
Computer-Based Technology in Language Learning: Beyond the Walls of the Traditional Classroom

In the 1980's and beyond, discovering and creating optimal environments for foreign and second language learning is a question not only of language learning methodology but also of the relationship between methodology and computer-based technology. Although this article deals with the issue of computer-based technology as an agent of change, the primary focus is methodological rather than technological, that is, the emphasis is on *how to use* technology in language learning applications rather than on technology *per se*. In examining the issues of language learning methodology, the relationship of methodology and computer-based technology, and change in institutional learning environments, the authors highlight some of the Computer-Aided Language Learning (CALL) developments in Australia.

In early 1987, teachers at a high school in Brisbane, Australia, attended a seminar organized by the Queensland Department of Education. The seminar was designed to improve both teaching methodologies and language learning beyond discipline strategies in the classroom. In its approach, the presentation team advocated that teachers (in this case, the inservice team) should tell students (in this case, the teaching staff of the high school) not only *what* they should learn but also *how* they should go about it.

Although the model demonstrated by the in-

service team allowed for negotiation between teacher and students, such negotiation was limited and always referred back to the teacher and the fixed curriculum as ultimate authorities. The overriding premise of the seminar was obvious: A fairly rigid power-based control of the classroom is the effective means of developing optimum learning.

The proponents of the model demonstrated by the inservice team explicitly described it as a "top-down" model in which power flowed from the top (the all-powerful teacher) down to the bottom (the powerless students). That anyone in the late twentieth century should tout as ideal a program for classroom management and teaching that is rooted in such a "power-from-the-top" structure is disconcerting and disquieting.

An Alternative Methodology

In contrast, the methodology we propose attempts to create a learning habitat which may be described as having the following: boundaries which are constantly changed and re-defined according to students' motivation and assessed needs; teachers and curriculum that serve as important reference points rather than immutable totalitarian authorities; and students who move in a world of learning that goes beyond the traditional four walls, desks, and time constraints—a world richly-endowed with many resources, including technology, and sympha-

thetically supported by a cooperative learning pact among teachers, students, and the outside world.

Methodological Dimensions

Individual Differences. If learners are individuals in the fullest sense of the word, and if what is generally thought of as a "class" is unlikely to be the nice, homogeneous group that teachers imagine students to be, then feeding all of them the same, standard, packaged programs results in an approach to learning that can best be described as a "hit or miss" proposition.

The experiential differences of learners and the way in which these differences act as both perceptual and learning filters mean that we cannot expect learning to occur in lock-stepped synchrony for each and every learner. Learners come to the classroom with their own personal languages, cultural backgrounds, and histories with which to process the learning resources—information, materials, and techniques—offered. Such processing is inevitable. Consequently, despite the best efforts of teachers to assume a large degree of homogeneity in groups of learners, there will always be significant differences among the members of the group or class.

One of the dimensions of the proposed methodology is that it takes into account individual differences and, whenever possible, exploits the heterogeneity of the group.

Motivation. Given the recognition that learners are individuals, the importance of their needs and motivation has become a focus of study, especially in the so-called needs assessment surveys. It could be argued that such surveys should be thought of as motivation assessment since students are asked questions such as: "What would you like to be able to do? 1) Read newspaper headlines; 2) Read scientific books; 3) Understand news broadcasts; 4) Transact a purchase in a store."

Another dimension of the proposed methodology is that in it motivation is thought of as conscious or unconscious reasons for wanting to

learn a foreign or second language. And, while motivations are often diverse, in the proposed methodology, teachers try to determine common motivations of student groups and structure the learning environment both on commonality and diversity.

Needs. Learners, in addition to their motivations for studying a language, can also be thought of as having certain language learning needs—needs that are individual and spring from the interaction of each learner's self with the language tasks to be performed. If feedback from such interaction changes perception of needs, then motivations change as well.

If each self is eminently different, so are the needs of each self, and the differences among individuals in any one group may not only be significant but also variable in both quantity and quality. The presumption that standardized needs for sets of learners exist may be a dangerous one since such standardization is all too often based on what learners and teachers *say*, that is, on stated choices and motivations. What we say about ourselves and what we truly feel are often very different.

Perhaps, the most important dimension of the proposed methodology is that it provides an environment in which needs and motivation are elicited automatically.

Proposed Methodology Defined

Creating a language learning environment that takes into account individual differences, recognizes the commonality and diversity of motivation and needs, and elicits such motivation and needs automatically without dependence on what learners say is a complex, long-term objective.

The proposed methodology described in this article—and christened macrosimulation (Lian & Mestre, 1983; Lian & Mestre, 1985)—was first developed at the University of Queensland in its Department of French. Since then, it has been adopted and adapted by the Adult Migrant Education Services in Sydney (Heras & Regan, 1985), and is currently a part of the Royal So-

ciety of Arts Training Program for teachers of English As A Second Language (ESL).

