations of foreign language laboratories.

David Williams discussed evaluating the use and effectiveness of interactive video disc in a paper for the Research Society and the Evaluation Network. He observed:
Not only are students expected to develop vocabulary, listening skills, speaking fluency and cultural awareness, but they are expected to gain skills in self-diagnosis and management of instruction.\textsuperscript{85}

According to him, students benefit from more than matters of curriculum but also from an exposure to self-guidance of instruction. Williams believes the enticement to this type of instruction comes from the "combination of all media forms [text, video, audio, computer] on one format and under computer control."\textsuperscript{86}

The second example of instructional media combination is called hypermedia. Hypermedia does not mean the video or audio is a peripheral; rather, a computer so equipped may use its own graphics capabilities or generate synthetic voice. Synthetic voice does not sound natural to the human ear, however, and although progress is being made towards more natural voicing, synthetic voice is not yet generally used in second language acquisition.

HyperCard is an enhancement offered by Apple which comprises tools to "draw", "paint", lay out text, and cut-and-paste graphics. Underwood describes HyperCard as

More than a program shell waiting to be filled in, HyperCard is like a stack of blank magic cards (magic because they have hidden posers), waiting
to be used for whatever purpose you can think of. ...

But what makes HyperCard a true hypermedia system is the button tool. A HyperCare "button" is a hot spot on the screen, an area that the user clicks on with the mouse in order to make something happen -- to go to another screen, get more information, play a sound, and so forth. Buttons link screens ("cards") together, cause text fields to appear or disappear, and -- in the most interesting case -- control a videodisc player. Buttons, like fields, can be created with a few clicks of the mouse.87

The possibilities for creation in hypermedia are heady. Perhaps one day we will be able to make second language acquisition more interesting than television, especially when huge memory devices such as CD-ROM (Compact Disc - Read Only Memory) do away with the need to attach peripherals. As with all new technologies, CD-ROM means new equipment (the player) and new investment in the discs themselves. Verl Woodbury recommends caution:

The potential is obvious in its memory capacity, present level of industry-wide standardization and multimedia capabilities. Its limitations of cost, access of date, and difficulty in taking advantage of the multimedia capabilities seem to center
around a continuing need for standards both in hardware and software.\textsuperscript{88}

The technological uses of the computer in this chapter have gone beyond those provided by the usual kinds one finds in language labs. These uses are more commonly found in media centers, a term more descriptive of the actual ongoing instructional activities. Nonetheless, every function mentioned in this chapter can be assumed by the language learning center and its computers. The information in this chapter is aimed at widening horizons already presented in Chapters 4 and 5.
NOTES

77 Kjell Johansen, Lab Director at the University of North Texas, personal interview, July 16, 1990.


80 Lindenau 68-69.


83 Marchessou 51.

84 Marchessou 51.


86 Williams 21.

87 Underwood 10.
CHAPTER 7

RESULTS OF THE SURVEY

I present here the results of a survey mailed to Texas universities in order to determine computer use in foreign language departments. Chapters 1 through 6 have looked at the technology which is available today to foreign language educators; however, availability does not imply use. In the fall of 1990 I sent questionnaires to the foreign language lab directors of Texas universities whose population is greater than 5,000 students (see Appendix A and B for examples of the questionnaire and the letter). In this chapter, I analyze the statistical results of my survey. I chose larger institutions to ensure that foreign language study would be part of the curriculum. Those universities who responded that they had no foreign language department are not included in the analysis. Thus, the population of my study is very small. However, I received a ninety percent (90%) response to the forty-one mailed out. Many respondents also included valuable comments. I would like to thank all those who responded to the questionnaire. I believe the overwhelming response is due to the desire among higher education institutions for guidance in this
area of technology in foreign language learning. The study was conducted on a confidential basis, so university names will not appear in this discussion. However, I would like to cite the comments of one institution as representing what I consider the new direction of those rebuilding a lab:

Computers are used for administrative and pedagogical purposes. Students may go to a microcomputer lab and use Word Perfect in Spanish, for example, to write papers, etc. ... We are looking for computer equipment for a language lab. We do not want a traditional lab.89

A dilemma arises when the faculty on the lab committee, having decided on this new direction, face the decisions of equipment choice: one institution commented that it is planning to build a new lab with lots of computers, a satellite dish, etc., but hadn't yet decided on the equipment. This comment indicates the astute caution necessary to making an informed choice of which hardware and which software to purchase, when the investment is very great and the longevity of the system determines the payback both to students and to faculty. It is of paramount importance, however, to first look into the software and find those which fit best into the curriculum; it is only at the second stage of planning for a new lab that one should consider equipment to support the curriculum. The equipment
should fit the needs of the curriculum and the methodology of the learning process, not the reverse.

