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In the course of my visits to the 1987 CALICO Symposium and the 1987 TESOL Convention, and of the seminar on CALL that I organised at the Hochschule St. Gallen, I collected the following impressions:

1. There is a rapid development under way in the area of hardware, such that it is ever more difficult to obtain a real overview of the situation on the market. The picture is further complicated by the failure to agree on standards in many areas where development is taking place quite rapidly, such as interactive video.
2. Software is, as one might expect, lagging a little behind the developments in hardware. This is not least because the latest hardware is expensive and, anyway, takes time to filter through to the average user. Meanwhile, much work is being done on producing both courseware and authoring systems that one could describe as traditional (re-inventing the wheel).
3. There is a concern among those who are most closely involved in CALL to avoid a similar situation arising to that which was created by the arrival on the scene of the language laboratory, namely:

    1. an over-emphasis on hardware to the detriment of a more extensive concern with software;
    2. inflated expectations about what the new technology could in fact do;
    3. a large number of «amateurs» producing courseware that was either unsuited to its purpose or just pedagogically unsound.

Hardware

The main developments lie in the area of *interactivity,* where systems are now available that will produce interaction involving audio or video. *Interactive audio (IAA)* is typified by the Instavox random access player/recorder, which uses a 13'' floppy disc as its storage medium and produces quite acceptable sound and fast access times. It can be interfaced to an IBM computer, but it has one drawback apart from its size, and that is its price of some $ 2000. In view of the progress being made in storing speech on computers' hard discs, it is unlikely that the Instavox

will become the standard means of providing such interactivity. *Interactive video (IAV)*, which is far from a new field is also on the edge of a considerable step forward with the advent of *CD-ROM* (compact disc read-only memory) and the beginning of a widening of interest in videodiscs. Both technologies are based on the same principle, namely the laser disc, but CD-ROM players are unfortunately not compatible with videodiscs, and *vice versa*. Both media are «read-only», i.e. it is not currently possible for the user to save his/her own data on them, though this will presumably change in the next few years, as WORM (write once, read many [times]) laser discs as replacements for magnetic discs are starting to become available. The only alternative to videodisc is videotape, which has the advantage of being cheap, permitting anyone to record on it and being playable in a cheap and standardised machine. On the debit side, there is the slowness of access caused by the serial nature of the tape medium, which makes random access impossible. Despite this drawback, tape has many users, even for interactive purposes, and is quite satisfactory provided one does not use long pieces of visual material (90 seconds' duration seems to enable quite fast accessing of any required section of the recording).

Interactivity on the audio front is currently available by a variety of means, including a serial system rather like that referred to above for IAV and using Tandberg's very fast and accurate cassette player, which can be interfaced with a computer, which can then control it. As I mentioned above, the ability of hard discs to store digitised sound is improving dramatically, so that they should soon become the standard means of providing IAA. There are various levels of quality of reproduction available, but the best is most impressive and wholly adequate for language teaching (LT) purposes (N.B. I do NOT subscribe to the view that second-grade sound reproduction is good enough if one «only» wants to reproduce speech – quite the opposite!). Software is readily available that enables the relatively easy creation of IAA exercices, e.g. the CALIS system produced by Duke University. Naturally things in the world of computers are never as straightforward as one might imagine, and one inevitably needs interfaces and extra boards that plug into the computer's free slots in order actually to perform the wonders that one can see demonstrated at congresses. Typical of these is the video overlay board (around $ 1800) that enables a tv monitor to produce both a video picture and text sent to it by a computer, or the «Dialogic» card required by the CARLIS IAA system.

We are also beginning to see the first applications to LT of a possibility that has been available on large computers for some time, namely *voice recognition*. This is still comparatively in its infancy, mainly because it

requires very large amounts of storage and computing power, not to mention considerable programming skill and knowledge of phonetics, phonology, grammar, syntax, etc. However, over short expanses of speech (2–3 seconds), current techniques are able to produce quite short reaction times and quite reliable recognition. This is of course only the prelude to talking computers, which, if it is to be really meaningful, will have, though, to be preceded by the improvement and speeding up of parsing programs. This alone can bring about the communication between learner and machine (based on spoken natural language input) that will extend vastly the power of the computer to teach languages – or rather of the programmer to enable the machine to teach them. The other element of verbal communication between people and computers – voice synthesis/reproduction – is of course also dependent on the knowledge and computing skills that parsing programs will one day incorporate, if it (voice synthesis/reproduction) is to become an adequate replica of natural language input for the language learner. That this will happen seems certain, it is only a question of how long it takes; in the meantime, we shall have to content ourselves with the already useful performance of digitised speech, as discussed above. It is probably correct to say that progress in all areas of computing takes place at a truly astounding speed, so there is no reason to assume that the kind of facilities that are required by machines if they are to conduct authentic natural language communication with people will not become available in the next ten years or so, since data storage media are becoming capable of storing ever larger volumes, and computing power for a given size of machine is constantly increasing.