Macrosimulation may be thought of and characterized in the following way.

It is an ongoing, extended simulation in which communication in the foreign or second language takes place, and events occur over real time. During the duration of the simulation, both linguistic and communicative events are covered. There is no pre-determined end to the simulation; theoretically, it can last indefinitely. In practice, at the University of Queensland, it lasts between 13 and 26 hours spread over 13 weeks.

The simulation is self-managed. The learners, not teachers, bear the responsibility for the development of the simulation which often begins by asking learners to create an imaginary environment for themselves, e.g., a French village. The characteristics of the environment are negotiated collectively.

Having established the environmental characteristics, students then select roles, personalities, etc., which they are asked to maintain for the duration of the simulation (or change and reappear in some other form). Since choices are never totally haphazard, role selection is in itself a way for students to begin their psychological involvement in the activities.

The roles chosen by students are often commensurate with their assessment of their communicative skills. Since one of the features of the system is constant reassessment based on success or failure feedback (and teacher observations), students soon learn to gauge and tailor their ambitions and estimations appropriately or have them tailored by other participants in the simulation.

Because the simulation is ongoing, a sense of common history develops. Actions are no longer discrete or arbitrary (e.g., the teacher saying, "Today, we shall pretend to be in a café."). Rather, actions are directed—as in real life—by the general thrust of activity in the simulated community and by the interaction among the participants. All language activity is purposeful; it is not undertaken because the teacher

or the book dictates; life obliges the participants to do whatever they do. Essentially, such a simulation forms a complex and highly dynamic system where every action affects—in some way—everyone and everything participating.

The simulation is not the only component of the course, but it is the place where students experiment, practice, and acquire foreign or second language competency. In order to achieve such competency, however, the macrosimulation requires an extensive support infrastructure which helps students examine their performances, seek help to perform appropriate tasks, meet and rehearse their parts—all with teacher assistance whenever required.

Macrosimulation and Technology

Students use macrosimulation for experimenting, practicing, and acquiring communication skills; to improve their performance, however, they must turn to the learning support infrastructure. Since their needs at any one time are largely unpredictable, they require a large array of support facilities to pinpoint the kinds of knowledge (as opposed to merely information) which allow them to reach their performance goals.

At the University of Queensland, about two-thirds of the students' time is spent in monitoring activities and preparing for various tasks. Both monitoring and preparation activities require specialized learning spaces—indispensable aspects of the support infrastructure.

One of the most pivotal aspects of the learning support infrastructure is a multi-dimensional and strong resource base. A methodology built around macrosimulation is greatly dependent upon a resource base that supports specialized learning spaces required by learners in macrosimulation.

For example, although students who need to discover how to reserve a hotel room in the target language country could ask the teacher or read a book, students who need to discover the specialized language of hunting or analytical chemistry may find neither teacher nor book of much help. A large resource base providing not

only data but also instances of usage of the language of hunting or analytical chemistry would be extremely useful.

Furthermore, imagine the advantage of being able to tap into an international audio-visual data base in order to contrast behavior patterns of various cultures. Students in macrosimulation may need insight into distinguishing between anger and concern as expressed in French sociolinguistic contexts; in turn, they may wish to contrast such patterns with English equivalents. Opportunities to observe—via computerized information retrieval systems—target language natives in true-to-life communicative interactions surely surpass most teachers' attempts to demonstrate the same thing.

Not only are the existing and emerging computer-based technologies essential in resource-based methodologies like macrosimulation, but they also are enabling developers to advance interactive learning through the exploitation of videodisc materials, the digitalization of written documents, and the development of very sophisticated information retrieval systems.

Call Developments in Australia

The kind of computer-based resources which have priority in methodologies like macrosimulation are currently in developmental stages in Queensland, particularly at the University of Queensland's French, German, and Philosophy Computer Assisted Learning (FGPCAL) Unit.

Videodisc. The production of videodisc in Australia at present is being addressed at both ends of the cost spectrum.

At the low end of the spectrum, various developers are investigating the use of low-cost, locally relevant, high density videodisc materials. Of particular interest is the development of listening comprehension skills. To this end, developers already have a prototype language learning videodisc containing materials in French video based on the work of Dr. Jacques Montredon (cf. Calbris, G. & Montredon, J., 1986) and an episode of a popular Australian soap opera, *A Country Practice*. This language learning videodisc is usable in conjunction with macrosimulation activities, as well as reinforce-

ment when students watch it on their TV at home. Additionally, one of the videodisc's sound tracks has been dedicated to audio only materials for use in a French listening comprehension program. To the authors' knowledge, this is the first interactive language learning videodisc produced in Australia. Funding for this project is provided by the Computer Assisted Learning Unit at the University of Queensland and by the Migrant Education Branch of the Queensland Department of Education.

