ABSTRACT

This article summarizes the efforts to apply high technology to the teaching and learning of languages at Brigham Young University. These efforts are largely centered around three separate departments. These are: 1) The Learning Resource Center which in addition to the normally expected audio and visual equipment, courseware and other resources also offers courses on the TICCIT Computer System; 2) the David O. McKay Institute of Education which did pioneer research work in the area of videodiscs and associated technology; 3) and the Humanities Learning Resource Center which offers several facilities for the benefit of the language student and which provides an Apple Language Lab for those students.

During the past decade, educational technology has developed at such a rapid pace that some feel it has nearly outrun the teacher. This may be particularly true of language teachers, since second- and foreign-language educators generally have not been considered innovators in the use of technology. However, this is rapidly beginning to change. Many language programs throughout the United States and in other countries are experimenting with and utilizing in their curricula the most recent types of audio and visual media equipment available. Appropriate use of these new resources has been effective in upgrading language instruction and learning.

In an effort to improve language training at Brigham Young University, a considerable amount of time, effort, and money has been spent during the past decade on research with and implementation of new and existing technology. Language educators and instructional technologists at BYU feel that the time is at hand when the combination of text, tape, microcomputer and video will offer the highly motivated learner an efficient and flexible means of attaining a basic communicative competence in a target language. At BYU three support programs are primarily involved in developing and providing technological learning aids for student use in foreign language learning: TICCIT, the videodisc research program of the David O. McKay Institute of Education, and the Humanities Learning Resource Center.

TICCIT

In order to understand TICCIT and its role in language training at BYU, it is useful to know a little of its unique history and development. A great deal of Brigham Young University's experience with computer-assisted instruction began with the National Science funded TICCIT Project. TICCIT, which stands for Time-shared Interactive Computer Controlled Information Television and is now a trademark of the Hazeltine Corporation, was an interactive television system first conceived by the MITRE Corporation. MITRE had been investigating computer-television technologies for several years when it received a grant from the Office of Technological Innovations to further define the TICCIT system and apply it directly to education. To assist in this task, MITRE chose as subcontractors the University of Texas at Austin CAI Laboratory and the Instructional Research Development Department of Brigham Young University. Both these subcontractors had notable backgrounds in applying instructional science principles to educational media.

IN 1972 personnel from both Texas And BYU combined at BYU to form the Institute of Computer Uses in Education (ICUE), whose role for the remainder of the MITRE-NSF TICCIT Project was to design and develop instructionally-sound mathematics and English courseware. For the next three years MITRE molded the TICCIT hardware and software around the design...
developed by ICUE instructional scientists and subject matter experts. A group of technicians was added to the team and large amounts of courseware were produced. This team effort culminated in a year-long demonstration of computer-assisted instruction in a public school setting at two junior colleges: Phoenix College at Phoenix, Arizona; and Northern Virginia Community College in Alexandria, Virginia. The MITRE Corporation, having developed a usable product, sold the TICCIT concept to the Hazeltine Corporation for commercial development.

The TICCIT Instructional Design

The TICCIT project contributed a number of innovative ideas to the philosophy of computer-based education. For example, TICCIT is one of the few CAI systems to be designed by both educators and computer technicians. Together, they developed a system based on the philosophy of learner control, as inspired by Pask's model for student machine communication and Merrill's taxonomy of instructional variables. This instructional design was formed to answer the diverse needs of a college freshman population and help ensure a certain quality in the courseware developed.

One of the concepts developed by the TICCIT project was the idea of a mainline instruction mode. Using the computer in this way called for a major rethinking of the traditional teacher-student relationship. Under the mainline concept, the computer (TICCIT) would become the instructor, combining both textbook and routine classroom lecture into one presentation. Class time could be focused on higher levels of interaction and the instructor would become more of an information resource manager as well as a personal tutor, giving individual attention to those students having trouble with the computerized instruction. The net benefit, in this way of thinking, was not to replace teachers with machines, but to give the instructor more effective control over the education of a larger number of students.

The ETS evaluation of TICCIT vindicated the mainline concept. ETS indicated that according to their evaluation Mainline instruction was far more effective than using TICCIT as an adjunct to the classroom. However, most courses developed for the TICCIT system have elected to use it as an adjunct.

