1

MICROCOMPUTERS IN FOREIGN LANGUAGE TEACHING: A CASE STUDY ON COMPUTER AIDED LEARNING

Author: Robert L. Blomeyer, Jr.
Department of Curriculum and Instruction
Oregon State University

A Chapter for: Case Studies of Computer Aided Learning
Editors: Blomeyer, R.L. & Martin, C.D.
Falmer Press

2

Computer aided learning (CAL) is a powerful educational innovation that has great potential for the improvement of teaching and learning. Books and articles on instructional methods relevant to K-12 computer use are available in abundance. In the last few years, a growing body of professional literature has become available on the subject of school computer use. This includes information from a major national survey on the instructional uses of computers (Becker, 1986), findings from a substantial number of experimental and quasi-experimental studies on computer-assisted instruction (Becker, 1988; Kulik and Kulik, 1986; Sampson, Niemiec, Weinstein, and Walberg, 1986; and Kulik, Kulik and Cohen, 1980) and a variety of naturalistic studies on CAL (Blomeyer, 1988).

Existing quantitative research on CAL does little to illustrate links to classroom learning. Research findings provide little clear methodological or policy guidance on how to optimize the instructional effectiveness of computers in the schools. Available survey research provides a general picture of how microcomputers are used in the participating schools, but surveys seldom provide detailed examples illustrating the programs sampled that could make the statistical profile more apprehensible. Experimental and quasi-experimental studies present evidence on the effectiveness of CAI as an instructional intervention in mathematics instruction, but may have limited curricular significance because of limits on generalizability beyond a specific experimental treatment.

Studies on the "effectiveness" of technological interventions have also been questioned because existing research seldom demonstrates statistically significant findings. Solomon and Gardner have suggested that this may be due to a lack of sensitivity to concomitant changes affecting instructional settings where experimental research was conducted. They call for a more tentative or heuristic approach to inquiry on CAL that can lead to the discovery of instructionally significant questions for future research (Solomon and Gardner, 1986).

Among available naturalistic studies on CAL are case studies and other qualitative research on instructional computing programs in a variety of settings and curricular domains. These studies provide detailed perspectives on the instructional use of computers in schools that have significance for the planning and implementation of new programs and for the integration of microcomputers as a component of instruction throughout the traditional curriculum. Contextually explicit naturalistic research on

instructional computing provides heuristic models of policy and practice that allow practitioners to critically examine alternative implementation strategies and curricular applications. Choices can then be made about the acquisition and use of microcomputer applications (Blomeyer, 1988).

The case study described here will examine instructional applications of microcomputers as a curricular innovation in foreign language teaching. Language teachers generally use textbooks, workbooks, audio tapes, films, and other instructional media as instructional tools. At the time this study was conducted (1983-1984) microcomputers were just beginning to be used in support of foreign language teaching. The objective of the study was to provide a detailed portrayal of computer-aided learning in a specific instructional context, with the aim of giving policy-makers and practitioners a practical and relevant basis for making decisions regarding utilization of this new instructional technology.

There is a long history of research on innovation in education and social sciences. Although this study is ethnographically oriented, the intent is to portray characteristics of the innovation rather than the cultural features of the participants. More particularly, the approach to this study is based on studies of the "diffusion of innovation" that are common to cultural anthropology, rural sociology, and educational research. One of the key concepts from the literature on innovation is that the "compatibility" of an innovation (i.e., its compatibility with existing socio-cultural values and beliefs, previously introduced ideas, and need for additional innovation) has a great influence on long-range outcomes for continuing adoption or rejection of an innovation (Rogers and Shoemaker, 1971).

Planning decisions about the adoption or rejection of computer aided-learning need to be based on thorough professional understanding of its instructional significance within the established curriculum. When instructional personnel understand the practical significance of new methods and delivery systems, instructional technologies can be integrated as an effective component in any area of subject matter. The present study establishes a measure of the compatibility between computer aided learning and foreign language teaching. This will allow language teachers and curriculum specialists to examine the potential of CAL as an instructional alternative in foreign language curriculum.

4

Approach: A Multiple Site Case Study

The model that guided fieldwork and data analysis for this case study was quasi-ethnographic and used two contrasting school sites to establish a basis for a comparative analysis of naturalistic data. LeCompte and Goetz (1984) discuss three categories of data that are generally used to document naturalistic research. These three data types also provide a convenient and logical scheme for the presentation and discussion of naturalistic data. The data categories that are used to describe CAL in foreign language teaching programs in this study are: (a) baseline data, or information about the human and technological context of the students, instructional staff and community setting; (b) process data, or information derived from observations of CAL activities in these settings and some of their outcomes; and (c) value data, or information about the values of the various participants and the values implied by their use of microcomputers in foreign language classes.

The initial study was completed for the author's unpublished doctoral dissertation from the University of Illinois entitled The use of computer-based instruction in foreign language teaching: An ethnographically-oriented study (Blomeyer, 1985). The format of the unpublished dissertation allowed for a very comprehensive and detailed treatment of data and conclusions. Separate chapters were included detailing observations and interviews conducted in both locations. Classroom events were reported from both synchronic and diachronic perspectives. Data chapters concerning each of two schools studied included accounts of interviews with students, teachers, and administrative personnel.

This case study provides an abbreviated version of the data and conclusions from the earlier work. Although particular data segments used to document this case study comprise only a small portion of that used in the unpublished dissertation, the substance and tone of the original work is maintained. References are provided to more detailed sections of the original work when appropriate. It is the intent of this study to illustrate the significance of CAL as an instructional innovation used in support of foreign language teaching. In addition, the conclusions suggest broader questions regarding the role of CAL in other areas of curriculum. The concluding section will examine some of the broader implications of this study for an increased understanding of computer aided learning's potential impact on teaching and learning.

5

Fieldwork Strategies

This case study is based on a fundamental concern that educational research should improve professional understanding of relationships between educational policy and practice and translate this knowledge into information used for improving educational practice. One of the first published multiple-site case study of CAL by Smith and Pohland (1974) was a significant influence on the conceptual direction and methodology of this case study. They believed that anthropological methods grounded in cultural theory would produce research findings useful for educational improvement. They expressed their concern in the following way:

> It seems to us that it is incumbent upon the profession to narrow the gap between educational theory and practice in terms that are both appropriate and understandable to the practitioner. (Smith and Pohland, 1976, p. 265)

The methods employed during the fieldwork conducted for this case study were specifically chosen to maximize applicability of findings for the improvement of instructional practice and to minimize potentially disruptive effect of classroom-based naturalistic research. Naturalistic inquiry techniques minimize intervention into the routine functioning of the classroom and school settings and are preferred by many researchers for school-based educational research (Guba, 1978).

The case study offered here used a standard approach to site access and field methods. Site access was negotiated between the researcher and the school district with the support of a foreign language specialist employed by the state board of education and faculty members from a major university. Fieldwork strategies included participant and non-participant observation and interviews. Interviews were conducted with teachers and other school staff members. Additional interviews were conducted with students to broaden the database, triangulate preliminary data with additional emic perspectives, and to generally increase the representation of the students' viewpoint on using CAL in foreign language classes.

Initial observations were unstructured and utilized time-sequenced observer field notes and (when possible) audio recordings to document the classes observed. Most field observations remained unstructured, but "progressive focusing" on clusters of events and

potentially significant issues refined the study's "foreshadowed problems," evolved new data categories based on the observed phenomena, and led to an "expected evolution and redefinition" of the questions suggested by prior case studies of instructional computing (Blomeyer, 1985).

Data was gathered in both research sites. Audio tape recording was used to document a sampling of the classes observed and to record all of the staff and student interviews. Observations provided questions and concerns that were later formalized as interview questions that were used with the cooperating teachers and selected students. These were conducted after the classroom observation was completed in order to: (a) check the accuracy of the preliminary data, and (b) control for contamination that might result from imprudent conversations with teachers or students.

Classes observed included both traditional foreign language classes and classes meeting in microcomputer laboratories where the students made use of CAL. In School One (hereafter referred to as Woodville West High School) nearly all the regular classes conducted away from the microcomputer site were tape recorded. In both schools it was found that the sound level was too high in the microcomputer sites for effective audio recording. Because teachers in School Two (Hilldale Community High School) specifically expressed specific concern that the use of a tape recorder would intrude on their normal classroom settings, audio taping was more selective and generally confined to the classes that were observed toward the end of the fieldwork in their classrooms.

The approximate time required for this study was one school year. Original plans called for completion of the classroom observation and staff interviews for both schools during the fall semester of 1983. Follow-up visits were made during spring semester 1984 to interview a sampling of students from the classes observed in both school districts. Observations in each school included preliminary visits, two to three weeks of inclusive observation, and three day follow-up visits for the purpose of conducting student interviews. Table 1 shows the number of classes and time spent observing each of the four participating teachers and what portion of the classes observed actually included CAL. Use of CAL by the cooperating teachers only accounted for a small percentage of overall class time devoted to foreign language instruction. Table 1 contains a summary detailing classroom observations and the portion of that time that was devoted to CAL by each of the cooperating teachers.

