COMPUTER-ASSISTED INSTRUCTION IN BEGINNING COLLEGE GERMAN: AN EXPERIMENT
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ABSTRACT

Background information on other German CAI programs and articles written by authors of German CAI programs with which the author is personally acquainted is first presented. Information on the author’s experiment is then given. In the experiment two nearly homogeneous sections of second-semester German were utilized in this experiment. The experimental class used ten modules of computer-assisted instruction instead of the workbook, which the control group used. The purpose of the experiment was to find out if immediate reinforcement in self-pacing would enable the students to perform better on the final exam and to get a better course grade. Both sections were taught by the investigator. Both classes also took an achievement test at the beginning of the semester for comparison. The results show the experimental class was far superior.

KEYWORDS: computer-assisted instruction, modules, grammar vocabulary, experiment, German, immediate reinforcement, overview, SUNY, University of Iowa, University of Illinois at Chicago, University High School, Brigham Young University, The Ohio State University, University of Georgia, Western Michigan University.

How can I improve my teaching? How can I encourage more students to enroll in German? How can I stimulate their interest for a subject which is being pushed aside by computer science, mathematics, and science? Good teaching was the answer in 1964 and is undoubtedly the answer today as well. The challenge for us today is to update our bag of tricks. Our collection of realia from the 60’s and 70’s just won’t do for today’s students. We are now on the threshold of the information age. I, personally, need a computer to keep track of and file my countless letters, worksheets, tests and syllabi, just to name a few items. My students also know there are faster and better ways of learning routine information and storing that information until it is needed. They have been exposed to modern technology in other subject areas and expect us to make use of these marvels too.

I became interested in computers about 15 years ago, but I could not afford one nor could I convince anyone else to purchase one. In fact, 15 years ago, I considered it a major breakthrough to introduce individualized instruction in German at a southern university where I was doing graduate work in German education. The German department head was reluctant to accept the idea that students could be taught to accept much of the responsibility for their own learning. I had to convince him not only to let me teach an experimental class, but also to allow two other instructors, who would use the materials which I had developed, to teach experimental classes as well. He finally gave in after I had assured him that my dissertation and my entire future rested in his hands.

Recently I came across an article on microcomputers being used to teach German at the very same university! What a change in 15 years! Tears almost came to my eyes, not that I had anything to do with it, but just think for a moment—if you have a dream you believe in—then you must work for it until you can achieve that dream.

Yet it was not this article which launched me into experimenting with new learning materials and approaches, but rather a sudden awareness that I had to do something to encourage higher enrollment or else I would be out of a job. Also since I was on an alternate-year appointment in 1982-83, I took a computer literacy course in Basic and later, one in Pascal as well.

After taking the computer literacy course, I was convinced that I had to do something and that I had to do it as soon as possible. I knew that there would be
very little financial support for German. Fortunately for me, our Lab Director also understands computers and would like to see the faculty use them more. He has encouraged me to write grammar exercises for my students. In addition, one of my colleagues in French had written some grammar exercises for the computer and used them successfully with her students. Therefore, I did not encounter any opposition when I asked my present chairperson for $20 to do a bibliographic computer search through Bibliographic Retrieval Services. That search, done in the summer of 1983, yielded about 100 annotated entries related to CAI in foreign languages and encouraged me even more to write my own materials for my students. Funding for the computer time comes from a general fund for experimental projects through our University’s Computer Center.

Related Research

Computer-assisted instruction (CAI) has been available since the early 1960’s. In 1960 the University of Illinois, in conjunction with the Control Data Corporation, developed the first major system. This system, called Plato, uses the time-share concept, i.e. a terminal connected to a mainframe computer with each user paying for the computer time he uses. Thus, such a computer can teach courses in twenty different subjects, including foreign languages, simultaneously since each user uses the computer for only a few microseconds at a time. There are now (1984) fourteen Plato systems worldwide.1

Of course, many other institutions have developed their own computer-assisted programs. Yet these mainframe programs have not been adopted widely, although the current trend seems to favor a proliferation of computer systems and software. Among the reasons for the lack of more computer systems in place are the following: (1) money: a single Plato terminal could cost a school district as much as $6,000. This is one reason many schools have gone to microcomputers. (2) It takes many hours to develop good software and until recently, there was little high-quality software available. Even now, most of the software which is available is tied to a particular computer. (3) There is not much convincing data that computer-assisted instruction is superior to other methods of instruction. Without such data, schools and universities cannot justify the expense.