TICCIT at BYU

At the close of the NSF-funded TICCIT project, it became apparent that the comprehensive goals of the Institute for Computer Uses in Education would be too broad for the funds available at BYU. As a result, a much smaller organization was created to integrate the TICCIT system into the BYU curriculum, to conduct research on TICCIT's effectiveness, and to advise the university administration on the possible applications of new technology in education. This organization, known as the Computer Teaching Research Center, studied a number of factors influencing the effectiveness of TICCIT courseware and experimented with different teaching methods.

During the period of research, Brigham Young University instituted a curriculum change that greatly aided acceptance of the TICCIT system into the BYU academic system. Recognizing the national problem of basic skills deficiencies and noting the fact that in today's shifting job market a good general education is of increasing importance, the university moved from the traditional system of required general education to a system of required general education competency examinations. Under this new general education program, a student could prepare for required competency examinations in such subjects as mathematics, English grammar, reading, and writing in a number of ways. Instead of taking a preparatory class, the student was able to elect to prepare for an examination on his own by working in a tutored laboratory setting, by using the TICCIT system, or by combining any of these resources. Given the impetus from this student-managed preparation program, the TICCIT system at BYU made a relatively smooth transition from being only a research system to being a fully implemented academic support service.

To better perform this service role, the Computer Teaching Resource Center was reorganized in 1977 as a Computer Teaching Services (CTS) to provide existing TICCIT courseware to the students and to assist
Facilities and Services

Currently, the BYU TICCIT system consists of a 28 terminal work area with in the Learning Resource Center of the University library. In this setting it is available to any interested user, including non-students. CTS provides student assistants or proctors to introduce the system to new users and help the students as they work through the course wear. CTS provides weekly reports to instructors showing the number of lessons each student has passed, total time on-line and the last day the student used the system.

Using TICCIT

Student acceptance of the TICCIT system has been extremely positive. In a survey conducted in 1981, well over 80% of the students queried felt that TICCIT was a useful and effective tool. The major complaint received from the students is that that learner-controlled design of the material is hard to understand in the beginning, and that many of the features of the system need to be more completely introduced to the new users.

The difficulty in immediately grasping the learner-controlled approach becomes apparent when TICCIT is seen from the student's point of view. After a student has logged on to the TICCIT system, his is shown a series of diagrams representing all of the units, lessons in a selected unit, and segments in a selected unit, and segments in a selected lesson with their relationship to each other. These diagrams are called MAPS and each one becomes a dynamic status display showing the student's progress through the course. As the student begins each instructional segment, he has a choice of accessing four primary instruction files: OBJECTIVE, RULES, EXAMPLE, or PRACTICE.

The OBJECTIVE display give the student a behavioral adjective statement followed by a sample problem with the correct answer given, thus showing the student what he should be able to do to master the segment. The student can use the OBJECTIVE as a decision point to determine what instructional sequence to follow, or, in other words, the branching decision as to which instructional sequence to see next is placed in the ands of the learner instead of the computer. The student's choice of RULE, EXAMPLE, PRACTICE, or doing an entirely different segment will depend on his previous understanding of the task to be performed and his particular learning strategy.

If the student feels he already knows the material, or if the material is too hard, he may press the MAP key and go on to something else. (The student may press MAP at anytime except when taking a test.) On the other hand, if the concept is new to the student he could press the RULE key to see a concise presentation of all definitions or procedures needed to accomplish the objective; or he could press the EXAMPLE key to access a file of items showing the objective applied to specific instances. Upon pressing the PRACTICE key, the student is given a file of problems upon which he will perform the task defined by the OBJECTIVE display.

In addition to the four primary instructional files mentioned above, three supporting files exist: HELP, HARD, and EASY. When viewing the RULE file, the student may elect to press HELP for an expanded version of the RULE, HARD for a more abstract form of the RULE, or EASY for a more simplified version. While seeing the examples of while doing the practice problems, the HELP key will access a step-by-step explanation of the specific time the student was viewing. The HARD and EASY keys access harder or easier problems if the authors have provided them.

A final component that should be mentioned is the ADVISOR. Because the student was given almost complete control over his own learning sequences, the TICCIT designers felt that the computer should watch over the student's shoulder and advise him as to
what he should do if he performs poorly or does something unexpected. Therefore, in addition to automatic displays that may prompt the user to see the HELP or to move on to the next segment, the student may also press the ADVICE key at any time to see the computer's suggestion as to what to do next.

TICCIT users

The majority of TICCIT users fall into six language groups: English, ESL, German, French, and Italian. Each of these TICCIT courses are developed under different circumstances and for different purposes.