Table 1. Classes Observed and Class Microcomputer Use

7

Classes Observed	Class Time Observed	Classes Observed Using Micros	Time Using Micros (Class periods & hours)
Woodville West High School (each period=50 min.)	35	26 hours	10 per./ 7.5 hours
Hilldale Community High School (each period=45 min.)			
Teacher S1	18	13.5 hours	3 1/2 per./ 1.3 hours
Teacher S2	13	9.7 hours	3 per./ 2.25 hours
Teacher G	16	12.0 hours	6 1/2 per./ 2.25 hours
SUB TOTAL	47	39 hours	7.5 per./ 6.25 hours
T O T A L	82	65 hours	17.5 per./ 13.75 hours

(Taken from Blomeyer, 1985, p. 118)

The French teacher at Woodville West had the largest percentage of time observed that was devoted to CAL with 28% and one of the Spanish teachers at Hilldale High School had the smallest percentage of observed time using CAL with 9%. Time devoted to observation tends to favor the impression that CAL was used to a greater extent than was actually the case. Teachers arranged for the researcher to visit their schools at times when they planned to use CAL. It was their understanding that the study was about computer-based language learning and they discussed the idea that days when the researcher were present probably did not accurately reflect the total percentage of use during the school year.

In some respects the two suburban sites for the field-study were alike in size and in terms of their overall educational programs. However, they were very different in the way that they approached instructional computing at the school level and in the hardware resources that were available. It is necessary to have an idea of the similarities and differences between the two schools selected for the study in order to appreciate the events observed in each location. The following section provides background information on the two participating schools and their respective instructional computing programs.

Baseline Data

8

One of the earliest findings of the study was that as of May, 1983, foreign language teachers were actually using microcomputers as an organized part of their instructional delivery in only a very small number of high schools in the state where the study was conducted. Although instructional computing had been a reality in some state school districts for three to five years, it appeared that use of CAL as a component of foreign language curriculum might be confined to less than a half-dozen suburban schools around the metropolitan area where the two schools were located.

The language teachers who cooperated with this study were leaders regarding their use of microcomputers in foreign language curriculum. This was the case even though the overall instructional computing programs in their schools were already well established. Stated in terms of Rogers (1983) innovation adoption categories, the cooperating teachers were "innovators" within the state wide population of foreign language teachers using computer aided learning in secondary school curriculum. By outlining the histories of the instructional computing programs in both schools, it becomes more apparent why the cooperating teachers were among the first foreign language teachers in their state to begin using CAL as a component of comprehensive foreign language instruction.

Woodville West High School

Woodville West was located about ten miles from a nearby metropolitan area in a middle income suburb (median income about $32,000.00), having a population of about 33,000 persons. It was a four year comprehensive high school with Basic, Regular, Accelerated, and Honors (Advanced Placement) course offerings within its curriculum. Weighted grades were given to the accelerated and honors courses. Advanced Placement (A.P.) courses included English, calculus, European history, U.S. history, biology, chemistry, physics, German, French and Spanish. The size of the total 9-12 enrollment was about 2200 students. According to school district statistics, about 77% of the graduating class usually went on to college. Records showed that 10% of the graduating class took the A.P. calculus and English exams. Out of 291 A.P. scores in a given year, 192 were 3 or better (A.P. scores range from a low of 0 to a high of 5).

At the time of the study, the school had a professional staff of about 165 persons with a teacher/pupil ratio of about 13 to 1. The foreign language department had a staff of twelve full and part-time teachers and an instructional supervisor who was also a part-time language teacher. The foreign language department offered classes in Latin,

9

Spanish, French, German, and Russian. In 1983-1984, 84 students were enrolled in Latin, 584 students in Spanish, 288 students in French, 87 students in German, and 19 students in Russian. Foreign language classes were offered at four levels with an optional advanced placement course. Among foreign language students taking the A.P. test in a given year 85% reported 3 or better in French and 100% reported 3 or better in German. In that same year, of students taking the A.P. Spanish language and literature test, 35-45% reported receiving a 3 or better.

The educational computing program at Woodville West included use of both a mainframe computer and microcomputers. Initially, Cobol and Fortran were taught on the school's mainframe computer in applications programming courses oriented toward an advanced business curriculum. About two years before the study, an effort from the district superintendent's office led to the purchase of about thirty Apple microcomputers and the setting up of a single microcomputer site that was referred to as the "Apple Lab." The site was located in the wing of the school which housed the mathematics department. The microcomputers were to be used for "instructional computing" as opposed to learning programming languages, and the use of the site was opened to all classroom teachers on a "sign-up" basis. A computer "site manager" was permanently assigned to the Apple Lab to manage the scheduling, assist classroom teachers using the facility, maintain the lesson disks for the various classes, and maintain the site hardware.

At about the same time that the Apple Lab was opened, the district hired a chairman for their mathematics department who had a background in business computer applications. This individual was retained at a salary level competitive with private industry and given the responsibility for overseeing the district wide "Computers in Education" program. In addition to his other duties, the math chairman/computer coordinator offered basic "computer literacy" and programming courses to interested staff members in all the school's departments. These in-service courses included beginning to advanced level programming using a "business applications" approach. Training involved providing the interested participants with enough information to develop their own applications and to integrate resources for educational computing into their own classes when and if they considered it appropriate. Money was made available in the department budgets that could be used for software purchases but final decisions on authorization of software purchases were left to the instructional supervisor or head in each department.

The French teacher at Woodville West who collaborated in the study had learned Basic programming techniques by attending the in-service courses offered by the math department chairman. She began attending these courses when they were first offered to the teaching staff and created her first computer-based language lessons as projects during those sessions. She piloted these lessons with her students during the year prior to this study by fitting her use of the microcomputer lab around the existing schedule for math, science, and business classes by checking with the individual instructors. She submitted her lessons to a foreign language publisher for review and subsequently had them accepted for publication. The school district granted her sole ownership of the materials for commercial publication although they had been developed as a direct outcome of district sponsored in-service training activities. These lessons continued to be used by the teacher during the period of the study.

Additional developments during the study included the purchase of a "Corvus" hard-disk system and replacement of older model Apple II microcomputers with newer models having sufficient memory for programming in the PASCAL language and for administrative applications used by the principal's office. The French teacher who participated in the study continued to attend in-service training courses and studied the PASCAL language while the study was in progress.

Hilldale Community High School

Hilldale High served an area that included nine suburban communities about 15 miles southwest of a large urban metropolitan area. The combined population of these areas was about 80,000. The communities in the immediate vicinity of the school itself were comprised of professional and managerial class families. However, the mean income for the school district was just around the $30,700.00 level; at or slightly below the median income for middle class families. The average income of the area had dropped considerably because the district redrew boundaries to include two low income areas in the catchment area for the school district. At the time of the study, 182 students attending the school were eligible for free lunches under the Chapter I guidelines.

11

Like Woodville West High School, Hilldale High was also a four year comprehensive high school, with a grading system which gave weighted class rankings to Fundamental, General, Regular, Superior and Honors-A. P. course levels. Advanced placement courses included three English and literature courses, calculus, algebra, computer science, European history, U.S. history, biology, chemistry, physics, music theory 1 and 2, German, French, Spanish, Latin, and Russian. Students were assigned to course levels on the basis of test scores, achievement and teacher recommendations.

The school was housed on two campuses located about ten blocks apart. The total enrollment for grades 9-12 was about 3600 students. According to available school district statistics, about 72% of the graduating class usually went on to college. Records showed that in 1982, 202 students took 308 advanced placement examinations. Of these students, 81.8% reported scores of 3 or better.

Hilldale High had a professional staff of about 232 persons with a teacher/pupil ratio of about 11.5 to 1. The foreign language department had a staff of 22 teachers and an instructional supervisor who was also a part-time language teacher. The foreign language department generally offered classes in Latin, Spanish, Italian, French, and German, and Russian. In 1983-1984, 105 students were enrolled in Latin, 1085 students were enrolled in Spanish, 105 students were enrolled in Italian, 408 students were enrolled in French, 212 students were enrolled in German, and 71 students were enrolled in "Word Clues" (an etymology course). This means that a total of 1955 students, or 56% of the student body chose to enroll in foreign language courses. Foreign language classes were offered at four levels with an additional advanced placement course as an option. The exception to this pattern was Italian, which was taught at three levels. In 1982, 24 students took the A.P. French exam, 21 took the A.P. Spanish exam and 8 took the A.P. German exam.

The educational computing program in Hilldale also included the use of both a mainframe computer and microcomputers. The school had over 250 TRS-80 Model III microcomputers located in six general usage sites which were spread out over the two campuses. In addition to the mainframe computer terminals and TRS-80 Model III's, IBM Personal Computers were available for use in an Advanced Placement PASCAL programming course.

Hilldale High had a course in "computer literacy" that was required for all incoming freshman. Some students were allowed to substitute other more advanced computer

courses if they had computer literacy courses in elementary or junior high school. The only formal policy effecting instructional computing in Hilldale High School was the requirement for student "computer literacy." Computer literacy was defined by the school's administrators in terms of the following objectives:

1. Students will become familiar with computers, their history, and essential vocabulary pertaining to them.
2. Students will see how computers are used, what they can do, and what they cannot do.
3. Students will learn about the microcomputers' impact on society, vocational implications, and controversial issues (e.g., privacy, electronic crime).
4. Students will interact with computers by practicing keyboard skills, observing sample programs, observing how different statements alter a program, and writing simple programs themselves.
5. Students will apply computers in subject-related areas and in specific courses in their daily schedule.