Most of the large systems which have been used have many similarities: (1) the student uses a monitor with a keyboard or a teletype which also provides immediate hard copy for the student to keep and review; (2) the computer gives the student immediate feedback in the form of reinforcement or assistance. Some programs have intricate branching schemes for providing guided clues rather than a direct answer; (3) the student continues through the program at his or her own pace; and (4) the computer usually keeps a record of the student’s work by filing information such as number of correct responses, time on task, types of errors, or number of units completed.

Clearly then, some of the routine drill and record keeping could be taken out of the classroom and replaced by conversational activities or written application of the grammar or vocabulary skills learned from the computer sessions. The lower cost of the microcomputers makes this more of a possibility than ever before. Our colleagues in mathematics and the sciences have been using the micros for several years. At larger universities and in larger school systems, it is not uncommon to see hundreds of microcomputers being used in the above-named areas. Yet in our foreign language department we have only one which is used by the Language Lab for keeping track of how many audio tapes are out and who has them.

**STATE UNIVERSITY OF NEW YORK AT STONY BROOK**

Any foreign language teacher who plans to use the computer in helping his students learn German will do well to read John R. Russell’s remarks in the Premier Edition of the CALICO Journal (June 1983). John Russell is Professor of German at the State University of New York. He has designed numerous CAI programs in German and was one of the original authors of German courseware on PLATO. His article is entitled: On Getting Started. John Russell reminds us that the computer can be an aid to learning, but that we must be careful. The computer can be misused just like the language labs of the 1960’s. The computer can allow the language teacher to determine how to make the best use of classroom time. If grammar drill and explanations can be done better by computer, then perhaps they should be done that way. However, it won’t be easy for us to change our ways, because most of us German teachers take considerable pride in being able to explain German grammar to our students. However, the possibilities exist with some computer software, that the exercises can easily be modified and upgraded.

According to Russell it was not easy at that time to buy a ready-made program and that is still true today. First of all, the choice for German is still limited and then your school or institution may not have the computer which runs the software being offered for sale.

Russell suggests that since most foreign language teachers are not programmers, they may want to examine a ‘template program’ which allows the user a choice of options for constructing substitution-transformation type drills and for having the computer guide the student through them. This is a user-friendly program, since the basic programming has already been done and only the exercises need to be added. Thus, a teacher can custom design his own program. An excellent example of such a program is Jim Pusack’s Dasher.2

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Sue K. Otto and James P. Pusack, who are both at the University of Iowa, also have considerable expertise in CAI. Sue Otto is currently the Media Center Associate Director of Project Development and Computer-Assisted Instruction. James Pusack is chairman of the Department of German and is a recognized authority in CAI. He is presently the foreign language series editor for CONDUIT, a non-profit clearinghouse for educational computer software.

In their article which also appeared in the CALICO Journal: Stringing Us Along: Programming for Foreign Language CAI the writers explain what programming is and how to teach programming. In addition, they discuss some advanced programming techniques for foreign language teachers.

The authors make the point that, a dedicated, experienced teacher-programmer, for example, could probably design and write a useful vocabulary dictation program with helpful diagnostic messages in a weekend of hard work. That amount of work would be paid off by the countless hours that students spend using the program, eliminating the need for the teacher to grade the assignments or hold boring drill sessions.

However, when software is written in an instructional language, it must be kept in mind that it can only be used by others if they have exactly the same system on their computer. Furthermore, if a lot of time and money is to be invested in the production of computer lessons, then it should be done with a programming language shared by many systems, so that the project is relatively transportable, i.e. it can be easily adapted for use on other computers.

In their section on programming techniques, the writers present nine common routines for speeding up the execution of a program. For example, one is a trim routine which removes leading, trailing, and multiple blanks from a student’s answer. Another example is a file reading routine which ignores commas and other delimiters in the lines of text input. These routines and others are needed to process students’ answers.

Obviously, if you are going to set up a course in computer programming, or planning to add a CAI segment to your methods course, or are just getting into some serious programming, you will want to contact Sue Otto and James Pusack.

Dr. David Weible, who is a professor of German, has been active in the field of CAI since 1972. He has worked with mainframe computers as well as microcomputers. He has also been teaching a course in FL CAI at the University of Illinois at Chicago for the past seven or eight years, as well as having held a number of workshops on this topic in various parts of the country. He is currently the Special Interest Group (SIG) chairperson for courseware development in CALICO.