1. English—Originally this course consisted of thirteen units comprising rules of grammar and composition. During the NSF funded project, the TICCIT English course was considered to be a true pioneering effort as the underlying assumption was that mathematics could easily be taught by a computer, but a successful marriage between computer and English composition was at best tentative. It is ironic that at BYU the mathematics program was never accepted while the experimental English course proved to be more effective than may had hoped, and, in fact, saved the TICCIT system at BYU from being completely rejected. It was the successful implementation of this original English course that created interest among other language instructors to begin work on additional language material.

There is a wide diversity of acceptance among the English instructors with the majority considering TICCIT as an adjunctive resource that maybe utilized as the student sees fit. A small number of graduate students instructors have understood the potential of the course and have experienced remarkable success when they have integrated TICCIT instruction with the regular course work in a manner approaching the mainline concept.

The following list of unit titles represents about 56 hours of instruction available in over 280 instructional segments:

- CRITICAL READING—Finding the Main Idea, Reasoning, Interpretation, Other Concepts.
- GRAMMAR—Basic Elements of the Sentence, Analyzing Sentences, Expanding the Sentence, Multilevel Sentences, Spelling Verbs and Pronouns, Punctuation Capitalization, Sentence Faults, and Effective Writing.
- COMPOSITION—Structure of Writing, Writing Paragraphs, Organizing Essays.

During the 1982-83 school year, 609 students were registered for the TICCIT English course, representing 9% of all freshman English students. They spent a total of 2,731 hours on the system, which averages to 4.5 hours per student.

2. English as a Second Language—Soon after the TICCIT English course was fully implemented, graduate students of Dr. Frank Otto of the BYU ESL Department began developing instructional segments for TICCIT as student projects. Soon after this, Dr. Otto received a research grant from the university to develop a complete English grammar review specifically for intermediate to advanced ESL students. Over a four-year period a thirteen unit course was developed that is now used by 96% of the ESL students. In 1982-83 290 students averaged 10.8 hours on TICCIT for a total of 3,138 hours making the ESL students the most dedicated of all the student users. Most of these students are enrolled in an intensive program to prepare for the TOEFL test, the examination that they must pass to be admitted to the university. The titles of the ESL units are: Diagnostic Tests; Verbs; A Basic Overview; Verbs: Tense, Mood, and Aspect; Nouns; Pronouns; The Determiner System; Adjectives; Adverbs; Spelling; Conjunctions; Prepositions; Sentence Types; and Sentence Sense. These units are divided into 296 segments representing over 40 hours of on-line instruction.

3. French—This course was designed by Dr. Don Jensen of the BYU French Department as a general grammar review.
4. Students who are found to be deficient in grammar areas through diagnostic testing, departmental examinations, or teacher interaction are sent to TICCIT for remediation. In addition, first and second year students use the material as supplemental exercise to the regular workbooks. Last year 364 students representing 61% of all first and second year students used the system for a total of 917 hours, or 2.5 hours per student. The three units, Beginning Drills, Intermediate Drills, and High Intermediate Drills, comprise 52 segments or about 8 hours of instruction.

5. German-Dr. Randall Jones made good use of the experiences of other courseware developers when he developed the BYU TICCIT German course. By training a small number of graduate students in the art of instructional design and having all of the material reviewed by a German native, he was able to produce a course of over 240 segments without the major design changes that had typified earlier TICCIT courseware development. The German course also makes good use of many of the TICCIT system capabilities that earlier authors were unsure of. In addition to the standard RULE-PRATICE type of segments, the course also includes language games to sharpen the student's vocabulary and help with memorization.

Last year 302, or about 30% of the target population, spent an average of 5.1 hours each for total 15,333 hours on the system. While the core grammar portion of the course is complete, parts of the material are still being written. The unit titles are: Nouns, Case, Verbs 1, Verbs 2, Pronouns, Modifiers, Determiners, Prepositions, Word Order, Rechtschreibung, Culture, and allerlei.

6. Spanish-The TICCIT Spanish course was designed to meet a different need from the other foreign language courses developed for the TICCIT system at BYU. Instead of emphasizing grammar for the beginning to intermediate language student, this course was developed by Dr. James S. Taylor and is used in conjunction with a departmental diagnostic test that pinpoints deficiencies along with the appropriate review material on TICCIT. Currently this is the most highly used course on the TICCIT system at BYU with 641 students registered for the course during the last year, representing 63% of all third year Spanish students. The average student spent 9.8 hours totaling 6,274 hours overall. The seven units are titled: Nouns, Pronouns, Modifiers, Basic Verb Tenses, Subjunctive Verbs, Special Verbs Usage, and Miscellaneous Grammar Points. The 201 available segments represent about 50 hours of instruction.