A South Australian project (Peppard, 1986) which is funded jointly by the Australian Commonwealth Government and the South Australia State Government is designed to address the high-end of the videodisc cost spectrum. Its aim is to produce a Montevideo-like (Gale, 1983) branching videodisc targeted at Australian adult ESL learners.

Databases. A project soon to get underway is the development of a management system based on the functional-notional taxonomy (cf. van Ek, 1975; Coste, 1976; Munby, 1978). This is to be used for the classification of authentic resource materials. It aims to create a high resolution system capable of referring teachers and learners to specific sections of appropriate documents. For example, a question such as "Give me an example of two old friends greeting each other in the afternoon." might result in a response of "Look at page X of book Y." or "Look at and listen to videodisc Z from frame A to frame B."

A project already underway is digitizing large numbers of written documents. Because many of the documents are fragile and cannot withstand frequent handling, this project will convert them into compact, highly portable, easy-to-inspect, easy-to-modify, and easy-to-reproduce formats (through the use of laser-based technology). The result will be an extremely large database of materials ranging from postcards to administrative letters to newspapers. In a real sense, the documents will always be new and could be updated without difficulty.

Similarly, Queensland Migrant Education is establishing a resource database of ESL materi-

als available within Queensland. The database will be indexed according to author/title as well as language function and resource medium (book, cassette, computer software, etc.).

Computer hardware and software are being purchased, and funding for staff has been allocated for the establishment and operation of this ESL database. The facility will provide the inquirer the name, description, and location of any resource selected. This resource reference service will be available to all Migrant Education teaching and administrative staffs in the state. People will be able to access the database through several channels: modem, electronic mail, telephone, and the post.

A similar ESL Database is planned for the University of Queensland.

Andrew Lian is the recipient of a federal government research grant (ARGS) aimed at developing a natural language database suitable for the generation of authentic-like dialogues and for use as a sophisticated information retrieval system. The computational architecture is based on a series of linked micro expert systems to be managed in a multitude of ways in order to produce the desired results. The end product will be a system capable of answering requests ranging from a simple question like "How do I greet my boss?" to the generation of successive language events based on such broad scripts as "A day in the life of a young Parisian executive." (Joy & Lian, 1983; Lian, 1986).

Computer-Aided Learning System

Two members of the University of Queensland's FGPCAL Unit (Andrew Lian and Roderick Girle) are involved in the development of a general purpose, intelligent, computer-aided learning system called EXCALIBUR. Among other things, this system will involve a student-machine interface, a subject expert, a teacher expert, a student model, and tools for authoring and maintaining courseware. The project, under the direction of Dr. Thomas J. Richards of La Trobe University, has brought together researchers from five Australian tertiary institutions (La

Trobe University, Melbourne University, Macquarie University, University of Queensland, and Griffith University) (Richards, 1986; Girle, 1986).

None of the developments outlined could have emerged were it not for the fact that there already existed at the University of Queensland a computer-aided language learning unit, the FGPCAL. Since 1985, this unit has been providing resources to meet the learning requirements of students in the Departments of French, German, and Philosophy.

The FGPCAL Unit

The mainstay of offerings to students provided by the FGPCAL unit includes programs in the following areas: the development of listening comprehension skills based on authentic materials; reading comprehension programs; sound recognition; cloze testing; interactive fiction; spelling database support; drill and practice.

Currently, the system is running on the UNIX-based ALTOS supermicrocomputers. It supports 10 student terminals capable of generating foreign character sets. Six of the terminals are equipped with random-access cassette recorders.

In 1987, the first videodisc player is expected to come into routine use. Also expected in the same year will be the first IBM-compatible PCs running—initially—in terminal emulation mode made possible by a custom-designed emulator written by the CAL Unit. Furthermore, it is hoped that 1988 will see the introduction of high-end UNIX-based workstations such as the IBM RT-PC or Mac II together with the addition of appropriate software and hardware. This will allow the development of high-speed communications between machines at the University of Queensland and elsewhere, and it will provide endusers with an excellent interface for accessing information.

Given that the FGPCAL Unit is already connected to all the major international university computer networks, it is not impossible to imag-

ine that through the use of electronic mail facilities, there is great potential to communicate with people in France, Germany, and elsewhere, thus providing students with the opportunity for additional, purposeful language activity. Already, users enjoy the FGPCAL system's inter-student mail facility. Furthermore, the availability of electronic mail can provide a source of large amounts of materials of all kinds produced throughout the world, and high speed networks may, in time, provide access to large, international audio-visual and other types of databases. Currently, all student-related software has been developed locally; it is written in C programming language for enhanced portability between systems. Software is not restricted to lesson materials; most importantly, it also comprises user management/administration systems, including reservation systems for queuing students through the system smoothly. Thus, every effort is made to ensure that everyone is given a fair chance to use equipment of the appropriate kind. The administrative systems also keep detailed records of usage.