After you have read the article: The Foreign Language Teacher as Courseware Author by David Weible, you will feel like trying to write your own software. Dr. Weible makes the point that the computer will help the slower students to review. And if your are interested in individualized instruction, the computer will greatly facilitate detailed record keeping.

For several varied reasons, any computer software which is to be used in language CAI must be very good and very easy to use. Since most teachers will not be able to spend the time necessary to learn how to write computer programs and it takes experienced teachers with considerable knowledge to produce appropriate and meaningful exercises, the novice programmer may want to look at CAI-oriented authoring systems such as PILOT, PASS, or PROF. These systems make the programming and debugging of tutorial type lessons a lot simpler. They also save time and help produce better programs.

One point that David Weible also makes is that the teacher benefits from learning how to program, because the real challenge in computer programming and in most teaching tasks is learning how to think clearly and to give clear expression to one’s thoughts. AI of us can benefit from additional practice in doing that. Anyone who has attempted to write computer programs know that they must be written in a clear and straightforward manner or they just won’t work.

Curtin and Shinall reported on successful computer-assisted reading lessons in French, German, Russian, and Spanish at the University High School in Urbana, Illinois. These lessons are for first and second year students and utilize the Apple II. The lessons are called packets in order to emphasize that they are self-contained with vocabulary help and explanations where needed. Since these exercises are for review purposes, the explanations are optional and short, intended just to aid the student’s memory rather than to provide a detailed exposition. Each lesson also includes an introduction, a series of interactive exercises, a game-like activity, and a scored final test.

Their lessons are individualized in the following way: (1) the students are able to set their own rate of working through the materials. For example, the students can control how fast vocabulary moves across the screen; (2) the students are given several choices at the end of the exercise: (a) they may repeat the exercise; (b) they may go on to additional material, or (c) they may stop. They found that it was better not to force students to repeat exercises they had missed, but rather to let the students decide for themselves if they should repeat a set of exercises.

Computer-assisted instruction also needs to be private. For example, the authors have used musical reinforcement in their packets to indicate right or wrong answers. They soon found that it was necessary to give students the option of turning the sound off because the noise was distracting and/or the students did not like letting the other students know each time they made a mistake which was sounded out by a mildly negative tune.

The authors also found that the active interaction with the computer is important. The aspect of the immediate feedback is most important because it lets the student...
know if he is on the right track, and it permits him to focus on the items he missed.

In the format of the exercises themselves, single or multiple fill-ins seem to be superior to having the student type in an entire sentence. True-False and multiple choice formats were also used to check understanding. Graphics and animation provide an additional enhancement to the learning process. Cultural elements and geography are also included in the games.\(^3\)

The packets which were described here are available from COMPress Publishers. I received a flyer in the mail, just a few days ago, advertising these materials. The authors also offer summer workshops for secondary school foreign language teachers who are interested in learning how to write programs.

**BRIGHAM YOUNG UNIVERSITY**

Educators and computer technicians developed a sophisticated CAI system at Brigham Young University. This system is known by the acronym TICCIT, which stands for Time-shared Interactive Computer Controlled Information Television and is now a trademark of the Hazeltine Corporation. One of the concepts which sets it apart from other programs is the idea of it functioning in a mainline instruction mode.

Under this concept, the computer is programmed to provide both the textbook and classroom lecture in one presentation. Class time could, therefore, be focused on higher levels of interaction and the instructor then serves as an information resource manager as well as a personal tutor. The net benefit was not to replace teachers with machines, but to give the teachers more effective control over the education of a larger number of students.

In 1983 the TICCIT system at BYU consisted of a 28-terminal work area within the learning resource center at the University Library. Thus, the system is available to any user including non-students. The computer teaching service (CTS), formerly the Computer Teaching Resource Center, provides the new users with proctors to introduce the system to them.

The TICCIT system has the following features: (1) after the student logs on, he is shown a series of diagrams representing all of the units, all of the lessons in a selected unit, and all of the segments in a selected lesson with their relationship to each other. These diagrams are called maps and each one becomes a dynamic status display showing students their progress through the course. As the student begins each instructional segment, he has a choice of accessing four primary instruction files: (1) objective; (2) rule; (3) example; and (4) practice.