One of the broad assumptions guiding the implementation of the instructional computing program in Hilldale High was stated as follows:

> An infused computer literacy program taught across all departments by all staff reaches more students and diminishes negative impact upon curriculum. (Blomeyer, 1985)

The instructional computing program had four initial components:

1. definition of computer literacy,
2. teacher training,
3. instructional courseware development,
4. implementation of computer literacy units for the students.

The operational definition of computer literacy detailed above was applied first to developing a model for staff in-service training. Then, the teachers who received the training used the model to implement the student computer literacy units.

During the first year of Hilldale High's instructional computing program (1980-81), goals and objectives were formulated, an initial number of TRS-80 Model III

13

microcomputers were purchased and the first teacher training seminars were initiated. The first computers purchased were not used by the students, but rather for teacher training. Initially one outside consultant trained eight teachers. These eight teachers then trained 35 more teachers, who eventually trained the remaining staff of 240 teachers. All three of the foreign language teachers who collaborated with this study had been participants in the training program between 1980-1982.

In all, twenty hours of training occurred over a period of fifteen months. After completion of the initial training experiences, free access to the microcomputers and peer assistance continued to be available to those teachers who wished to further develop their skills. Toward the end of the formal training experience, teachers were "encouraged" to identify curriculum content that was suitable for delivery in the computer based medium.

The administration also encouraged the staff to submit formal proposals for courseware development. These were reviewed and proposals which were accepted were implemented in "summer computer curriculum development" workshops held during the summers of 1981 and 1982. During these workshops, teams were selected which included subject matter experts (teachers whose proposals had been accepted), designers (teachers knowledgeable in both implementation and curriculum), and professional programming consultants (college students with programming background). All participating teachers were paid at a rate equal to their regular salary rate and the outside programmers were paid approximately $10.00 per hour.

The outcomes of the summer materials development workshops at Hilldale High were limited amounts of instructional software produced by teachers from twelve departments. The level of training that was attained by the 65 participating teachers was one of the most significant results of the program. Additionally, courseware of variable quality became available for use in a variety of subject matter areas. After the software was screened and evaluated, much of what was produced during the first workshops was either revised or never actually used for student instruction. Those materials that were considered suitable for classroom use were utilized by classroom teachers as an optional mode of instructional delivery as soon as the microcomputer sites were installed during the 1981-1982 school year.

The two Spanish teachers who collaborated in the present study had participated in a materials development workshop as "subject matter experts" during the summer of 1982.

14

During that workshop they had produced the prototypes for the computerized language lesson materials that they used with their students during my period of observation in their classes. Some of the lessons were written by using authoring systems and "driver programs." These included basic vocabulary recognition and grammar review exercises. Additionally there were some "tutorial" lessons (oriented toward teaching recognition and production of basic grammatical distinctions in Spanish) that were written from the ground up using Basic. Only a limited amount of materials were developed and use of the computerized lessons during class time was generally sporadic. Both Spanish teachers were still occasionally revising features of these lessons and updating the subject contents of the "driver programs."

A collaborating German teacher in Hilldale High School had not been a participant in the materials development workshops, but instead worked with other teachers who were more experienced in the use of authoring systems and "drill drivers" for the presentation of various types of subject matter. The German teacher consulted with other staff members to determine what kinds of lesson formats were available (translation drills, grammar drills, quizzes, etc.), wrote out the lexical contents of the display and the correct response for each question, and finally had these contents inserted into the "driver" programs by a school staff-member.

In the case of the German teacher, the lessons were actually implemented with the help of the other two more experienced materials developers and a "computer aide," a non-academic employee who assisted with the instructional computing program. These lessons tended to be less oriented toward a "tutorial" approach and more oriented toward "drill and practice" or computerized quizzing formats than those written from scratch in Basic by the other two cooperating language teachers. However, the flexibility of these lessons for adapting them to different lexical and grammatical materials meant that it was possible to develop review exercises for virtually every unit in the German teacher's instructional plan. These materials were used by the German teacher's students on a regular basis during the school year.

Recent hardware and software developments influenced the Hilldale instructional computing program. These included the evaluation of various microcomputer systems as possible replacements for the 250 TRS-80's and the ongoing evaluation of new instructional applications. During the period of the study, all six of the microcomputer sites were "networked" so that software programs could be loaded into all of the student

15

workstations from either a workstation under teacher control or from a "file server" under student control. At the time of the study a significant factor influencing decisions on hardware being considered as possible replacements for the TRS-80 workstations was the school administration's requirement that networking be an available option with all hardware systems under consideration.

Another factor affecting microcomputer use was that the curriculum in each department was under review for determining what portion of the required subject matter could be delivered effectively in the computer-based medium. This meant that in addition to their regular instructional and extracurricular duties, the foreign language teachers who collaborated with this study were consulted on the evaluation of other hardware systems and involved in the location and evaluation of commercial software.

Two Contrasting Policy Models for Computer Aided Learning

As can be seen in the accounts above, while the two schools and their respective communities have striking similarities, the treatment of CAL as a component of the curriculum in the two schools was very different. In summary, the two schools present contrasting examples illustrating the impact of distinct policy scenarios on instructional computing programs. At Woodville West High School we can describe the situation as **the default definition of instructional computing as math, science or computer technology.** In this case policy was a consequence of actions taken by the first teachers who became users of the microcomputer laboratory. Use patterns were established on a "first come, first served" basis and teachers from curricular areas that were not early adopters apparently had difficulties obtaining access to the microcomputers.

At Hilldale High School the policy situation can be described as **institutionalization of instructional computing in comprehensive curriculum.** In contrast to Woodville West, a district planning initiative resulted in the formulation of a curriculum policy that mandated use of microcomputers by all students enrolled in the school. Administrative practices affecting personnel and resource allocation also supported an instructional climate where the use of microcomputers as an ancillary component of instruction was common in all areas of curriculum.

16

The policy frameworks in both schools had distinct implications for instructional practice as it was observed in the classes of the four cooperating teachers. The general business of foreign language teaching and the traditional methods of foreign language specialists were common to both schools, but interactions involving the students, teachers, and CAL materials were different. By sampling process data from observations of conventional foreign language classes and classes where CAL was used as part of the instructional delivery system, the next section will illustrate some of the unique instructional events that occur when CAL becomes a component of foreign language teaching.

Process Data

The foreign language teachers who cooperated with the field study used computer-based foreign language instruction as a supplementary instructional strategy in beginning and advanced classes in French, German, and Spanish. In all cases the interactive computer-assisted lessons used were designed and implemented or modified by the cooperating teachers or other instructional personnel in the respective schools. Although both schools had large foreign language departments, only the four teachers whose classes were observed during the study made use of available CAL materials.

The cooperating teachers were generally knowledgeable about instructional use of microcomputers and three of the four were designing and programming their own materials. As discussed in the previous section, both schools offered training opportunities where their teachers could contribute to the design and implementation of CAL. Because of the special problems of designing computer-based instruction as distinct from other computer applications (management, record-keeping, answer judging, etc.) and the additional technical requirement of foreign language characters (accents, tildes, etc.), much of what the teachers learned in their initial training experiences had to be adapted or discarded as new techniques were devised by trial and error.

One of the observations made in a Spanish class at Hilldale High School provides an illustration of the approach used by the teachers to field test and revise their locally developed computer-based lessons. During this particular observation, the teacher used

her lunch period loading the required BASIC program into each of about eighteen student workstations from a disk before class. The class was in session for a twenty minute period prior to the break for lunch. As the last student returned from lunch, the teacher announced the protocols for using the prototype interactive lesson materials.

> "1. Don't push the <BREAK> key; 2. Don't push the <CLEAR> key; 3. Don't push the orange <RESET> button; and don't turn the computer off!

She continued:

> "You will see `PRESS RETURN TO CONTINUE' written onscreen. After doing so you will have to type `RUN' and go through the program. Please understand that this is a lesson I am developing and it is not finished yet. I would appreciateyour comments and questions. Please hold up your hand if you have any question about the lesson and I will try and come around and help you. I will be circulating through the classand I will try and check with each of you sometime during the period."

A female student was observed using the lesson. The screens began by presenting clear directions about using the lesson. The first part is an on-line review of preterite verb forms. The first few pages give examples for regular verbs using -ar, -er, and -ir endings. Then the students began using an interactive drill where they were to key in the preterite form of a given infinitive verb.

The students finished the first part of the new program quickly and the teacher came around to question a female student about the prototype lesson. She asked:

> "Were the directions clear? Was anything about the instructions or the design of the program confusing? Were the screen displays too crowded? Or were they designed in a way that made the answer obvious?"

18

After the student responded to all of the questions about the lesson, the teacher noticed that there was only about ten minutes left in the period. She asked the students to turn off their computers and began a discussion with the class. She reviewed the materials covered in the drill and asked the class:

> "What was the program trying to teach about preterite and imperfect? What were the words that enabled you to distinguish between the two types of past in the last group of sentences requiring identification of verb tense? I don't intend to always give you translations of the phrases. I want you to figure out the answers in context from the language given in the exercise."