In the questionnaire I asked each institution to indicate whether given statements were true or false in relation to conditions in its foreign language department. The following is a statistical summary of my findings. The percentage of respondents who marked the box appears to the left of the statement:

32% "We do not use computers in our foreign language department."

12% "We do not currently use computers in our foreign language department but are planning to do so in the near future."

44% "We use a computer for administrative purposes only (scheduling classes, verifying enrollment, etc.)."

27% "The foreign language lab has a console for listening practice which can monitor student production in a student carrel."

15% "The foreign language lab has a link to a satellite dish and uses foreign language channels as a part of language instruction."

29% "The teaching staff uses computer-assisted language learning programs or interactive video instruction either in the classroom or in the language lab."

The questionnaire showed that thirteen out of forty-one respondents do not use computers in their foreign language
departments while another twelve indicated that the teaching staff uses computer-assisted language learning programs or interactive video instruction either in the classroom or the language lab. Since these categories are mutually exclusive, it is interesting to note that the distribution is about half and half. Therefore, Texas universities seem to be in an era of transition towards using computer technology for foreign language instruction.

Eighteen marked the box for the category "We use a computer for administrative purposes only" which includes one institution stating use of a computer for advising, one stating use of a computer for achievement testing, a third stating that classroom materials are generated by a computer, and a fourth stating that there are 35 computers for use by 43 faculty staff. These uses come under the definition of computer-assisted instruction (as defined in Chapter 2); that is, the use of a computer to generate instructional materials where the students do not actually have "hands-on" experience with the computer. Five respondents who do not use computers currently in the foreign language department indicated that they are planning to do so in the near future for both administrative and pedagogical purposes. This statistic is not a strong showing for the growth of computers in foreign language departments, whether for use by the teaching staff for
grading, filing, or computer-assisted instructional materials.

According to this survey, the use of foreign language lab consoles is still frequent at the university level with eleven out of forty-one institutions providing the information that they do use consoles for listening practice. Those consoles are: Tandberg IS-10 (two institutions), Sony LLC-7 (indicated by one of the two respondents using this system to be an "antiquated system"), Sony LLC-11, Sony LLC-4500, Sony LLC-9000, an EM (Educational Media) system used on a library system (not manned), ASC-AS4M, Telex, and Telex 6120. Although I did not ask, it would have been informative to know whether the listening practice was console-directed or library-oriented.

Six institutions reported using satellites and foreign language channels as part of the language instruction. Two institutions indicated that the foreign language department did not have the dish itself but received transmissions by cable from the down-site. One institution specified receipt of France TV Magazine, while others did not specify the channels received. Another institution responded that the lab will soon have satellite capability, that the dish is in the planning stage and that the video transmission will be part of the university's fiber optic cable. Another institution responded that their lab will be hooked up during the academic year (this university is not included in
the statistic). Since so few of the respondents indicated use of satellite transmissions, this technology is the least-used of all included in the survey.

Respondents who used computer-assisted language learning (CALL) were asked to specify which programs they use. Some institutions have a veritable library of software from which to choose; others cover their pedagogical demands with a few programs designed for more than one language; while some utilize authoring languages and other in-house programs to produce their own materials including tests for each foreign language. The following is a breakdown by specific language of all the CALL listed:

**FRENCH**

Locally produced programs

MacLang for Workbook to accompany *Le Français Départ-Arrivée*

IBM and Apple IIE programs available

CALIS authoring program

Commercial computer program in French for *Rendez-Vous*

The *French Mistress* for IBM PC

*MacFrançais* accompanying *Rendez-Vous*

French Achievement Test

Hyerglot French pronunciation

**SPANISH**

DASHER
Random House Videodisc/Hypercard program stack, to
accompany *Puntos de Partida* 3e.

Spanish laserdics-interactive video is used in
class and as individual option

IBM and Apple IIE programs available

CALIS authoring program

Conjugate!Spanish

Spanish Tutor for IBM/PC

MacEspañol accompanying *Puntos de Partida*

Spanish Verb Tutor

Spanish Contest 1 and 2 for Macintosh with

Hypercard

Lingo Fun

Hyperglot Spanish pronunciation

Macintosh verb drill

*Practicando español con la Manzana II*: verb drills

for Apple

Lecciones en español - (conduit for Apple),

explanations and drills for Spanish

Spanish Hangman: vocabulary, sentences for Apple

**GERMAN**

Hyperdeutsch

CALIS authoring program

Fleece

Dasher Drills -- two institutions

The German Master for IBM PC
Tutorial in German Passive Voice for Macintosh
Hyperglot pronunciation for Macintosh