At present, use of the system is largely voluntary. Only three of the eight courses supported by the system require any form of compulsory use. In 1986, about 350 foreign language students were enrolled; about half of these were regular users of the system. Presently, approximately 202 lesson hours spread over 278 separate lessons are available. Nine authoring systems—mostly designed to perform fairly simple tasks—have been written, and two major administrative packages have been produced.

Methodology, Technology, Change

We, in foreign and second language learning, cannot change our traditional methodology—and create a learning habitat that responds to learner motivation and needs while simultaneously providing a world of learning rich in target language resources—without the cooperation and support of administrators in our institutions of learning. When it comes to resource-based methodologies like our proposed macrosimulation, many administrators may dis-

agree strongly with what to them amounts to catastrophic change: "Imagine the chaos that would result if students were left in charge of their own learning?" "What happens to the academic timetable?" "How can you possibly have a classroom without tables or chairs bolted to the floor?"

The University of Queensland is no exception when it comes to responding to the kind of changes a methodology like macrosimulation would require. Language faculty and course designers are still a long way from accepting the need for change as well as implementing changes that the existing and emerging computer-based technologies make possible. There are, however, indications that such changes are not impossible; better yet, there is evidence that the availability of educational technology is spearheading some of those changes.

Compulsory CAL in French. As an example of change on a modest scale, two of the French Department's first-year (post-high school) complementary courses (FR131 and FR132) were transformed into listening comprehension development courses and transferred to the computer system (Lian, 1985; Cryle & Lian, 1985; Joy, Lian & Russell, 1983; Lian, 1984) in 1986.

Students enrolled in these courses were expected to do the required CAL work alone or in small groups. A teacher directed a regular workshop which was designed to assist students with linguistic and technical problems related to the courses or the CAL assignments. All communication with the supervising teacher was done in person or via electronic mail. In turn, the teacher communicated with students in the same way.

Observations about the 1986 version of FR132 were as follows:

- 1) The number of hours taken to complete the set tasks varied from under 9 hours to over 108; the mean number of hours was 40.3, while the expected average was 65;
- 2) Although the teacher always attended the weekly workshop, no student attended the

weekly workshop after the first two weeks of the course except when general meetings were called to negotiate assessment procedures.

3) Students used the system during the whole range of availability (usually from 9:00 A.M. to 11:00 P.M.);

4) All students passed, and there were no dropouts;

5) The students enrolled in the course performed significantly better on listening tests than students not enrolled;

6) Although FR132 is designed as a stand-alone course, it is usually taken at the same time as one of two other first-year courses taught in the traditional way.

It is tempting to draw many inferences based on the above-mentioned observations. Although FR131 and FR132 are a long way from being full-blown macrosimulations, and we in the support infrastructure are a long way from realizing the technological potential made possible by the existing and emerging technologies, one thing seems clear: these courses are modest attempts at change, and they have enjoyed positive response.

Students have valued the flexibility with regard to scheduling; they have appreciated the control they have over the intensity of their efforts; and, they have enjoyed guaranteed availability of technological and human resources at their convenience.

All in all, the students in these two courses exercised far greater control about the "when", "who", "what", "why", and "how" of the course than ever before.

It has been said that customer satisfaction is a powerful agent for change. Since enrollment in the 1987 version of the course is up by 37% (from 30 to 41), and inquiries about enrollment and requests for CAL courses are also up, it appears that there is a growing interest in a changed methodology supported by computer-assisted technology.

Although in the great scheme of things, the changes in methodology in the French courses at the University of Queensland are seemingly

small and relatively insignificant, they may yet turn out to be critical.

Were it not for the fact that there existed at the University of Queensland a Computer-Aided Learning Unit, the FGPCAL, none of the current, ambitious projects throughout Australia would have emerged. The fact that major projects in interactive videodisc applications are being done is due largely to the impetus generated by FGPCAL; the fact that ambitious database retrieval systems are under development throughout Australia, especially for ESL instruction, is also largely due to the influence of the work done by FGPCAL.

In the case of French, the seemingly small changes made possible an easily available, low cost, responsive system that is based on respect for individual learners, their fundamental individualities, and their ability to make choices, albeit with guidance.

It appears that these small changes have helped learners become sensitive to the value of a resource-based methodology, albeit one whose potential has yet to be developed. In the long-term, this newly-developed sensitivity may be the force that will change the nature of the whole system as we currently know it.

Whether or not the nature of our foreign and second language learning methodology changes enough to realize its full potential remains to be seen. What is already obvious is that the existing and emerging computer-based technologies will permit us to change our methodologies in ways never dreamed of before.

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