(Adapted from Blomeyer, 1985, pp. 238-241)

In the example given above, it is evident that field testing a prototype lesson was a very labor intensive undertaking for the teacher. Once revised and completed, the grammar drill would probably be a significant resource for the Spanish classes in the school. However, the time required of the teacher for design, prototype development, field testing and revision was significant.[1]

An element that was common to the instructional style of the teachers observed was use of a wide variety of learning activities and instructional strategies in their classroom teaching. Typical activities included both oral and written practice on vocabulary and grammar as well as presentation of cultural aspects of the lessons. The teachers used microcomputer-based lessons as one strategy within eclectic but traditional foreign language syllabus design that included both oral and written learning experiences.

---

[1]During the observations conducted at Hilldale High School, this class was the only occasion when the particular Spanish teacher was observed to use the microcomputer laboratory. When questioned about her infrequent use of the microcomputer labs, the teacher explained that the amount of time necessary to assure technical accuracy and a pedagogically sound lesson design made regular use of the microcomputer labs very difficult. The teacher said that she was not able to find commercially published materials that were suitable and insufficient time was available to produce a substantial amount of locally-developed courseware.

19

In the classes observed, integration of computer-based instruction into the foreign language syllabus design was accomplished by incorporating subject matter from traditional classroom materials that were already in use as the content items for the computer-based lessons. The courseware used by students during this study was all designed or modified by the classroom teachers. As a result, the contents of the computerized lessons were closely tailored to the particular content of the individual classes.

The individual lessons generally used the format common to drill and practice exercises covering the same vocabulary and grammar as the regular lesson materials in a different instructional medium. In addition, computer-assisted testing was used in an Advanced Placement French class as preparation for the grammar test that the students would be encountering on the A.P. examination. The following example illustrates the way that these A.P. prep lessons were used by the French teacher at Woodville West:

> A boy and two girls are seated at microcomputer stations near the back of the room. Conversations between students in this situation tend to be in English. The three students are seated as follows:
>
> Jon Patricia Louise
>
> All three students were working on their grammar review. Louise has a small technical difficulty and had to request help from the "site director" in locating a computer that will work properly. She moved over to the right one station and borrowed a lesson disk from Jon to reload the BASIC program into her Apple computer.
>
> At 12:13 Jon and Patricia were going through the pre-test but did not appear to be taking notes on their own performance. They did not appear to be getting many correct. The questions are "fill-in's" and their scores were not good. They went through eight questions without getting any correct responses. Jon remarked:
>
> "Whatever I think is right... is wrong!"

20

Jon and Patricia finally finish the exercise and the program gives them their cumulative scores and a percentage. Jon got 10 out of 20 questions right for 50% and Patricia got 8 out of 20 correct for 40%. Both appeared discouraged. In order to restart with another exercise, they needed to have a lesson disk that contains the program to reload. Jon retrieved the lesson disk from Louise and both reloaded their microcomputers to continue with the computer-based A.P. diagnostic lessons.

About 12:17 the teacher switched the fifth year group to "un petit exercise en classe" so that she was free to zero-in on individual students who were having problems with the on-line exercises. She repeated her instruction that they should be writing down the diagnostic information on the items they miss and using this information to study the review materials in the printed lesson documentation. She tried to encourage those students (like the two under observation) who were becoming discouraged by their initial failure on the pre-tests. She talked with a few individuals and at about 12:20 moved to the back of the room to work on English grammar with the two French speakers.

At about 12:20, after the teacher's words of encouragement, Jon, Louise and Patricia went on to another exercise that had a multiple choice format giving a French target sentence with a preposition deleted. The students were given one chance to choose the correct preposition and indicate the answer by pressing the correct number on the keyboard. The program judged the answer as in the previous exercise, and offered information on the location of remedial grammar information in the documentation. A typical multiple choice item from the interactive lesson is illustrated here:

Regardez _____ la fenênre. Il pleut.
1) par (correct)
2) de
3) à

21

4) hors de.

All three students tended to get more of these multiple-choice items correct. At 12:29 Patricia finished twenty multiple choice questions and scores 12 out of 20 for 60%. That was a better score than her previous 40%. The students noticed that the lab period was over and began to switch off their microcomputers.

While the students were finishing up the bell rang. The French teacher began to pick up the microcomputer disks from the students as they left the microcomputer lab.

(Adapted from Blomeyer, 1985, pp. 152-156)

In the schools observed, support was available for software purchase as a discretionary item in the departmental budget. Allocation of funds within foreign language departments in the cooperating schools was determined by the department heads in consultation with the teaching staff. In Woodville West High School other budget items presently had a higher priority than the purchase of instructional software. At Hilldale High efforts were underway to locate and preview materials. Staff in both schools indicated that when commercial software materials became available that met their standards for usability, appropriate materials would be purchased as regular items within the department's annual budget.

After approximately sixty five hours of classroom observation in both schools, preliminary analysis of field notes indicated that the use of CAL in foreign language classrooms appeared to be resulting in some structural and procedural changes in teaching practice. Gradual accumulation of documentary and observational information pointed to a number of potentially relevant issues that required further study. During the final days of classroom observation, an interview schedule was designed to address these emergent issues and interviews were scheduled with the cooperating teachers and administrative personnel.

The perspectives of the teachers and instructional supervisors were needed to provide their interpretations of events and their attitudes toward computer aided learning and it's role in foreign language instruction. In turn, their interviews further refined the issues and

22

questions to a point where the students' interpretations and attitudes became necessary information. In particular, the students' descriptions of the teacher-developed software and their attitudes toward CAL as a component of foreign language instruction were a particularly revealing perspective on the observational data.

In the next section, the value data presents viewpoints of the students, teachers and supervisory personnel on seven key issues that emerged from the classroom observation as critical for understanding the role of computer aided learning in foreign language teaching. The text will be illustrated by some quotes from student interviews and paraphrased material taken from staff interviews. Direct quotes will not be used from interviews with teachers and administrators to avoid compromising the identity of the individual respondents.

Value Data

The seven issues used here to categorize the value data from the interviews conducted in both schools provides a summary of concerns and questions relevant to understanding the particular role of CAL in foreign language teaching and considering the more general role of CAL in support of discipline-based subject matter in secondary school curriculum. The seven issues are addressed in terms of the following questions:

1. What are the similarities and differences in implementation strategies?

2. What are the human costs of integrating CAL as a component in foreign language curriculum?

3. What is a possibly optimal level of operational computer literacy for foreign language teachers?

4. What policies might optimize the effective use of CAL as a component of foreign language instruction?

5. If policies are appropriate, how should they be formalized to maximize positive impact on language teaching?

6. What is the potential impact of CAL on the "dominant core" of teaching practice as apparent in language teaching?

23

7. What are the implications of CAL for broad policy initiatives concerning the efficiency, equity and quality of foreign language education?

1. Similarities and Differences in Implementation Strategies

Some of the similarities and differences between the strategies used in the two schools to adapt microcomputers as a part of language teaching have been discussed in preceding sections. As discussed in the section on baseline data, differences in implementation strategies were attributable to each school's policies effecting CAL. This is particularly evident regarding policies defining student and staff computer literacy and policies influencing use of microcomputer-based instruction in the foreign language classes.

A. Student Access to Microcomputer Workstations

One major area of difference relates to either de facto or explicit policies governing access to microcomputer sites. For instance, the French teacher at Woodville West appeared to have a difficult time scheduling the use of the microcomputer lab because it was fully booked with computer math and programming classes. When asked whether their usage of microcomputers was generally regular or irregular in occurrence, students from French classes responded in the following way:

> She (the French teacher) had to work her classes in around the computer classes. Sometimes we would go to the lab and there would be a math class there. Then we would have to re-schedule and do something else that day.

In contrast the teachers at Hilldale High apparently had little trouble obtaining the use of microcomputer labs because there was a larger number of workstations available for use by all departments and because administrative practices favored integration of microcomputers throughout the curriculum. When students from one of the Spanish classes in Hilldale High were asked an identical question about regularity or irregularity of usage, they responded this way:

24

> "Use has been pretty regular. Sometimes once a week, sometimes twice a week. It evened out over time. The variation is probably because of other classes using the lab. We went in when she could schedule the room."

B. Site Implementation and Hardware Differences

Other differences in instructional practice involving microcomputers were consequences of decisions on the purchase and disposition of hardware resources. Different brands and configurations of microcomputers (Apple, Tandy, IBM, etc.) vary according to hardware features, capacity, and whether they are used as free-standing microcomputers or workstations in a local area network (LAN). Configuration and disposition of hardware appear to have a pronounced effect on both integration and management of computer aided learning.

At Woodville West Apple II microcomputers were configured with 5 1/4 inch floppy disk drives and programs were loaded from disk. This required the teacher to spend time duplicating, distributing, and recovering the students' lesson disks. When insufficient disks were available for the number of students present, it was necessary for the students to "boot and run" the programs, remove the disks, and pass them to another waiting student. All of the students interviewed at Woodville West reported that there were never enough copies of the disks for all the students. They said that they had to "pass them around" to load the programs into the microcomputers. Students also indicated that they generally had to share workstations with other French students in the computer lab.