OTHER

IBM and Apple IIE programs available in Latin
CALIS authoring program in Russian
Chinease for Chinese calligraphy on IBM/PC
Davka in Hebrew for Macintosh
The Italian Tutor for IBM/PC
A Japanese Tutorial for PC-Sig.
Russian Word Torture
Russian Noun Tutor
Russian Verbal Aspect
Introduction to Russian for Macintosh with Hypercard

Hyperglot for Russian pronunciation

Most of the above materials are not dedicated to a particular textbook; however, it is interesting to note that three of the CALL software listed for French are for use with a textbook. The value of this kind of CALL is tremendous, for the vocabulary and structures which the student already knows are reinforced and the student is not faced with learning new vocabulary or idioms in order to complete the CALL exercise.

Another observation about the entire CALL list can be made: the thrust of the pedagogy seems to be aimed at the elementary and intermediate level of foreign language
learning through the use of generic drill-and-practice and tutorial exercises. Many of these generic packages are not dedicated to one language: the standard seems to be to include similar templates for drill-and-practice, games, vocabulary, fill-in-the-blank exercises for the three most commonly-taught foreign languages -- French, Spanish and German.

Only one institution mentioned that they use MacWrite for their students' writing skills; however, this department also teaches English as a Foreign Language (ESL) and I suspect that their word processing use is dedicated to ESL. As was discussed in Chapter 2, there are still few CALL materials for advanced levels; the above tends to underline that fact.

One institution indicated the use of in-house developed CALL and a few institutions use authoring languages to create CALL materials. I believe that the prevalence of generic packages over teacher-developed materials is due to the investment of time required by the teacher in developing materials or authoring exercises. Anyone willing to develop materials must begin with a rudimentary knowledge of the computer on which the materials will be constructed. Then, for authoring programs, the novice must learn how to successfully put exercises together. Often, the manuals accompanying the software are not as "user friendly" as the program itself may be touted to be.
If higher education systems are to move into the development of in-house CALL, the multi-media language learning center must be manned with personnel who can assist the teaching staff in developing materials. Perhaps even one resource person may suffice: a person who is computer literate in MacIntosh and IBM PC and who can become proficient in the pedagogical use of the CALL programs which are used. Such a resource person could be invaluable in evaluating software and making recommendations to the foreign language educators for future CALL use. Thus, the time investment for teachers would be lessened while their input would remain invaluable. If such a person is not available, the resource person could be the professional teacher designated as lab director. In either case, the regular duties of such a resource person should be lessened so as to allow time for development of materials.

Unfortunately, the respondents of my survey expressed concerns which are not considerably different from those of Solveig Olsen in her survey of ten years ago, though she surveyed the nation and I surveyed only the State of Texas. The same reticence to use technology exists now as it existed then. Statistically, however, we seem to have made progress. In 1980 only four university foreign language departments in Texas offered CAI in the curriculum; in 1990 twelve Texas university departments offer CALL, but most of this CALL is still in the three most commonly-taught
foreign languages. Olsen found only ten percent of nationwide foreign language departments using CAI and CALL while I found 29 percent of Texas departments listing the CALL they use. On paper, we have made progress in Texas, but I still fear that CALL has not penetrated to saturate the curriculum. Isn't it ironic that students may own the technology of their choice, and never find it in their instructional environment?
89 Due to the confidential nature of my survey, I cannot give an identification to this note.

CONCLUSION

THE MULTI-MEDIA LANGUAGE CENTER

AND SECOND LANGUAGE ACQUISITION

In Chapter 1 I discussed the evolution over the last decade toward a new methodology in foreign language learning, and the increased attention which is currently being paid to the distinction between language learning and language acquisition. The contemporary multi-media language center should be dedicated to language acquisition. Computer-assisted language learning (CALL) by itself cannot offer a naturalistic environment which engenders creative language. CALL is part of the learning process of language as described in Chapter 1 through the work of Krashen and of Chomsky, that part dealing with the abstract, rule-governed system. Acquisition occurs as a result of learning, whether teacher-directed or computer-assisted. The advantage of CALL over learning in the classroom is that "[t]he use of the computer would permit a single student to experience approximately forty or fifty interactions in one hour" compared to the possible five to ten times in the classroom (depending on the number of students). CALL, when not used as drill-and-practice or games, can also offer the student the environment in which to be more creative; however, CALL programs still remain correct-answer-oriented and, as shown
in Chapter 4, only capable of accepting answers which are programmed into the script.