The objective file gives the student a behavioral objective statement followed by a sample problem with the correct answer given, thereby showing the student what he must be able to do to master the segment. Therefore, the student can use the objective as a starting point in order to make a choice between rule, example, or practice files or even to go on to an entirely different segment of instruction. If the student presses the rule key, he will get a precise presentation of all definitions or procedures needed to accomplish the objective. The student could, on the other hand, press the example key to access a file of items showing the objective applied to specific instances, or if the student presses the practice key, he is given a file of problems upon which he will perform the task defined by the objective display.

In addition, there are three supporting files: Help, Easy, and Hard. Help is an expanded version of the rule file, Easy is a simpler version, and Hard is a more abstract version. Finally, there is also an advisor component which tells the student what he should do if he performs poorly or does something unexpected.\(^6\)

Before the German component of the TICCIT program was implemented, a small number of graduate students were trained in the art of instructional design, and with the aid of a native German, a course of over 240 segments was produced. The German course also includes language games to sharpen the student’s vocabulary and help with memorization. The units which were available in 1983 were: noun gender, case, verbs, pronouns, modifiers, determiners, prepositions, word order, spelling, culture, and miscellaneous.

The TICCIT project also includes research on the use of the videodisc, particularly in Spanish. It would not surprise me to see the videodisc materials available in German in the near future, if they aren’t available already. This entire program is obviously one of the most progressive programs in the country.

**THE OHIO STATE UNIVERSITY**

The Ohio State University was also one of the first institutions to use individualized instruction which included a computer-assisted instruction component. They received a NEH grant in 1976 and developed a program for six foreign languages including German. Their German program is known by the acronym DECU: (Deutscher Computer Unterricht) and was developed by Heimy Taylor and Werner Haas. This CAI program works almost like a personal tutor. It is written in such a way that most student mistakes are anticipated and hence the computer can give the students hints based on their errors. Between 5 and 25 anticipated wrong answers are programmed for each exercise and hints are provided for these wrong answers. In short, the program is capable of branching to various alternatives as well as varying performance levels.

The student’s printouts are checked by an instructor at the Learning Center. This work is not graded, but the students receive advice based on an analysis of their answers.

The individualized instruction track differs from the traditional classroom track in the following ways: (1) Attendance and instruction: all students are required to attend an orientation to the Learning Center, the materials, and the computer program. After the orientation, students proceed at their own pace. They are encouraged to visit the Learning Center at least once a week. How often the students actually go and how much effort they put into their work is entirely up to them. Computer terminals are available in the dorms and at other campus locations. These students do not attend regular classes. (2) Variable-credit: students must sign up for at least two credits per quarter.
Peter A. Jorgensen from the University of Georgia reported on using a mainframe computer, the VAX 11780, to teach German grammar. The programming was done mainly in an authoring language called DAL (Digital Authoring Language). The German faculty was taught how to do the program writing and thus could determine directly what the students would see and do.

A review grammar was fashioned; this made the program very versatile, because it could be used at various levels wherever it was needed for review. It could even be used for composition classes, for example. Jorgensen maintains that the program must be modular and have control over sequencing as well. Modular in this context simply means that certain topics could be omitted by intermediate students who have already mastered a topic or topics. He feels that each module must be very short, but with grammar explanations and specific exercises. The modules are directly accessible from the main menu.

Having many modules also permits the instructor to use the program with almost any textbook. The course coordinator simply makes up a list of the modules that go with the various chapters.

The modules are also sequenced in related groups: Adjective Endings, for example. The related group is then introduced by a general module which explains the concept. When the student uses the material, he can skip the explanations if he wishes to. Explanations for incorrect responses are also offered and a student may repeat the frames he answered incorrectly before moving on to new material. Jorgensen also maintains that fill-ins are more appropriate than multiple-choice questions when the exercises are mixed together in the review exercises.

The authoring system which Jorgensen used also included upper and lower case umlauts as well as the sharles ess, commonly known as the SZ. Furthermore, this system also permits the use of graphics, which is most helpful in explaining the troublesome two-way prepositions which may take either the accusative or the dative case.

An effort has also been made to carefully document the Georgia program in order to facilitate the changing of the program by future users. This program also reviews the most common English grammatical concepts as remedial lessons for the first weeks of elementary German for the students who need it. The basic vocabulary of the program is restricted to the two thousand most common German words. By now they have probably added a vocabulary search feature which allows the user to jump out of a lesson in order to ask for the definition of a word and then return to the same lesson.

All in all, this seems to be an excellent program.