In contrast, Hilldale High School configured their TRS Model 80 microcomputers without disk drives and linked them to a master workstation through a local area network. The teacher loaded the available program into the RAM of the master workstation and the students then loaded the program into their own workstations through the network. Disk duplication and distribution was unnecessary and lab management appeared to be generally easier in the networked environment. All of the students interviewed at Hilldale High indicated that there were nearly always terminals and programs sufficient for each student to work independently. One student said:

25

> Yeah, there were enough terminals. Nobody had to share. There were a couple out of adjustment, and someone had to come in and adjust them... but there were enough.

C. Lesson Design Similarities

Some of the similarities in practice were due to the design of the computer-based materials themselves and their dependence on similar presentational paradigms. In response to an interview question asking them to describe the foreign language lessons they had done on microcomputers, a Woodville West French student from an intermediate class responded this way:

> She would present the lesson... then we would read it. Then we would press the return key and read more. And then she would give us example problems that we could fill in. If we would put down the wrong answer... it would say "No, try again" and then it would show us the page in the lesson that it applied to. Then we would read it over again and then we would have another chance to do it.

Another Woodville student from Advanced Placement, fifth year French gave a different account of the grammar exercises the teacher devised to help them prepare for the A.P. French exam:

> It was grammar. She had a big packet of all the most difficult stuff in the French language." (Written materials detailing the grammar rules with examples or grammar squibs.)
>
> First we studied real hard... all the stuff in the pack... then we'd have a test on the problems." (A computer-based test simulating the format and content of the A.P. test.)

After the on-line test was completed, scores were generated automatically and the indicated areas of deficiency led the students back to study the materials appropriate for a particular aspect of French grammar.

26

The descriptions of CAL materials given in response to the identical question by language students at Hilldale High School were generally similar regarding content, but tended to be more elaborate regarding details describing the interactive lessons. A German student described the computer-interactive lessons as follows:

> The lessons were mostly vocabulary or verb drills. Conjugations where you type in the right verb, but mostly vocabulary drills. These were simple translation exercises where you translated a word from English to German or visa versa.

Overall, students from both schools reported seeing both grammar and vocabulary exercises in computer-based form. These were always drill and practice in classical CAI interactive format. One exception to the standard drill and practice format was the computer-based tests administered as practice for the A.P. French test at Woodville West.

D. Sources of Lesson Materials

Another point of obvious similarity between the implementation strategies in Woodville West and Hilldale High School was that the teachers produced the computer-based lessons themselves using subject matter taken from materials already in use. Student interviews in both schools confirmed this apparent correlation between the curriculum materials used during conventional language classes and the CAL materials.

In Woodville West all the students interviewed said that the CAL materials were consistent with the other materials used in the class. Five out of six students indicated that they were aware the teacher had developed the materials specifically for their classes. Eighty two percent of the students interviewed at Hilldale High indicated that the computer-based lessons they used were consistent with other instructional materials and assignments necessary in their language classes. One student put it this way:

> "The computerized materials were basically a supplement to what we were doing in class. They fir into the overall class plan pretty well. It is just another way of presenting the same materials in a different form."

27

E. Similarities Attributable to Foreign Language Teachers

Other similarities were possibly due to complex factors like the instructional practices common to conventional foreign language teaching and the training of the individual teachers involved. The cooperating teachers were all asked how they came to be involved with using computer-based language instruction. Teachers at Woodville West and at Hilldale High said that they became involved because the microcomputers were available and they thought that it offered potential as an instructional resource.

Teachers at Hilldale High School indicated that their initial introduction to CAL had been in response to participation in required "in-service" workshops. They also stated that they continued to voluntarily participate in developing and using computer-based lessons because they felt a strong personal and professional responsibility to take any opportunity available which might provide additional instructional options that could benefit their students.

It is important to note that at the time of the field study the American Council of Foreign Language Teachers (ACTFL) was actively involved in implementation of programs intended to increase the emphasis on oral proficiency in foreign language curriculum. Teachers in both schools were members of a state ACTFL affiliate organization and they discussed their commitment to improving the oral proficiency of their classes. They expressed their belief that the use of computer-based drill and practice over grammar and vocabulary allowed students to progress over materials faster than conventional classroom methods. This was important to them because they felt it allowed them to re-allocate class time for additional practice on oral proficiency.

F. Similarities Attributable to Teacher Computer Literacy

Another important similarity of all of the cooperating teachers was that they all had sufficient functional competency using microcomputers that they could confidently use the technology for instructional purposes. Individual levels of expertise varied from the French teacher at Woodville West who had experience programming commercially published drill and practice materials to the German teacher at Hilldale High who professed to have no interest in programming computers.

28

It seemed that generally the teachers were more able to make creative use of the technological resources to generate new applications as their level of literacy increased. In this respect the computer literacy of the teachers seems to be critical component of instructional computer use by foreign language classes in both schools. This was true for four of the five teachers. However, the German teacher at Hilldale said she was interested in knowing only know enough about operating the microcomputers to preview the lesson materials prepared for her by others. She indicated that this was necessary to check the materials for spelling and grammar accuracy.[2]

2. Optimal Levels of Functional Computer Literacy for Foreign Language Teachers.

The integration strategies that the teachers in both schools were using to make instructional computing a functional part of their foreign language teaching programs required the ability to make determinations of the "fit" between computer-based resources and the existing instructional materials. Making these judgments required that the teachers be familiar with the available alternatives and criteria for software evaluation and also have adequate knowledge about the pedagogy of computer-based language teaching. The teachers had become materials developers themselves and actively participated in the design and implementation of the computer-based language lessons used by their classes.

The teacher in Woodville High designed her French lessons "from the ground up" using the BASIC language. Her technical proficiency as a programmer was increasing through continued study and experience gained by writing and "field testing" her lessons on the students in her classes. In interviews the teacher expressed her belief that she could profit from additional advanced course work in the design and implementation of computer-based materials.

Two of the language teachers at Hilldale could write programs in BASIC, but many of the materials used in their classes were produced from flexible utilities or lesson

---

[2]t is interesting to note that the German teacher had the highest ratio of classes observed using microcomputers to total classes observed (see Table 1). This could suggest that the one teacher studied who was not spending time developing CAL materials was able to actually use computer-based materials with greater regularity. An implication of this anechdote could be that developing CAL materials makes use of computer-based materials with ongoing classes more difficult.

29

templates developed by other teachers in the school. Their technical literacy included the ability to use flexible resources like authoring programs and open-ended drill templates to develop applications that were appropriate for the specific grammar and vocabulary of their current lesson materials.

> All teachers participating in the study said that they believed that the "in-service" training they had received was adequate to enable their own use of CAL. They indicated that "more of the same" was needed for other foreign language teachers in their departments when they become more interested in similar instructional applications of computer-based lessons. Teachers in both schools also expressed similar opinions that the majority of foreign language teachers in their schools were not ready to begin using CAL because of the limited availability of appropriate instructional software.

3. The Human Costs of Integrating Instructional Computing into the Foreign Language Curriculum

Data presented in previous sections indicates that integration of instructional computing into the foreign languages curriculum was accomplished by using locally developed computer-based materials. In both cooperating schools the teachers themselves were the source of the subject matter content for these materials. In some instances they actually coded the interactive lessons themselves using authoring tools or program templates. The lesson materials used in the two schools had a high degree of compatibility and even overlap with the materials used in the regular classroom settings. However, the cost of this close fit between instructional computing and classroom teaching was high. The teachers who contributed to developing the materials paid a high price in terms of their time and energy.

In interviews, the teacher at Woodville High School revealed that she had voluntarily taken a reduction to half-time status in order to have sufficient time to study programming techniques, to revise her existing lessons and to develop new interactive lesson materials. In her case the development costs for the computer- based language

lessons were absorbed by the teacher. The teacher seemed willing to accept the reduced salary in part because the ownership of the materials remained with the author and was not claimed by the school district. Her lessons had been published by a company specializing in foreign language instructional materials, and she was already receiving royalty payments during the period of this study.

At Hilldale High School the school district had made a sizable investment in an ambitious in-service training program. Initially, in-service training was provided to all teachers in the school. These first experiences were followed by voluntary summer workshops in which the participating teachers worked with student programmers to develop and implement materials to be used in the following school year. The participating teachers were paid a stipend to subsidize their attendance. After the initial workshops they used summers, weekends, and evenings to write and revise instructional programs.

The teachers who continued to work on materials development and teach a full schedule of classes simultaneously said during interviews that the time necessary to maintain existing lessons and work on new projects cut deeply into their personal time. They reported giving this time willingly because of their professional pride, but it was evident that this commitment was taking its toll. The description of the Spanish class period already given in the section on Process Data is a good example of the extra work involved in teacher-based software development. All the cooperating teachers remarked in interviews and conversations that they did not consider it to be reasonable for administrators to assume that teacher-produced materials would be a primary source of instructional software.

Perhaps significantly, the teachers at Hilldale High who actually worked on the development of computer-based language lessons were not regular users of the microcomputer labs. The one teacher who was a regular user (once every two weeks) of the computer labs had provided the language materials for the lessons, but had not participated directly in the mechanics of developing the lessons nor in writing the programs for student use. According to the students of the "regular" microcomputer lab user:

> "We used the lab about once every two weeks. Now (about three months after completion of the fieldwork) it's getting to be

31

every three weeks. It depends on when the teacher can get the materials prepared."