Hardware layout is something that some attention is now being paid to, and views on this are changing. The Eurocentres are now experimenting with an interesting setup, where there are groups of three computers on a round table, with a partition between each computer and the next one so that students can work without being too disturbed by their neighbours. The tables are also revolvable, with the result that the computers can be passed from one group to the next without a lot of fuss and noise. Probably the standard layout for classrooms equipped with PCs is simply to put the machines where room can be found for them and they will cause the least disturbance, which is often round the walls of the classroom, whither students retire when they need to work on them. For those with the money and the desire, it is now possible to buy computer laboratories set up rather as language laboratories are, namely with a number of machines linked to a central console, from which the students work can be observed by the teacher on his monitor. I doubt the value of such a layout, but the link from the teacher's machine to students' ones might be useful (cf. networks).

This is not so different from the idea of a *network,* which is also an increasingly popular arrangement for computers in the classroom, as it enables communication between students via the network, thus producing – one hopes – authentic communication via the medium of the foreign language. This idea goes a stage further with the use of a modem and a telephone line to enable communication with other students in other schools and even in other lands. Such electronic exchanges of, say, letters with a class in a German school can be a very fruitful, enlightening and enjoyable experience for a group of English school children, whether they be learning German and therefore using it as the language for their letters to their friends in Germany or whether the communication takes place solely in English for the linguistic advancement of the German students and the information and edification of the English ones. The purchasing of a modem also enables the consultation of *databases* all over the world, which can also be an enriching experience as well as one which enables students to perform some task that they have been given by the teacher or that results from some project they are engaged in. Such activities are presumably among the most useful for the learner because he/she is not only increasingly his/her knowledge about something but is using the foreign language to do do, thus engaging in communicative activity of a kind that should bring in its train an increase of the student's knowledge of the foreign language. If this is carried out at Krashen's $i+1$ level, it should be maximally effective, assuming that Krashen's theories are correct.

Software

There is a bewildering variety of software now on offer, but it is probably true to say that a lot of it really only re-invents the wheel. This is not meant as a criticism, since it is clear that ever easier and better ways of preparing some of the by now well established types of CALL exercise will continually appear, and that this is to be welcomed. Furthermore, given the British love of the BBC microcomputer and the American love of the Apple, it has taken a long time for some of the most famous programs to appear in MS-DOS format, so that we are now being offered many new versions of well-known software not previously available on IBM and compatible machines. However, it is also the case that what is new is *per se* interesting, as it represents the direction in which things are going. The really new programs are not very numerous, a fact which is in part attributable to the fact that some publishers are not very keen to market very much be-

cause of the problem of pirating. One area where there has been a noticeable amount of production is that of *authoring languages* and systems. This is all the more understandable as IAV programming is complicated enough from the design point of view without the teacher having to master all of the commands that control the videodisc player from within the computer program. Examples of such software that were on display at CALICO and TESOL include Allen Communication's QUEST, Imsatt Corporation's IMSATT 2000, Video CALIS (an IAV cousin of the software mentioned above) and Interactive Technologies' CDS/GENESIS (though this is in a different price bracket from many of the other products). There are also new and relatively cheap templates now available in MS-DOS format for all kinds of text manipulation, including some more unusual exercises such as speed reading – this latter is possible with Innovative Courseware Design's Versatext – and QUEST, for example, can also be used for such humble purposes as traditional text-based exercises.

With the growing interest in *IAV,* there were a few examples on view of what can be done in this direction, though it is clear that the investment of time and resources constitutes a very discouraging barrier to most people. The famous Montevidisco was not shown, but samples of a program produced by Miami-Dade Community College for the teaching of Spanish were presented. Those who feel daunted by the production or use of such materials can try the humbler interactive simulations of the Granville type (produced by Cambridge University Press but unfortunately only available for the BBC computer as yet). It will probably be some time before much is available off-the-shelf in IAV because of the cost of the equipment and because there is as yet no single more or less universal standard for videodisc recording, though it is presumably only a question of time before one emerges. Once it does, one can presume that the cost of hardware and software will decline rapidly, thus creating the conditions for a rapid expansion of the supply of ready-to-use packages as well as authoring languages and systems with which to make one's own IAV exercises.

