An Introduction to Computer Assisted Language Teaching

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To Richard and Monica Kenning,
Serge (in memoriam) and Marguerite Marige,
our parents.

Introduction

This book is intended for anyone who is looking for a practical introduction to the use of computers in language teaching: from teachers who want to keep abreast of developments and are curious about the new technology which already affects their daily lives and will soon enter the field of their professional interests, to teachers with some programming experience who wish to see how others tackle the same problems.

The aim of the book is twofold: to assist those using computers, or interested in using computers for language teaching purposes, and to explain how to write programs. No knowledge of programming is assumed. The intention is to help the open-minded novice to judge the potential of computer assisted instruction in language teaching, while providing the already convinced with practical help and sample programs. The book thus includes both general programming information, and discussion of points specific to language teaching applications, together with bibliographical and other specialist information.

An important feature of the approach adopted in this book is the avoidance of the bias towards numerical applications so typical of many existing books on computing, including manufacturers' reference manuals, where concepts are illustrated with arithmetic examples from algebra, trigonometry, etc. and pride of place is given to the mathematical capabilities of the language or languages described. This very common approach is a source of difficulty for the reader whose interests lie elsewhere and whose mathematical expertise may leave something to be desired. It is at best off-putting and at worst may make it impossible to get to grips with programming, because the chapters dealing with non-numerical applications occur towards the end of such books and assume that what has gone before has been assimilated. The present book approaches computing from a language teacher's point of view and focuses on those aspects which are of direct concern to the language teacher. In selecting the material to include and in deciding upon the order of

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presentation, the authors have been guided by two main considerations: usefulness and relative complexity. The same considerations led to the decision to concentrate on the language BASIC as being the best way of introducing the language teacher to programming techniques, leading to a better appreciation of the possibilities of computers.

The book starts with a discussion of computer assisted instruction, CAI, first in general, then with particular reference to Computer Assisted Language Teaching/Computer Assisted Language Learning (CALT/CALL). The advantages and limitations of computers are delineated and the options open to the teacher with regard both to equipment and to materials are then considered. A brief summary of what you need to know in order to get started concludes the chapter.

In chapter 2 we discuss a number of topics essential to Computer Assisted Language Teaching: dialogue, learner/computer interaction, response analysis, decision making based on the nature of such responses. We show how such techniques can be implemented in BASIC, introducing new features of the language as and when they are needed. The chapter ends with an example dialogue program, and it is shown how, by varying the content of the dialogue, the program can be used in a variety of different applications and contexts. Modifications to this dialogue program are used throughout the book to illustrate the techniques developed in later chapters.

A certain minimum of numerical capability is essential, even in CALT applications, for instance for marking and keeping score, and more generally for loop counters and program control. In chapter 3 we show how elementary arithmetic is carried out in BASIC and end with a version of the dialogue program which allows the learner up to two attempts at the question and maintains a score counter.

It is relatively easy to write a program which includes the essentials of a question and answer dialogue, including a simple matching procedure. It soon becomes apparent, however, that in the analysis of the learner's response we need matching techniques which can, for example, cater for non-unique correct answers, and handle learner responses which are not precisely what was expected. Chapter 4 contains a discussion of such techniques, introduces the required BASIC facilities, and includes a number of example programs illustrating how such techniques may be implemented and used.

An understanding of the essential structure of an exercise, as distinct from its content, provides a highly efficient technique for the development of teaching materials, since many apparently different

types of exercise are soon seen to possess the same structure, implying that the same procedure can be adopted in a variety of superficially different circmstances. At one level this approach can be useful in writing drills which consist of some operation to be carried out many times, with only the content of the exercise varying. At another, and perhaps more significant level, the structured approach encourages modularity, which both enables the teacher to apply programs and routines developed in one context to a wide range of problems, and also simplifies the process of writing large programs. These points are developed further in chapter 5, where the BASIC statements and functions to be used are introduced. Example programs containing routines and loops are considered in some detail.

Chapter 6 contains a discussion of ways of introducing a measure of unpredictability by randomization of the material presented to the learner. The chapter includes random-number generation and the use of arrays in BASIC, together with several illustrative programs.

In chapter 7 a number of features relying on the use of disk files are described. These include the use of lesson files (the separation of the BASIC lesson program from the text, questions and answers), help files (the provision of background information to be accessed by the learner as and when he or she wishes) and response files (a logging facility providing the teacher with feedback). The chapter begins with a discussion of the BASIC pre-requisites, and then each topic is discussed and implemented in turn.