At Hilldale some of this demand for time and specialized skills was filled by providing "computer aides" and programming consultants to assist with the development of new materials in high priority areas. However, the maintenance and revision of existing materials was still the job of the individual teachers. The "aide" and "programmer" positions seemed to be filled by persons without professional education background. Their salaries were not competitive with industry and the positions appeared to have a high turnover rate. Additionally, these staff members lacked skills in instructional design which could make possible the production of more sophisticated and useful courseware.

Although successful integration of computer-based materials into a syllabus was probably the result of developing and using teacher produced interactive lesson materials, their design and implementation of CAL materials is technically demanding and time-consuming. Based on this, it seems logical to assume that using commercially produced computer-based language teaching materials would be easier than undertaking local software development. However, for the teachers who were observed during this study, this did not appear to be true. As new foreign language courseware continued to be released by publishers, the foreign language teachers found that the task of locating, pre-screening and selecting suitable computer-based instructional materials to be both time consuming and difficult.

When computerized materials were made available for preview, thorough review of content and technical implementation required a large amount of time and good understanding of the pedagogy involved in the design of computer-based language lessons. At Hilldale High School the cooperating teachers were in demand to review software that was being considered for purchase by the foreign language department. The teachers found errors in the grammar and spelling of the courseware they previewed and found much of it to be of questionable relevance.

In some of the programs that had already been purchased, the teachers felt they had to edit the commercial programs to remove the errors. This was also time-consuming and required a high degree of technical skill. In addition, copyrighted commercial lessons were usually protected from modification by law and by elaborate disk protection

32

schemes. All these factors made editing or modification of commercially produced lessons problematic.

In summary, integration of CAL in foreign language teaching appeared to be a labor intensive activity whether the interactive materials were locally developed or purchased from vendors. In either case, the classroom teachers spent a substantial amount of time on tasks required to prepare computer-based materials. Because there was no accompanying reduction in instructional load, activities related to computer-aided learning increased the foreign language teachers' workloads. Time that the cooperating teachers were investing in activities related to instructional computing was a voluntary addition to their normal teaching load. It was questionable whether they could continue to carry full instructional loads and maintain their microcomputer-related activities indefinitely.

4. State, District and Individual School Practices Affecting the Classroom Use of Computer-Based Foreign Language Instruction

There was little evidence found during this study that any educational policy originating with the state office of education was having an influence on the instructional computing programs in the cooperating schools. In fact, the absence of any guiding state or district policy provided both schools studied with an opportunity to develop their own unique responses to community mandates for increased microcomputer use in the schools. As discussed, school district initiatives at Woodville West High School placed microcomputers in the math department of the school with the intention that they be used for general instructional purposes. However, observations in the school showed that the microcomputer site was used primarily for teaching programming and that teachers outside the math department actually had limited access to the microcomputers.

At Hilldale High School, district and school policy were more in agreement. District policy established "student computer literacy" as a requirement for all students and local principals and curriculum directors encouraged all departments in the school to make use of the available microcomputer resources. According to administrators and teachers who were interviewed at Hilldale High School, the formal policy and local implementation

33

was a comprehensive response to local community pressure on the school district to make instructional computing a component of curriculum (Blomeyer, 1985).

5. Instructional and Administrative Practices With Long-Range Effects on Continued Commitment to Use of Instructional Computing

Hilldale High School had a required course for all incoming freshmen which provided basic information on the use of microcomputers for instructional purposes. The course was intended to give them some basic concepts of programming and advice on the vocational choices and special training necessary to pursue careers in computer technology. Woodville West had no requirement for computer literacy and exposure to computer-use skills was a function of elective choices or experiences outside of school for the students in that school.

Interviews with students in both schools showed differences between their respective abilities to discuss and describe their experiences with computer-aided language learning. Quotes given below come from responses to identical interview questions asking the students to describe fill-in format items from the lessons they had used and tell whether the computer-based lessons used in the language classes were in learning the assigned materials.

Generally, the students in Woodville West, who had little previous experience using microcomputers before French class, tended to give relatively few detailed remarks about the strengths and weaknesses of microcomputers as a tool for language study. Although they were not uncritical, most tended to be positive in their attitudes toward computer use and felt that instructional computing would somehow help them in their foreign language studies.

> "What you had to do was fill in a blank or choose a, b, c, or d... whatever was the right answer for a multiple choice grammar quiz. The other was a fill-in-the-blank where you had to fill in the right word or words."

> "Well, the computer is a little more fun to play with... It's something different from just sitting in the classroom.

34

> You're doing things yourself. You're punching things into the computer. Computers themselves are exciting... At least I think so, 'cause I'm in computer class now."

In contrast, the students at Hilldale articulated a more detailed view of the strengths and limitations of computer-based foreign language instruction. Overall, the students at Hilldale appeared to have a stronger sense that computerized lessons had limits to their instructional effectiveness. They were also generally more skeptical in their attitudes toward the benefits of microcomputer use:

> "The lessons were mostly vocabulary or verb drills. Conjugations where you type in the right verb, but mostly vocabulary drills. These were simple translation exercises where you translated a word from English to German or visa versa."

> "It was some help, but it wasn't unique. It could have been done a lot of other ways in class. I don't think that there was any specific benefit just because we were using a computer. I think some people like using computers because they are new... It is new and innovative, but I'm not really convinced how useful it really is right now."

Observations suggested that at Woodville West the students using computers in the foreign language classes were often less efficient and less comfortable using microcomputers as a medium for foreign language instruction. The foreign language students required a great deal of in-class instruction on the basics of using the microcomputers as an instructional medium. Conversations of the students at Woodville with the teacher sometimes demonstrated either unrealistic expectations of the microcomputer's contribution to learning or (occasionally) an outright aversion to using the computer.

In contrast, at Hilldale High where students all had a basic computer literacy course it was seldom necessary to use class time for instructing the students on the use of the microcomputer. The students were all able to use the computer-based language learning programs with relative ease. When present in the computer labs with their classes,

35

teachers supervised the use of the materials and answered questions about lesson content. The teachers spent more time monitoring the work of all the students and evaluating student progress than the teacher at Woodville West.

In summary, student computer literacy is apparently a major factor effecting use of microcomputers in foreign language curriculum. Simply stated, students whose repertoire of learning strategies included an introduction to the use of interactive CAL and other instructional applications were apparently able to use computer-based drill and practice lessons as a supplement to other instructional strategies. Students lacking this introduction to computer literacy appear less able to use CAL efficiently.[3]

6. The Impact of Instructional Computing on the "Dominant Core" of Teaching Practices.

Although computer-based instruction was being used as part of the foreign language curriculum by the teachers observed in both schools, the overall impact of this microcomputer use on teaching practices appeared to be minimal. Some activities that might have been conducted by the teacher during regular class time were Vocabulary reviews, verb conjugation, and adjective or pronoun agreement seemed to be the subject matter that was most suitable for the computerized drills used by the students. These drills were most often used as a means of studying for tests. Only one teacher out of the four made the use of the computer-based lesson a regular part of her lesson plans and in that case the ratio of time was about one period in the computer lab to nine days of regular classroom study (Blomeyer, 1985). The instructional computer use and the regular foreign language class activities that were observed in the two schools seem to support the notion that the use of microcomputers in the classroom may not have any strong effects on dominant classroom practices. It seems more likely that the "core practices" will dominate the conception of computer-based instruction more than they themselves will be changed.

---

[3]A related observation may be that students having a "computer literacy" class were able to discuss the use of computers with better fluency and more appropriate use of technical terminology. Students who had computer literacy classes also seemed to be more critical in their perceptions of CAL as an instructional tool. This suggests a possible correlation between the ability to use microcomputers effectively and conversational fluency regarding their use and significance.

36

The teachers in both of the participating high schools had integrated the use of computer-based lessons as a limited portion of the curriculum design in their respective classes. The majority of their class time was still spent on more traditional classroom language learning activities. The traditional classes that were observed in both schools followed closely the teaching practices that have persisted in American education since the later nineteenth century. These practices are characterized by whole group delivery, teacher dominated conversation, reliance on textbook materials, desks arranged in straight rows, and classroom interactions structured in a "question and answer" framework (Cuban, 1983).

These same teachers had begun to evolve routines and procedures for conducting classes in the microcomputer laboratories. Their instructional and management strategies that were observed in the microcomputer labs were probably influenced by individual observation of colleagues' using the microcomputer laboratories or adapted from past experiences using "language laboratories" during the post-Sputnick era. However, it was unclear whether any of the teachers had specific preparation for using the microcomputer labs with student groups. At Woodville High School the teacher had taken in-service classes in programming with the mathematics department chairman. At Hilldale High the teachers had all participated in training experiences organized by the school district. It seems reasonable to assume that their own training in the use of microcomputers had an influence on instructional use of computers in their classes.