7. Italian- The Italian course was first begun as a series of drills for the first year student. The original courseware was written several years ago by senior students in Italian. Currently the courseware is being completely rewritten by Dr. Sante Matteo and Joseph Ganci and will be expanded to a complete grammar review course for all levels. The three units now being developed include a short review of the basic parts of speech in English, a unit of vocabulary and basic grammar drills aimed at the beginning student, and the comprehensive review unit. Students are just beginning to use the courseware recently developed. The course should be completed by 1985.

Brigham Young University's year of experience with the TICCIT CAI System has been of great value to further research into other CAI systems and other high technology-based applications such as videodisc training and microcomputer development. All of these experiences are being added to each year with the avowed objective of helping the language learner learn the language.

THE VIDEODISC RESEARCH PROGRAM

The David O. McKay Institute of Education at Brigham Young University has sponsored a videodisc research program since 1979, but several members of the organization have been investigating interactive videodiscs since 1973. Interest in videodiscs technology arose from work being done with the TICCIT project described above. The TICCIT project, with its individualized, interactive deliver strategy and its learner control
keyboard, was nevertheless restricted to a clumped arrangement (128 terminals connected to neo computer) and could not show random access audio visual material in motion. The videodisc system appeared to overcome these two limitations. From 1974 through 1979 proposals and presentation were prepared to illustrate how the new videodisc technology could be used to provide individualized, interactive instruction. With the introduction of microcomputers in 1976 and their unbelievable increase in capabilities coupled with dramatic reductions in cost, it was readily apparent that these two technologies (videodisc and microcomputers) could be combined to provide low cost, high quality delivery systems for a wide variety of instructional materials. Videodisc research by the McKay Institute personnel was delayed several times because of the delay in bringing the videodisc hardware to the market. First promised in 1976, then in 1977, and finally brought out in very limited quantities in December 1978, the videodisc/microcomputer combination finally became a reality.

But, even after convincing the university to purchase pre-production prototype videodisc player (an MCA model PR7800) in order to get a year's head start, it took several weeks to design an interface to allow a microcomputer to control the player. Finally in late 1979 several demonstrations were ready. Using existing videodiscs, mainly the old U. S. Demo, we were able to provide illustrations of branching video programs coupled with textual presentations on the computer terminal. The four-minute sequence of Columbo, used by almost every group dabbling with videodiscs, provided an early video game under our Detective software program. The user was told that "You are Columbo. What you see on the screen is your clone. You can direct him to do any of several choices present." The viewer could then make a choice and the program would branch him/her to the appropriate sequence on the videodisc. On this early demonstration videodisc, choices sometimes branched the viewer to unrelated sequences. These programs were exhibited to a few faculty and students who were always asked to extrapolate what they were seeing to envision what could be if we were able to create our own material. However, even this short piece of video became a valuable resource for one teacher of Japanese who used the second sound track to test comprehension of Japanese. A short program was developed to allow students to repeat each phrase until they had mastered the content. After three years, this same program is used every semester by this instructor.

After demonstrating the feasibility of computer control of videodisc material, funds were obtained to press a videodisc using an existing 35mm film called MACARIO. A copy of this 87-min film was obtained and rights to press to disc were granted. With the help of the Spanish department hundreds of splices were made to shorten the motion sequences to 27 minutes. Single frames were selected and spliced in to represent the scenes that were discarded. A new audio cassette player that could be computer controlled within a half second accuracy was added to the delivery system to play the sound track for the missing video. A Spanish instructor divided the newly pressed videodisc into 29 scenes and produced about eight questions and answers for each scene. These questions related to cultural themes as well as to language.

A computer program was developed that provided control over the videodisc and permitted the student to stop the program at will and to present the questions for each of the 29 scenes. This computer program was designed with files for the frame numbers and questions relating to each scene. The advantage of this type of programming is that other films or videotapes committed to videodisc could be used in a similar manner without having to develop new computer programs to make them operate. Only the files need to be changed; a matter of a few hours of data input time compared to the weeks of time required to create the original computer program. The economy realized by such a strategy was recently demonstrated when a second interactive videodisc was created at a cost of about one-tenth of the MACARIO budget.