Ways of dealing with problems associated with the man/machine interface and learner motivation are discussed in chapter 8, including personalization, the use of games in language teaching, and program security. Example programs are given for each topic.

In chapter 9 a number of issues relating to the actual writing and development of programs are discussed, including the analysis, the coding, and the implementation phases. Practical advice and suggestions are given on such topics as editing, documentation, and things to avoid. We list a number of common errors and discuss ways of tracking down and correcting faults in programs.

Finally, chapter 10 contains a comprehensive survey of the current state of CALT. It includes a discussion of a number of issues which have provoked controversy among language teachers concerned with CALT, and an outline of recent developments, and it comments on possible future applications of computing techniques in the classroom.

In using this book, the following points should be borne in mind.

1 Unless the book is being used for reference purposes, the order of presentation should be respected, as later units build on earlier units. Exceptions are the last two chapters which, in the main, contain information which does not presuppose a specialist background.

2 The division into chapters should not be regarded as constituting a scheme of work. It is for readers to decide what they can cope with in one session according to their purposes and the extent of their familiarity with the subject. On the whole the book is meant to be taken slowly, particularly by those with no computing experience.

3 Finally, it is essential for those who wish to master BASIC, as opposed to getting an overview of programming techniques, to try and work out for themselves the examples appended at various points, and to write programs of their own, incorporating the new techniques as they are encountered. To follow what is being said is one thing; to be able to apply it is another. With computer languages, as with natural languages, nothing can replace practice.

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1 Computers and language teaching

The idea of using computers for teaching purposes in subjects like modern languages arouses mixed feelings and meets with a variety of reactions. The fact that computers are used in the teaching of other subjects and are put to a great many applications in society makes one suspect that no field lies completely outside their scope and that they might indeed be of some use. To many the prospect of using computers is not without appeal; it is the kind of challenge which one feels drawn to respond to. At the same time the technology frightens us; we are afraid that it may come to dominate us, we have qualms about dehumanization in a subject which is concerned above all with human communication, and we may even be afraid of losing our jobs. It is also known that language teaching does not escape the waves of fashion; we remember the errors of the past, the theories and inventions which failed to come up to expectations. Is the use of computers in language teaching, as some critics say, "the language laboratory all over again"?

Such anxieties can be dispelled only by a proper acquaintance with the facts. To begin with, a computer is nothing more than a tool, an aid, to be used or not, as the teacher thinks fit. Indeed, one of the aims of this book is to provide the teacher with the necessary information to make such decisions rationally. The computer, like any other electrical or mechanical gadget, such as trench-digging machines or public-address systems, provides a means of amplifying, or extending the effectiveness of, our natural talents and capabilities. And like other such machines, without the human input and control they are useless. Used properly, however, they can be very effective indeed, enabling the individual to carry out tasks inconceivable by other means. Finally, computers are technologically different from language laboratories. Not only do they involve primarily the written language, they are much more versatile; their impact on language teaching and language learning is therefore likely to be very different. There is no reason to believe that history will necessarily repeat itself; everyone is aware of the mistakes which were made, and those

engaged in computer assisted language teaching are the first to stress that computers are not a universal panacea.[1]

This chapter looks in turn at computer assisted instruction in general, at the contribution which computers can make to language learning and language teaching, and at the decisions facing the language teacher who is interested in using computers. It ends with a section on computer systems, which sketches over what you need to know before making a start.

1.1 The computer as an educational aid

1.1.1 Advantages

Few teachers nowadays, at least in the Western world, rely solely on chalk and blackboard. Over the years more and more technical inventions have taken their place among the educational aids with which teachers surround themselves, so as to make their teaching more effective. What distinguishes the computer from other pieces of equipment, such as tape recorders and film projectors, and what forms in fact the basis of its claim to the title *educational aid* is its interactive capability:

> The unique property of the computer as a medium for education is its ability to interact with the student. Books and tape recordings can tell a student what the rules are and what the right solutions are, but they cannot analyze the specific mistake the student has made and react in a manner which leads him not only to correct his mistake, but also to understand the principles behind the correct solution.
>
> (Nelson *et al.* 1976)