There has been vocal speculation among advocates of computer use in the schools about the "transforming" and "restructuring" potential of microcomputer use on public education. In the most optimistic scenario, microcomputers have been viewed as having the potential to "revolutionize" the existing educational system. Far reaching speculation has suggested that increasing availability of microcomputers and powerful computer-based "tools" for problem solving will provide instructional experiences far superior to those available now, and will shift the dominant conception of formal learning toward individualized learning based outside the school setting (Papert, 1980).[4]

---

[4]It is interesting to note that the protocols and procedures used in the computer laboratories by the language teachers in this study may show more similarity to the traditional core of teaching practice than to any radical change. Some computer-instruction advocates might maintain that the software these teachers were using was unsophisticated and did not fully exploit the creative potential of the interactive medium. However, in interviews the teachers said that the locally developed

37

Some shift in the "dominant core" constellation of practices toward greater individualization was noted during the observations, thus to some extent bearing out the predictions just mentioned. This apparently shifted the teacher's role from direct instruction to a resource provider who monitors self-pacing, individualized instruction. Once the programs were loaded and the majority of the class was working on the lessons, the teachers were free to circulate through the class and assist individual students. However, within the framework of the language classes observed in these schools (which used computer-based materials oriented toward either identification or recall of specific factual material), there seems to be little evidence that signals the beginning of a "revolutionary" change in the dominant conception of schooling (Blomeyer, 1985).

During these work periods on the computers, there was some margin for student conversations and for collaboration by students on the specifics of particular answers. However, this shift away from the constraints of a traditional "teacher centered" classroom environment was limited. If these student interactions exceeded a level that was acceptable to the teacher, management procedures were initiated and the dominance of the teacher was reaffirmed.

Much of the teachers' time in the microcomputer labs was spent in the logistics of getting the programs loaded into the student workstations. This was particularly true at Woodville West, where the programs were loaded into the microcomputers from diskettes. It was also the case that the French teacher in Woodville High had to spend more in-class time tutoring the students on the use of microcomputers in the classroom.

Direct instructional operations were necessary to some extent in the computer classes in both school districts. They required the teachers to give instructions to the whole class in group mode and to provide answers to individual questions as needed. Although these "classroom management" operations took place in the computer laboratories, they were nonetheless very traditional in form.

---

computer-aided language learning materials fit within the existing foreign language curriculum. Though use of CAL was limited, it was consistent with the goals and objectives of local curriculum.

38

Another significant characteristic of traditional classroom practice is the overall reliance of teachers on textbooks as a source for instructional materials. For some years, foreign language textbooks have been accompanied by Spirit duplicator masters, workbooks, audio tapes, slides, films, and a variety of other integrated instructional media. In an effort to integrate the use of computer-based instruction into their foreign language classes, the teachers in both schools had used vocabulary and grammar materials common to the other more traditional instructional materials already in use.

In this sense the teacher-produced interactive lessons were still dominated by the traditional textbook materials. The strong assertion, made by both teachers and curriculum directors interviewed during the study, that the majority of foreign language teachers will not use computer-based lessons until integrated materials are produced by the textbook publishers reinforces this point about the centrality of the textbook for most foreign language teachers (Blomeyer, 1985).

Another aspect of traditional classroom organization is the recurrent pattern of desks arranged in straight rows. In the computer laboratories in both schools, the student workstations were fixed in rows probably because of hardware connections, space limitations, and hardware security. These arrangements were even less flexible than movable classroom seating. Although more flexible options allowing movement of workstations in and between classrooms and lab settings may exist, they were not observed in the two participating schools.

The last characteristic attributed by Cuban to traditional classrooms is the predominance of "question and answer" frameworks in classroom interactions. As previously noted, the teachers observed spent a portion of their time in the computer labs giving direct instructions on loading lessons or explaining the particulars of using a specific interactive lesson. They also questioned individual students on their progress and answered student questions on the subject materials or instructions for using the programs. However, most of the students' time was spent using the interactive lessons.

If we consider the teachers' and students' accounts of the interactive lesson's contents and analyze the structure of the programs observed in use, it is obvious that the pattern of "question and answer" interactions is dominant in the lesson materials. The obvious difference is that the questions and answers are in a written form on the microcomputer

39

display instead of being part of the oral interactions that predominate in traditional classroom settings (Blomeyer, 1985).

7. Effects of Policy on Instructional Computing with Regard to Equity, Efficiency and Instructional Quality

Data gathered through both direct observation and interviews in the two cooperating schools provides limited information from which to draw conclusions about the effects of instructional computer use on the equity, efficiency, and relative quality of foreign language teaching. Broader conclusions about the effects on equity of the two schools' approaches to instructional computing within the total curriculum have been discussed above.

Observation and interview data suggest that a stated policy requiring universal "student computer literacy" may have a positive influence on the equity of instructional computer use in terms of encouraging female students to learn to use computers. It also appears that the use of microcomputers as a curriculum- wide instructional resource provides greater equity within a school than restriction of computer use to one area in the curriculum.[5]

Much of the current inefficiency involved in using microcomputers in foreign language teaching is apparently due to the apparent lack of professionally acceptable commercially produced materials. The high "human costs" and low level of sophistication displayed by

---

[5] This approach to increasing the equity of instructional computer use appears possible only for school districts having the financial resources to invest large amounts of capital resources in microcomputers and instructional software. The use of instructional computing throughout the curriculum is dependent on having sufficient financial resources to afford a substantial investment in microcomputer hardware. Additionally, a school taking this approach must either purchase commercial software or support local software development. In cases of smaller school districts with more limited resources, transferal of this approach would probably require external funding specifically earmarked for the purchase of microcomputer and software. Without some form of state-mandated assistance, it is doubtful that equity can be achieved in less wealthy school districts.

the locally developed foreign language courseware raises questions about the value and efficiency of using these materials and about the effectiveness of local software development in school districts. Using these teacher-produced materials has probably speeded the rate of adoption for instructional computer use in the foreign language teaching program and contributed to increased equity in the use of computers within the student population. Unfortunately, the trade-off may be a sacrifice of efficiency and quality.

Because the focus of this study was on relationships between policy and practice, little or no clear information is available about the influence of computer-based language teaching on instructional quality. To reach conclusions of this sort will require different research strategies and different fundamental research questions (Blomeyer, 1985).

Conclusion

Previous research on instructional technologies has often taken an optimistic view of computer-based instruction. This is typical of most studies of educational innovation. In general, researchers who are already advocates of a particular innovation conduct studies that confirm their "pro-innovation" position. This classical "technological perspective" on instructional innovation has been based on the primary assumption that innovation has an inherent positive value. Modernity has often been conceptually linked with educational improvement and, according to House: "To be modern was to be innovative." (House, 1979, p. 2). Until the instructional use of computers can be examined dispassionately and rationally by a greater number of researchers using a variety of approaches, little concrete information can be expected about the effects of microcomputer applications on student achievement and the quality of education.

Research funded by the National Institute of Education (NIE) has focused on broad aspects of computer use in elementary schools, i.e., access to microcomputers, changes in teacher roles, integration of CAI into curriculum, the quality and quantity of available software, teacher preparation for microcomputer use, and the effects and outcomes of microcomputer use. The research was conducted on schools in three pioneering districts, but the authors, Sheingold, Kane and Endreweit, concluded that their findings lacked specific information on how microcomputers will affect educational practice. Instead, they stated:

> "The results suggest that the effects of microcomputers on

41

> education, will depend to a large extent, on the social and educational contexts within which they are imbedded." (Sheingold, Kane, and Endreweit, 1983, p. 431)

Experimental and quasi-experimental studies comparing CAL to other instructional methods often show "no significant difference" between the performance of experimental and control groups (Solomon and Gardner, 1986). Meta-analysis of the available experimental studies indicates or only a small "effects size" from CAL interventions (Becker, 1988). These weak findings may result from use of inflexible or unreliable quantitative measures or because no agreement exists on whether the chosen measures reflect professional consensus on the goals and objectives of the program (House, 1980). Interpreting these quantitative findings may also be problematic for teachers and curriculum specialists because they offer little contextual information within which to judge the "fit" of particular treatments for possible transfer to new curricular settings.

The findings from this case study suggest that the effects of microcomputers on foreign language instruction are indeed context dependent. Within that context, there may be particular domains of influence that warrant special consideration for understanding the complex process by which microcomputers and other instructional technologies are integrated or rejected as a component of discipline based curriculum. A historical perspective on the relationship between curriculum and instructional computing is essential to interpret the significance of CAL for classroom learning. In these terms, it may be particularly important to document the life histories of the instructional specialists involved in the development and use of instructional computing applications (Goodson, 1988). Other specific domains of influence warranting careful examination may include the following:

1. hardware and site implementation (including logistic and technical concerns),

2. availability or access to microcomputer workstations,

3. design characteristics of the software (with particular attention to the interactive characteristics of CAL),

42

4. curricular and disciplinary sources of lesson materials,

5. pedagogical characteristics attributable to the content domain or the particular training of teachers as content specialists, and

6. the effects of specialized technology training or "computer literacy" on the functional ability and attitudes of students and teachers.

In this study of computer-aided language learning, the unavailability of sufficient acceptable foreign language software seemed to be the greatest hindrance to using computer-based foreign language instruction as a systematic component of foreign language teaching. Both the local production of computer-based foreign language materials the review of commercial materials for their eventual acquisition were tried as alternatives and proved to be time-consuming, expensive and inefficient.