Having demonstrated computer control of videodiscs, we challenged ourselves to use these technologies to simulate a visit to
a foreign country. The search time that occurs when interactive branching moves to a new location on the video disc was shortened from five seconds on our PR7800 prototype videodisc play to a two and a half seconds, the PR7820. Several scenarios were tired out on paper. Scripting techniques were refined, and finally a script of sufficient length to demonstrate the type of interaction we envisioned was developed. Many of our ideas were discussed in book form.12 This script was included in several proposals for funding. Funds for video production were finally secured from the FIPSE (Fund for Improvement of Post Secondary Education) grants of the Department of Education and final scripting and production were accomplished from January to April, 1981.

A detailed history and description of this project (Montevidisco) was presented by Dr. Larrie E. Gale in the premier edition of the CALICO Journal (Vol. 1, No. 1, June 1983) and will not be repeated here.

In the Montevidisco program, after each encounter the student may call for a surrogate student to model his or here reply in Spanish or ask the actor to repeat the sequence. Such highly interactive sequences present the student with a light-hearted drama where he or she is immersed in the action and is expected to provide half of the Spanish conversation. Most students using this system become excited by the experience and express a very positive attitude of this mode of hearing and practicing Spanish. Because our system is best used as an individualized delivery system, we try to schedule each student for a 3-hour block of time. It is not possible for a student to explore all of the branches in that amount of time, so some students sign up for a second session.

A new videodisc program is now being prepared by the McKay Institute for the British Broadcasting Corporation (BBC). This program will permit a Japanese business executive to experience a tour of the United States. It will utilize the new Sony SMC-70 microcomputer, videodisc player, and color monitor and will reduce the hardware cost to one half of our two player research system. Other lower cost videodisc players and microcomputers could cut the cost of delivery systems again in half. Progress towards re-editing our Montevidisco program and adapting it to these newer low cost videodisc/microcomputer systems will be reported as it occurs.

Conclusion

It has been very gratifying to see the excitement generated by students using these new technologies in a simulate visit to other foreign countries and to expand the level of use down to the lower levels of language ability. The repeat functions built into this interactive system permit a wide range of student abilities to be accommodated. But, because these delivery systems are so new, very little research data has been accumulated at this point. We need to know much more about a lot of parameters related to individualized interactive instruction in order to maximize the impact of these marvelous new technologies.

THE HUMANITIES LEARNING RESOURCE CENTER

In order to provide readily available facilities for students to participate in meaningful language-learning and other humanities-learning resource center for its specific needs. Faculty members throughout the college were consulted to determine as completely as possible the immediate and projected needs of the college with respect to technology and media that would be required, the university's Electronic Media Department, which would ultimately install and service the equipment, was consulted in order to ensure that electronically and mechanically reliable equipment would be purchased. In some cases actual samples of some of the machines under consideration were brought in and tested by both faculty members, who would be using the equipment, and by technicians from the Electronic Media Department. Final purchasing decisions were made based upon input form these persons.

Large Screen Video Projector

Some of the facilities and equipment in the HLRC are designed for group use, while others are more suited for assisting in individualized study. In one of the group-use areas (a 35-seat student capacity room) is a 72-inch screen video projector. The projector may be connected optionally to either a VHS or Beta video cassette player or to the campus closed-circuit television network. This allows professor to show any of the target-language video tapes from the HLRC or from their department, reviewing and replaying portions as needed. Or they may order a particular film or video tape in advance through the campus cable office and send their students to the lab room to view it at a designated time, thus saving in-class time for other language-use activities.

Teacher Training

This room has also been designed to function as a teacher training station. Four microphones installed in the ceiling of the room are connected to speakers in an observation hall, which is separated from the main room by a one-way glass window. A separate entrance to the observation hall allows observers to enter and exit without interrupting the activities of the teaching session. In addition to being useful for foreign language certification programs, the language departments in the college use this facility in training their teaching assistants. A video recorder and camera are available so that teaching sessions can be recorded for later viewing and evaluation.

Language Lab Facilities

Another room designed for group use houses 40 student carrels, each equipped with Tandberg 5600 audioactive-record cassette decks. Each of the decks is connected to a Tandberg IS-9 control console. The console has a dual control panel that allows
two teachers to monitor and assist their classes independently. Teachers have found that his facility provides much more than traditional language labs have offered in the past. Creativity and initiative are perhaps two of the biggest limitations with this system.