The computer gives individual attention to the learner at the console and replies to him. Traditionally it acts as a tutor, assessing the learner's reply, recording it , pointing out mistakes, giving explanations. It guides the learner towards the correct answer, and generally adapts the material to his or her performance. This flexibility, which can include allowing the learner to choose between several modes of presentation, is something impossible to achieve with written handouts and worksheets; it would require huge "scrambled books" with pages and pages of mostly unnecessary explanations, together with an extremely complicated system of cross-references. Nor would the learner get the instant feedback so beneficial to the learning process which the computer provides. The computer thus

promotes the acquisition of knowledge, develops the learner's critical faculties, demands active participation, and encourages vigilance.[2]

Acting as a tutor, however, is only one of the computer's possible roles. The computer can be a partner for the learner to play educational games with, or, less glamorously, it can be a very efficient reference book. Or it can be used to generate examples, to illustrate certain operations, or to simulate conversation.

The computer has a number of advantages over normal classwork. It offers privacy, which relieves learners from the fear of being ridiculed for their mistakes by their classmates. It allows learners to work on their own, in their own time and, most importantly, at their own pace. This is valuable not only for those who, because they have been ill or because they are slow learners, have fallen behind and need to catch up with the rest of the class, but also for the better pupils who always finish early and need extra materials to stretch them. The computer is patient and will tirelessly go over the same points for as long as is necessary. Finally the computer is consistent, unbiased, and has no "off days".

The popularity of electronic games would seem to imply that the computer holds a kind of fascination for people, particularly the young. Whether this will last is open to question - there may well be a risk of overexposure - but so far the attraction remains strong and learners' reactions to computers in education appear to be generally very favourable.[3] Part of this fascination is undoubtedly due to the appeal of the visual effects afforded by modern microcomputer systems using TV display screens. This is particularly true of colour systems, but even on black and white screens some very exciting effects can be achieved. Many of these techniques can be adapted to language teaching applications: movement of words, syllables, or characters around the screen, and simple graphical illustration of key lexical items are two of the most obvious examples in an area likely to become of great importance. As a result of this unique combination of tutorial, interactive, and visual capabilities, computers frequently have a beneficial effect on learner motivation.

To teachers the computer offers the opportunity to make better use of their time and expertise. By taking over tedious mechanical tasks like the correcting and marking of simple exercises, it allows them to spend more time on preparation and on activities such as discussion, simulation, or project work. By providing a means of usefully occupying part of the class, it opens up the possibility of small group activities. Lastly, through its record-keeping facilities, it

gives teachers access to detailed information on their pupils' strengths, weaknesses, and progress, which not only helps them to assess individual learners, but also enables them to evaluate the materials and methods they have been using.

However, it would be wrong to see the computer simply as a tool for automating educational practices. It also represents both an opportunity and a tool for investigating the very practices which are being automated. This is in fact where its real significance lies. As has been pointed out, "the proper automation of a procedure entails a re-examination and, where necessary, the reformulation of that procedure" (Ellis 1974:63). For the teaching profession to ignore this and be content with mechanizing current practices would amount to misusing the computer. In the long run, the greatest advantage of the computer must be that it urges the teaching profession to analyse what goes on in the classroom and reassess the basic tenets of the educational process.

1.1.2 Limitations

Computers, however, clearly have their limitations. First, as implied by the previous section, they are not equally suited to all the activities that go on in the classroom. Not only do they operate mainly within the medium of the written language,[4] but they operate in a predetermined fashion and cannot cope with the unexpected. Although this does not mean that one needs to be able to forecast the learner's response in minute detail, it does put a premium on predictability, and more or less rules out any genuinely open-ended activity. It also makes the computer's contribution to a course heavily dependent on the quality of the program it is obeying and in particular on the program writer's ability to anticipate all contingencies.

There are other drawbacks: one cannot usually roll back or move on through a computerized lesson as easily as one turns the pages of a book; it is more tiring to read from a screen than from a printed text; and, for teachers who develop their own material, the time spent on programming and typing in the lessons can be quite lengthy.

1.1.3 Conclusion

The emergence of the computer on the educational scene is neither surprising nor to be feared. While the computer has unquestionably enormous potential as an educational aid, providing new learning opportunities, it is clear that in many respects it cannot compete with the teacher. Computer and teacher should not be seen as rivals, but as complements to each other. The partnership is bound to vary from

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