That is not to say that CALL should go the way of the audiolingual method, too rigid to survive. Granted, a computer program usually is built on a technique of character string searches and matching characters. For example, the computer "looks" at the string of characters that the students input by comparing each character in the student response with the answer or answers given in the computer program. When it reaches a mismatch, the computer stops the reading process. The program then moves on to the next task, usually a prompt on the screen alerting the student that a wrong answer has been received. However, this seeming rigidity can be overcome by visionary and thorough CALL creators who research and include all possible correct answers, such as techniques like parsing discussed in Chapter 4. I believe it is this very rigidity which has discouraged many educators from making a strong commitment to CALL.

Access to computers, that is, the physical placement of computers, is an important factor in foreign language learning -- whether to install them in classrooms or in the language learning center. It is my belief that computers are more effective in a language learning center than in the classroom. Maximum time use cannot occur in the classroom, since the classroom teacher needs time for oral presentation
of lessons as well as oral communication between teacher-student and student-student. Computer time is best spent in the learning center where scheduling can permit whole class use or individual use, thus enabling the computers to be in use throughout the day.

CALL has its place in the multi-media language learning center (MMLLC) as the great learning tool which it is. However, the computers of the center need not be dedicated to CALL. The learning center computers can be cabled together easily as they are housed in proximity to each other, allowing for communication among all computers or a selected few. Richard A. Raschio supports the use of communicating computers for a better learning environment:

Local area networks (LAN) present teachers and learners with new possibilities for communication in the target language that have not been available with stand-alone microcomputers. . . . LANs present the teacher with the ability to group students according to interest or ability at the most appropriate level of a given lesson. . . . Also, the teacher can project individual or group efforts on a large screen so that the entire class can interact . . . .92

The center should also offer recitation practice on tape for learning pronunciation and the intonational flow of the target language. In this era of tape cassette
technology it is easy to assume that once given a tape to take home and listen to, students will comply. This presupposes a motivated student and a student in possession of a tape player. This may not be the case; therefore, the MMLLC should provide a few student tape players.

However, where the language center surpasses all other modes of learning is in the offering of simulations and cultural immersion techniques which will motivate students towards language acquisition. We have the means to offer students the sights and sounds of the target language through video coupled with computer programs which stop and query the students as to the language or the situation. We have satellite transmissions which can immerse the students in natural language. CD-ROM video disks (laser disks which allow storage of graphics, text and sound) provide the same sights and sounds of natural interaction, all on one medium. With these kinds of technology in the language center, the students can be inundated with the stimuli of natural language.

Krashen's Input Hypothesis gives a formula for the stimuli necessary to foster language acquisition -- the learners comprehension level \((i)\) plus the presence of the next higher comprehension level \((i + 1)\):

Three ideas contained in Monitor Theory have generated a great deal of discussion and research: the learning/acquisition distinction, the
comprehension of $i+1$ input as a causative factor in acquisition, and the assertion that acquisition takes place during comprehension rather than production.\footnote{94}

It is this final assertion that acquisition takes place during comprehension rather than production which leads to the realization that students must be constantly exposed to language which they do not understand in order to advance comprehension: it is during their logical processing of the foreign language that they infer, deduce and internalize.

Therefore, the multi-media language center should provide as many media as is possible in order to provide for acquisition as well as learning. It is common knowledge that we all have differing learning styles; some of us use audio-input best, some of us visual, some of us kinesthetic, etc. The language center should be an amalgam of all types of media in order to serve the optimum number of learning styles.

In the design of the MMLLC, space for a room of computers, enough to provide for a classroom of students in a LAN setting (25-40) should be considered, if the department has committed itself to CALL. I do not want to recommend which computers to install; I do want to caution that an institution should not buy all of one kind. In a rapidly changing market, one can never know if one has bought a piece of technology which will be obsolete in five
years. I recommend that the institution purchase at least two different makes and I recommend the purchase of personal computers. The advances in technology of personal computers have made them attractive because of their small size and the fact that each operates from its own CPU (central processing unit) and yet can also be linked into a communication network (such as a LAN). The question of compatibility then arises, since no two makes are identical in compatibility. However, no manufacturer has cornered all the best software; having two sets of products ensures that an institution will be able to purchase the best software of each manufacturer.

The physical configuration of the workstations should allow the monitor or the teacher to view all the screens easily, for example, placing the computers in a "U" so that a student in trouble can be spotted easily. Student chairs or desks may be set in the middle of the room if needed. A large TV monitor would be helpful when the project is a simulation so that viewing is made easy. A few personal computers could be dedicated for simulations in the projection rooms (discussed in the following paragraph) or in the classroom by being made portable on rolling carts.