In both schools studied, the teachers and foreign language department chairpersons had very definite ideas about what acceptable foreign language CAL should be. Their concerns were grounded in professional expectations about necessary vocabulary, pedagogy and the technical accuracy of acceptable foreign language materials. Their analysis was that the commercially available materials were not suitable. Their position was that until suitable materials might become available, use of CAL in foreign language classes would be limited to use of the few existing acceptable options.

Teacher-based materials development efforts provided a limited number of computer based lessons that fit well with the ecology of the existing foreign language teaching program. Interviews with both students and teachers revealed that these interactive drills were a useful and efficient supplement to traditional instruction. Even so, the teachers were outspoken about their belief that existing commercially produced materials were inadequate and that foreign language textbook publishers should take the initiative to produce computer-based materials as comprehensive supplements to series books.

Foreign language teachers in both schools expressed their belief that publishers should actively solicit the opinions and ideas of experienced classroom teachers having

43

discipline-based experience using and developing CAL. Teachers at Hilldale High suggested that until nationally prominent publishing houses were willing to invest in the development of comprehensive computer- based materials for use with their books, the majority of public school foreign language teachers would not be able to make effective use of CAL.

Since the study was completed in 1984, a large variety of new computer-assisted language learning materials have become commercially available. One particular publishing house (D.C. Heath and Company) has published foreign language series books for French and Spanish that have computer-based vocabulary acquisition lessons as optional supplementary materials.[6] Foreign language curriculum specialists have also responded to the need for pedagogically appropriate CAL materials by screening the available commercially produced lessons and developing additional interactive computer-based lessons based on standard foreign language pedagogy and technically accurate linguistic materials.[7] Additionally, a number of easy-to-use authoring programs and specialized programming utilities are now available to aid foreign language and English-as-a-second language teachers who want to create their own interactive lessons without unnecessarily complicated "ground up" programming.[8]

No data exists presently that could give an indication of the impact that the more recent series supplements and authoring utilities are having on current foreign language teaching. Information from the case study reported here suggests some significant concerns about the feasibility of attempts to utilize CAL as a more systematic component of foreign language teaching. It is clear that unless professionally acceptable materials become available to foreign language teachers, regular use of microcomputer-based language lessons seems unlikely.

---

[6] D.C. Heath and Company publishes Spanish for Mastery Software and French for Mastery Software for their related series books.

[7] Lingo Fun Inc. of Westerville, Ohio and Gessler Publishing Company of New York are good sources of computer-based foreign language materials.

[8] Athelstan Publications of La Jolla, CA has just published a new book on ESL/FL courseware authoring by Sandra Hampson (1988).

It is also questionable whether the majority of foreign language teachers will be able to make use of the more recently available CAL materials. Scarcity of hardware resources, monopolization of available hardware by curricular areas more traditionally viewed as being "computer users" and insufficient experience or training on the technical and pedagogical fundamentals of foreign language CAL are all areas of concern.

Given the perspective on CAL offered here, it seems unlikely that major reforms or changes in the central characteristics of the American educational system will be brought about solely by the introduction of instructional computing. On the other hand, if the CAL can be introduced in a way that promotes a review of course content in the various areas of curriculum, perhaps it can provide educational practice with new resources and a renewal of professional interest and enthusiasm. If the foreign language teachers themselves become active participants in the development and implementation of computer-based lessons in ways that encourage review and revitalization of curriculum content, then the effect is likely to be a positive one for foreign language instruction.

Finally, the most serious concern suggested by this case study may be that the foreign language teachers who were the innovators working to integrate microcomputers as a curricular resource increased their workload without a decrease in their instructional responsibility. Pioneering classroom applications of new instructional technologies is difficult and time consuming work. Unless the teachers who take significant roles in the integration of technology to discipline-based curriculum can be supported by availability of adequate planning and preparation time, it seems unlikely that instructional staff will become involved voluntarily. In last analysis, it is the teachers in the classrooms who will determine whether or not microcomputers and other instructional technologies make any significant contribution to educational improvement.

Naturalistic case studies of can broaden our understanding of CAL to include the socio-cultural context of computer use in curriculum and provide a view of its effects on teaching and learning from the perspectives of the classroom teacher and the students. Additional naturalistic research on instructional computing could help foster more appropriate applications of microcomputers as an instructional medium throughout the curriculum and help monitor the effects of instructional technology on teaching practice and the organization of schooling. These concerns should be important questions for studying curricular integration of microcomputers in other areas of discipline-based

45

curriculum besides language learning. This can be accomplished by adopting the following agenda for future research activities:

1. The ethnographic documentation and substantive evaluation of instructional computing in discipline-based applications,

2. The application of new knowledge about the role of CAI in educational settings to the development and implementation of prototype systems for instructional delivery, and

3. Measurement of the outcomes of the instructional use of computers in terms of the students' achievement, attitudes toward school computer use in general, and specific attitudes toward computer use in the full range of the curriculum.

The approach to research on computer-assisted instruction proposed here is potentially relevant to all of the subject areas in the comprehensive curriculum. In the next few years research findings on new curricular applications will hopefully become available to broaden our knowledge base on the effects of using CAL applications in a variety of disciplines. Interest in the areas of curriculum where instructional computer use is more frequent (i.e., math, computer science, natural sciences, and business applications) should not exclude computer use in the humanities. It is critical to work toward establishing a viable model for educational computing that includes the delivery of instruction in all subject areas.

The results from this and other naturalistic studies of instructional computer use raise questions about the overall efficiency and effectiveness of computer-based instruction as a classroom tool. More research on the integration of instructional computing into the curriculum is necessary before any broad policy recommendations can be made. One direction for this research is the continued study of how teachers and students use and apply instructional technology in educational environments. Another necessary direction is research on the impacts of instructional computer use on educational quality, equity and efficiency.

It is our hope that this case study and others like it this will contribute to the future development of exemplary instructional computer applications in foreign language

46

education and other related areas of the curriculum. Without continuing systematic efforts to study educational policy and instructional practices affecting the integration of computer-aided learning, most of the resources expended purchasing microcomputers for the schools and on lesson design and implementation of CAL materials may ultimately be limited to demonstrations of technological capacity and will lack true instructional value.

REFERENCES

Becker, H. J. (1988). The impact of computer use on children's learning: What the research has shown and what it has not. Center for Research on Elementary and Middle Schools, Johns Hopkins University.

47

Becker, H. J. (1986). Instructional uses of school computers: Reports from the 1985 national survey. Center for the Social Organization of Schools, Johns Hopkins University. Issues 1-3.

Blomeyer, R. L. (1988). A naturalistic perspective on computer aided learning: guidance for policy and practice in higher education. Journal of Educational Policy. 4(3), 259-274.

Blomeyer, R. L. (1985). The use of computer-based instruction in foreign language teaching: An ethnographically-oriented study (Doctoral Dissertation, University of Illinois, 1985).

Cuban, L. (1983). How did teachers teach, 1890-1980. Theory into practice, 12(3), 159-165.

Goodson, I. F. (1988). "Teachers life histories and studies of curriculum and schooling." in I.F. Goodson, The making of Curriculum: Collected Essays (71-92). Philadelphia PA: Falmer Press.

Guba, E. G. (1978). Toward a methodology of naturalistic inquiry in educational evaluation. (CSE Monograph Series in Evaluation No. 8), Center for the Study of Evaluation at UCLA.

House, E. (1979). Technology versus craft: A ten year perspective on innovation. Journal of curriculum studies, 11(1), 1-15.

House, E. (1980). Evaluating with validity. Beverly Hills CA: Sage Publications.

Kulik J.A. and Kulik C. C. (1986). Effectiveness of computer-based education in colleges. Association of Educational Data Systems Journal, 19(2-3), 81-108.
Kulik, J. A., Kulik C. C. and Cohen, P. A. (1980). Effectiveness of computer-based college teaching: A meta-analysis of the findings. Review of Educational Research, 50, 525-544.

LeCompte, M. D., & Goetz, J. (1984). In D. M. Fetterman (Ed.), Ethnography in educational evaluation, 37-59. Beverley Hills CA: Sage Publications.

Papert, S. (1980). Mindstorms: children, computers, and powerful ideas. New York: Basic Books.

Rogers, E. M. (1983). The diffusion of innovation (3rd ed.). New York: The Free Press.

Rogers E. M. & Shoemaker, F. (1971). Communication of innovations (2nd ed.). New York: The Free Press.

Sampson, G. E., Niemiec, R., Weinstein, T., and Walberg, H. J. (1986). Effects of computer-based instruction on secondary school achievement: A quantitative synthesis. Association for Educational Data Systems Journal, 19(4), 312-326.

Sheingold, K., Kane, J. & Endreweit, M. (1983). Microcomputer use in the schools: Developing a research agenda. Harvard educational review, 54(4), November 1983, 412-432.

Smith, L. & Pohland, P. (1974). Educational technology and the rural highlands. In R. Stake (Ed.), Four evaluation examples: Anthropological, economic, narrative, and portrayal (AERA Monograph Series on Curriculum Evaluation No. 7, 5-54).

\Smith L., & Pohland, P. (1976). Grounded theory in educational ethnography: A methodological analysis and critique. In J. I. Roberts & S. K. Akinsanya (Eds.), Educational patterns and cultural configurations (264-279). New York: David McKay Co., Inc.

Solomon and Gardner, (1986). The computer as educator: Lessons from television research. Educational researcher, 15(1), 13-19.