WESTERN MICHIGAN UNIVERSITY

During the summer of 1983, this writer developed a set of 21 grammar modules consisting of three to four levels each or a total of about 1000 sentences. These modules were designed so that they can be used to accompany any basic text or be used for a review of basic German grammar. The main purpose of these modules was to provide a means of reinforced self-study in a standard German class. The 21 modules contain the following topics: the nominative case, the accusative case, the dative case, the genitive case, all cases, basic word order, present tense of common

UNIVERSITY OF GEORGIA

The idea behind Goal Options is to give students a chance to pick something they really want to do.

This comprehensive program has increased enrollments and has improved the grades of the students who passed the course. Unfortunately, a number of students did not drop the course by the required date or waited until the last two or three weeks before they did any work so that makes the program appear less successful than it is.

From student questionnaires it was determined that 35 percent of all individualized instruction students found the computer instruction and practices very valuable; 58 percent useful; and 7 percent, not valuable.

In conclusion, the Ohio State University’s individualized instruction program in German is quite impressive and has improved the quality of the students’ work, as well as increased enrollment. I had the opportunity to see this program first-hand in 1979. I talked with the instructors and did some exercises on the computer. Unfortunately, the students were not on campus since I was there for a conference between quarters, so I was not able to get their impressions of the program.
In this experimental study, the students who used the modules did achieve a significantly higher mean on the departmental posttest when compared to the students taught by the conventional approach. Since the two classes had almost identical averages of 34.4 and 34.5, respectively, on the
pre-test given at the beginning of the semester, the conclusion may be drawn that they were approximately equivalent in ability. The experimental class scored 10% higher on the grammar section of the posttest when compared to the control class.

It is possible that the experimental class may have practiced the material more frequently than the control class. The frequency of practice was not monitored, although the writer observed that several students like the computer exercises because of the immediate reinforcement. In addition, if the students did not do well on a particular module, they usually did the module again.

**Implications for Teaching**
1. Students can learn grammar and vocabulary on their own if they are given carefully defined exercises with vocabulary lists and instructions.
2. Definite deadlines must be set for completing the modules and assignments, otherwise the students will think that the exercises are not important.
3. Students will read with greater comprehension if the vocabulary they are learning is reintroduced in supplementary modular exercises.
4. Teachers can make good use of the computer as an aid to learning.
5. Students should be given a certain number of points for each completed computer instruction assignment.

**Implications for Further Research**
1. A study should be conducted using the same modular materials at the intermediate and advanced levels.
2. Short prose selections for reading comprehension could be added to the existing modules. This could improve our students' reading skills.
3. A study which shows the effects of adding a level of translation exercises to each module could demonstrate a deeper mastery of the German language.
4. An experiment which gives the results of using additional cultural information on another level of the modules could also show interesting results.

**Summary**
Both mainframe and microcomputers are used in German language instruction. The microcomputers seem to be favored over the mainframe computers because they cost less and they don't require as much maintenance. At least, the whole system does not go down at once if you are using stand-alone micros.

All of the programs reviewed reported favorable results. The students learn vocabulary, grammar, and improve their reading skills as well. Most of the writers indicate that the students who use computer-assisted instruction also master vocabulary, grammar, and reading at a higher level of skill than students who do not use the computer. How permanent this learning is still has to be investigated. At any rate, most students seem to enjoy the support which a good computer system can give them.

Each of the programs reviewed in this article has characteristic features and strengths. None of the programs has all of these features. Of course, the features are not prioritized, because the priority ranking depends on each writer's perception of what his students' needs are.

These main features include: (1) immediate reinforcement; (2) adjustable rate or space; (3) fill-in-the-blank exercises; (4) the choice of repeating the work; (5) branching for review or help; (6) work checked by the instructor; (7) credit vs. non-credit for work; (8) work on various goals: reading, writing, speaking, cultural knowledge, listening, etc.; (9) modules; (10) logical sequencing; (11) adaptability to any textbook; (12) basis on word frequency lists; (13) use of foreign character fonts; (14) adaptable documentation; and (15) pre-tested and post-tested knowledge to measure progress.

In conclusion, it is up to us to make use of the computer, to investigate the software carefully, and to make better use of these tools than we did of the language labs. The use of computers in foreign languages and in German, in particular, is increasing as instructors become more knowledgeable about computers. Increased financial support at the state and federal levels will also help support computer-assisted instruction. Yet it is up to each individual instructor to make the first move and join the information age. My advice to you is: Learn more about computers today.
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