Two or three projection rooms should be designed for video and computer simulations, or video presentation alone. The seating here, as opposed to the stationary LAN setting, should be modular to enable groups to convene in different
areas of the room. As a recommendation, a VID camera which can project opaque objects should be available. The screens should be large; an entire wall would be excellent.

The MMLLC should be equipped with a check-out counter, located centrally to all rooms and which would direct equipment check-out to faculty. Within the library area should be located the computers holding the CALL or CAI materials, accessible by interested faculty and maintained by the library staff. A lounge area could be provided where students might view the incoming satellite transmissions. A programming guide should be posted outside the library (and perhaps disseminated among the faculty) for each week's events.

The staff of the MMLLC could be student workers, with the exception of their supervisor, who should be a professional. This professional could monitor the use of the various media and report to the faculty in order to determine the life of the various technologies. The staff of the MMLLC should be trained in the use and in the demonstration of use of all the equipment.

Although I propose a library setting for the MMLLC, I do not believe that voluntary use will bring enough students to the facility to warrant the expenditure. I see two means of encouraging students to enjoy the multi-media experience: regularly scheduled lab classes with a lab monitor; or on a time-card basis. Again, it must be noted that, if the
student is not motivated, a time card can mean nothing more than that the student did homework while spending time in the lab. What is paramount is the *seduction* of the technology; once each student experiences the natural language environment of a simulation, then compares it to the experience of language instruction in the classroom, the realization will dawn that the best way to acquiring a second language is in the multi-media language learning center. This is not to say that the MMLLC is the best place to teach language; that will remain the classroom. The MMLLC will be where students can experience that "AHA!" moment of consciousness when instantaneously one piece of information processed means an entire matrix of problems solved. Most importantly, their experiences of the multi-media center will be varied, new and exciting. It is their world that we as educators are preparing them for; they were born to this technology and understand it not as an option, but as a fact of life.
NOTES


Name of your institution: _____________________________

Name and title of person filling out this questionnaire: _____________________________

Please check the box appropriate to your current computer application:

[ ] We do not use computers in our foreign language department.

[ ] We do not currently use computers in our foreign language department but are planning to do so in the near future.

If you have checked the box immediately above, please give a brief description of the computer application you plan to utilize; i.e., is it administrative, pedagogical, ...?

[ ] We use a computer for administrative purposes only (scheduling classes, verifying enrollment, etc.)

[ ] The foreign language lab has a console for listening practice which can monitor student production in a student carrel.

If you have checked the box immediately above, please give the model and name of the manufacturer; i.e., SONY 5510, Tandberg IS-10, ....?

[ ] The foreign language lab has a link to a satellite dish and uses foreign language channels as a part of language instruction.

[ ] The teaching staff uses computer-assisted language learning programs or interactive video instruction either in the classroom or in the language lab.

If you have checked the box immediately above, please give a brief list of the program(s) and a description of each use:

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To the Lab Director:

As a master's candidate in French at the University of North Texas, I have proposed as my thesis project to explore computer applications to second language acquisition and to document the extent of computer use in the Texas universities. The paper will include a brief survey of the following aspects of evolving technology: microprocessor driven language practice in the language lab, computer-assisted instruction programs, authoring languages, telecommunications networks (particularly the Minitel) and reception of overseas satellite programs.

I would appreciate your participation in the enclosed survey of current computer application in your department. If you are not the person to whom this should be addressed, would you please relay the questionnaire to the appropriate person(s)? This information will be used as a basis for statistical study on such application, and all information will be strictly confidential. I am surveying only Texas schools, since I have no external funding for the project. I have no grant, nor political bias.

May I ask for a prompt reply? I am enclosing a self-addressed, stamped envelope for your convenience. Thank you in advance.

Sincerely,

Helen Guillory
WORKS CONSULTED

COMPUTER-ASSISTED INSTRUCTION AND COMPUTER ASSISTED LANGUAGE LEARNING


___."Research on CALL," in Wm Flint Smith, ed., Modern Media in Foreign Language Education: Theory and


FOREIGN LANGUAGE TEACHING METHODOLOGIES


Doughty, Catherine. "Relating Second-Language Acquisition Theory to CALL Research and Application," Wm. Flint Smith (ed.), Modern Media in Foreign Language


Wyatt, David H. "Applying Pedagogical Principles to CALL Courseware Development," in Wm. Flint Smith (ed.), Modern Media in Foreign Language Education: Theory and

THE LANGUAGE LABORATORY


TELECOMMUNICATIONS, SATELLITE DISHES, INTERACTIVE VIDEO AND HYPERMEDIA


Johansen, Kjell. Lab Director at the University of North Texas, personal interview, July 16, 1990.