Another kind of software that is starting to make an appearance is *CD-ROM.* This is similar to a videodisc in its basic principle, namely the digital storage of data on a disc that is read by a laser beam. CD-ROM presents the advantage over magnetic storage of a much higher density, so that a single disc can hold 550 MB of data, a truly mind-boggling amount. Its disadvantage is that it is basically – as its name implies – not a medium that can be written on (at least at the moment), though the WORM disc mentioned above shows that the technology will very soon advance to the

point where it will be possible for the average mortal to record and re-record on a «CD-ROM» disc. The discs involved are of the same size as CD music discs, but unfortunately, they are not compatible with the CD players that are finding their way into many people's homes. Since they can contain so many bits of information, CD-ROM discs are admirably suited to the function that they seem to be acquiring already, namely that of databases that can be used as tools by whoever finds them useful. Here, the language teacher can find some products that are admirably adapted to his purposes, *inter alia* the CD-ROM version of the Grolier Encyclopedia and the Visual Dictionary CD-ROM produced by Facts on File, Inc. of New York City. These two almost inexhaustible sources of information can be a real boon in the language classroom, as they provide the raw materials for a multitude of exercises that can be so constructed as to involve real communication and meaningful activity, a situation that is supposed to produce the largest gain in linguistic knowledge in language learners. Such tools are moreover enjoyable to use, since they are interactive and thus optimise the output for a given input of time (there being in theory no fruitless searching around «just in case», as the interface between the user and the data is able to search for occurrences of a given word and to present them one after the other). Arguably, the use of such tools should also be a useful intellectual training, since it not only teaches the use of what must become a more widespread medium of information storage but also teaches how to make one's thoughts more precise, since the formulation of the question is all-important in determining what information the computer will produce. One great advantage of CD-ROM for publishers is that – at the moment at least – they cannot be copied, so that pirating can be ruled out for the time being; indeed, if publishers pursue a sensible pricing policy, they should be able so to reduce the temptation to pirate their wares that no-one will feel moved to do so.

Methods

Together with the changes and hesitancy in the domain of software, there is also movement in the way that people see CALL being used in the language teaching/learning process. The *tutorial* style of lesson, despite being considered by some as rather skinnerian and therefore of doubtful value, is felt by students to be a useful exercise – just as they still like the much maligned four-phase drill in the language laboratory. This will doubtless continue to be offered, as it is relatively easy for amateurs to program and finds a ready audience. However, with the increasing availability of cheap

and user-friendly templates that permit the easy construction of *text manipulation* and *multiple choice* exercises, these should become increasingly widespread as CALL. However, there is a growing school of thought that sees the most interesting use of the computer in LT in an *exploratory mode* rather than some magisterial function. This would mean, for the multiple choice type of exercise, that the student should be given access to all the messages that the teacher has put into the exercise in anticipation of a whole series of wrong answers: by reading all this information, it is argued, the student is able to explore the whole framework of the exercise and learn much more than if he/she never saw all those helpful titbits that the teacher put in to act as a help if needed – indeed, it is pointed out (quite pertinently, I feel) that much of the teacher's work is otherwise destined to remain unseen by the student, and the effort of compiling the whole infrastructure of the exercise is more or less wasted. This would mean, further, that the whole process of scoring, however motivating it might be for some, will probably have to be given up, since it would be best to let the student try out as many answers as he/she likes, to see what the computer thinks of them (exploring the knowledge that forms the basis of the exercise). If this is to be possible, then scoring becomes difficult, since we want the student to be able to change his/her answer as often as is necessary to fully explore what is on offer.

It has often been suggested that *simulations* offer an ideal opportunity to involve learners in communication without their realising it. Typically, a simulation of running a fast food stand at a fair is supposed to provoke extensive use of the foreign language as students discuss business strategy. There is now a growing awareness that the expected stimulus to communication in the foreign language is not necessarily given by the computer around which a group of students are sitting. There is a tendency for such groups to communicate by almost any means other than the foreign language, and such problems can only be overcome by the adoption of some strategy such as thorough preparation of the work before the students are let loose on the computer (see Glyn JONES' interesting article in *System* 14,2).

It seems, from reading about what is being done in LT institutions around the world, that language teachers are increasingly looking around themselves for programs that they can borrow from other subjects and use in their own classrooms, rather than using something produced specifically for CALL. Typical of these are *inter alia* the *adventure game* (e.g. Kingdom of the Lost River, used by Glyn JONES), the *word processor* (see Miriam SCHMOLNIK's article in *CALICO Journal* 5,1, Sept. 1987), the *concordancing program* (as championed by Tim JOHNS). They all have in common

that they do not set out to teach language as such, but, by involving the use and examination of language, they can in fact make a substantial contribution to a learner's ability to understand and handle the language that is being used. Here is the point where CALL, to a certain extent, fades into the landscape, working – at least on occasions – through tools that students naturally use for other purposes. It is through such activities that language learning can most easily become something that the student does as naturally as possible, which is surely the best way. Having said that, I doubt whether the other forms of CALL will disappear, but I see them being fruitfully complemented by the array of possibilities opened up by CD-ROM, by new methods, by increasing use of computers for a whole host of tasks in schools and outside them. The future will certainly be an exciting time for language teachers!

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