One of the popular features of the IS-9 lab system is the automatic test mode. Several hundred have been administered for FL instructors by HLRC lab assistants using this flexibility. Test tapes can be prerecorded by the instructor and then administered by a lab assistant. The console automatically controls the student decks, stopping and starting them according to when the student is supposed to respond to questions from the master test tape. This saves time for the teacher, not only in administering the test, but also in scoring them, since the scorer does not have to listen to instructions and questions repeated on each of the student tapes. It was also decided to install quarter-track decks so that teachers could listen to and score the student test tapes in their office or at home using a standard cassette player. (A half-track audio-active-record machine records the student's responses on a track that cannot be read by a standard player, making it necessary for the instructor to listen to the test tapes made on a half-track machine in the lab.)

External program sources such as radio, video, and synchronized slide programs can be played through the console to the student positions in addition to the four internal program sources. If desired each of the student decks can be programmed from the console to operate independently in a free-study library mode.

Carrels
In addition to group-oriented facilities, a large portion of the HLRC was designed for individual use. The main room of the center has 32 multi-purpose carrels, each housing independent Tandberg TSR 514 audio-active-record cassette decks. Tapes stored in the closed-stack area of the HLRC can be checked out and listened to using these machines. (There are approximately 10,000 language tapes available for student use.) Twenty of the carrels in this room are also equipped with 9-inch video monitors that are connected to the closed-circuit campus television network. Instructors are able to schedule films or video tapes to be played at different periods during the day when their students can go to the HLRC and tune in the required programs. In addition to the monitors connected to the campus cable, there are four carrels that are equipped with independently operated VCR players so that students can stop and replay certain portions of a video tape when necessary.

Slide-sound
To aid teachers who find that they do not have sufficient time to cover both the language and the culture in the limited class time available, sound-slide and sound-filmstrip projectors have been installed in some of the multi-purpose carrels. The instructor arranges a set of slides or obtains a desired filmstrip, narrates the picture presentation onto an audio cassette, and has the HLRC lab assistant insert impulses onto the tape at each point that the frames should be advanced. Students check out and view the slide-films program on their own time outside of class.

Microcomputer Lab
An area of the HLRC that is constantly increasing in popularity and usefulness is the microcomputer lab. Ten Apple and two IBM-PC computers are available to students working on CAI programs. Use of these computers is restricted to programs for classes in the College of Humanities. Although using microcomputers for language instruction is a relatively new idea, the HLRC does have several programs for use in various languages, including English, French, German, Italian, Spanish, Japanese, and Chinese. Among the most widely used foreign language-related programs are diagnostic tests, culture simulations, and vocabulary expansion games and exercises. Several students are also using word processing programs for writing FL compositions.

The popularity of the microcomputer lab has grown tremendously since its installation. Students are becoming more aware of the kinds of learning activities that are available to them in this lab area. Many hours during the day this facility is being used to nearly full capacity. (The HLRC is open from 8:00 a.m. to 8:00 p.m. Monday through Friday and from 9:00 a.m. to 1:00 p.m. on Saturday.) On the average, approximately 700-800 students per day use the HLRC.

Interpreter Facilities
During the current school year, additional facilities will be added to the center. Two interpretation booths will be installed, which will allow language departments to assign simulated and actual interpretation programs. In the booths will be equipment that will enable students to view and listen to video recordings while recording their interpretations onto a separate tape, which can then be evaluated by the instructor at a later time. The instructor will also be able to monitor the exercise on an intercom while the students are performing the interpretation exercises.

Recording Lab
A recording lab is being planned that will enable teachers to make sound recordings specifically for their classroom needs. The instructors will be able to make live voice recordings, or mix and dub music and other sound effects in order to add variety and amusement to their recordings. Plans are also being formulated to include satellite reception and interactive video capability in the near future.

Summary
We are convinced that the kinds of instructional media discussed in this report along with future developments in technology will be influential in improving instruction and facilitation learning of second and foreign languages. We believe it is important to
seek new and more effective ways to use these resources in accomplishing the goal of language mastery. We also feel there is an urgent need for the development of courseware to use with present and future technology. While it is true that many foreign language teachers are involved in materials development, it is clear that much more needs to be done to develop useful courseware to keep pace with the growth in technology.

REFERENCES