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The Perfect Match? Information Technology and the Modern Language Curriculum

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The Perfect Match?
Information Technology and the Modern Language Curriculum

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In this lecture I will argue the following
- that Information Technology[1] (IT) is particularly suited to Language Learning;
- that the evolution of IT in Language Learning and Teaching is inexorable /irresistible/ irrevocable/ineluctable;
- that the pairing of IT and Language Learning will create virtual communities across the world, teaching and learning communities that will interact with each other, support each other and grow together across cultural boundaries.

And while at this point in time IT and Language Learning do not yet comprise *a perfect match*, they are fast becoming quite an adequate one.

I will trace a brief recent history of IT and Language Learning and Teaching, discuss the implications of some IT developments and look beyond current debate to what will become a new paradigm in education, that of *an Information Literacy*.

Practitioners diverge in the value they attach to IT in education.

Some believe that what is at stake is the historic paradigm of verbal dialogue between teacher and students, while others decry a need for new strategies focused on learning rather than teaching. The first reaction is clearly motivated by the fear that Technology will replace teachers, or more precisely the teacher-student relationship as we know it today.

This fear is not new in the history of human development. Plato's Phaedrus refers to a similar debate which predated his own era by thousands of years. Phaedrus presents us with the following paradox: in Egypt, one of the ancient gods, Theuth, who invented numbers and, most significant of all, letters, went and saw the King of Egypt and described his latter invention in these terms:

'This invention, O King, will make the Egyptians wiser and will improve their memories; for it is an elixir of wisdom and memory that I have discovered.' But the King saw the invention in a very different light and said: 'This invention will produce forgetfulness in the minds of those who learn to use it, because they will not practise their memory. Their trust in writing, produced by external characters,

which are not part of themselves, will discourage the use of their own memory within them... You offer your pupils the appearance of wisdom, not true wisdom, for they will read many things without instruction and will therefore seem to know many things, when they are for the most part ignorant, ... since they are not wise, but only appear to be wise.'

Like the King of Egypt some today think that technology signals the decline of learning as we have come to know it. It seems odd to note for instance that we, Academics who spend so much time learning through our research, without the aid of lectures and tutorials, somehow feel that the *only* way everyone can learn is in the classroom. Our historic paradigm, and its material manifestation: the classroom and the library, have become so fundamental to our way of thinking that we cannot imagine any other structure for learning. We think of libraries as physical repositories, and we have built our educational institutions around them. Information Technology is introducing fundamental changes; our historic teaching and learning paradigms, localised and centralised, will have to be revisited. As learning becomes lifelong learning, as the concept of learning has evolved to integrate not only the mastery of a body of knowledge but also the ability to construct knowledge, Information Technology gives us, language teachers and learners, the tools of addressing both the structural basis of language as well as its creativity, its resourcefulness. We have to find ways to use the new technology beyond the classroom, beyond the teacher-student dialectics, beyond structural organisation. We have made this transition in the way we conduct research. We have married the old and the new in the way we look for information, in the way we retrieve information, in the way we publish our research.

When we examine the technological developments and the evolution of methodologies in language teaching, interestingly enough, there seem to be a clear correspondence between the two. Distinct phases of Computer-assisted Language Learning (CALL) development can be observed, parallel to advances of technology (Barson & Debski, 1996). Language learning theories have evolved from an objectivist to a constructivist view of learning at the same time as technology has moved from computing tools to communication tools. But unlike technology, each advancement of which superseded the previous phase, new language learning theories and methodological approaches did not push aside the method of instruction of the previous stage. Rather the new added to the old, providing language teachers and learners with varied tools and methods, and the discipline in general with much needed eclecticism.

Early instructional software, during the 1950s and 1960s, which ran on mainframe computers, tended to be drill-and-practice material and supplied learners with elementary question-and-answer exercises. This approach

was commonly referred to as Computer-assisted Instruction (CAI). With the advent of the Personal Computer (late 1970s and early 1980s), teaching software slowly became more sophisticated, however still based on CAI exercises because of low memory and low disk capacity. In the mid-1980s, dramatic increases in memory, disk capacity, speed, and experience led to a truly new generation of instructional software. That is, machines began to conform to people, rather than the reverse.

Computer as a tutor

However the tutorial and drill and practice courseware remained based on the model of the computer as tutor (Taylor, 1980), the computer being a vehicle for presenting programmed instruction. Computer technology was accepted as a versatile platform for delivering individualised tutoring, taking care of the repetitive and time-consuming tasks and assessing student knowledge.

From the late 70s the behaviourist approach was undermined by the notion that the explicit description and mechanical acquisition of language forms did not teach language and was too removed from authentic communication to be effective *on its own* in language learning. 'Communicative' CALL (Underwood, 1984) was developed alongside the communicative methodology used in the language classroom. The use of the target language exclusively, implicit rather than explicit grammar, the generation of original utterances rather than the manipulation of prefabricated language, the tolerance for student 'errors' provided the new language teaching approach, and led in the area of CALL to new activities, such as text reconstruction programs or language games which claim to bring motivation to the learners and some degree of interactivity, wether it is between learner and computer or learner and learner (Stevens, 1989). In these programs, however, like the explicitly behaviouristic programs, the computer is still in possession of the right answer (Taylor & Perez, 1989), it is still the teacher, the instructor.

Computer as a tool

Communicative CALL, however, also uses the computer as a tool, a workhorse (Taylor & Perez, 1989; Brierley & Kemble, 1991) with which learners produce language or reflect on the use of language. The programs do not necessarily provide language materials for learning but they stimulate students' discussion, writing or reflection upon the language. In this category we find word processors, desktop publishing programs, grammar checkers, or concordancers. The computer is then part of students' groupwork, which represents a major step from its role as a tutor. However, by the end of the 1980s, it was felt that the computer was still being used as an add-on to classroom methodology and was not being coherently integrated within the language curriculum. According to Kenning & Kenning, the computer

found 'itself making a greater contribution to marginal rather than to central elements' of the language teaching process (Kenning & Kenning, 1990, p. 90). The various aspects of the language learning process were not being integrated and no model of integration had been put forward.

One technological advance which is helping integrate CALL into the language curriculum is Multimedia.

Multimedia CALL

With multimedia, text, graphics, sound, animation, and video can be accessed on a single machine and can create a more authentic language learning environment since visual, textual, and auditory information are combined like in the real world. Even better than in the real world the different forms of information are linked together and allow learners to follow their own path of discovery within the hypermedia environment. The four macro-skills—listening, reading, writing, and speaking—can be easily integrated within activities carefully designed as tasks that the students have to execute. Hypermedia allows the focus of the activity to be placed at different levels at once, on the task itself, on language forms or cultural information if needed. Students will choose to go and consult grammatical explanations, lexis or advice on how to tackle the task whenever it is relevant for them to do so. They not only go at their own pace, they also choose their individual path. This is why some have called these types of hypermedia programs 'integrative CALL'.

Yet all these apparent advantages for language learning have not produced a major impact on language teaching and learning, and this for different reasons.

First, the state of the current technology is not advanced enough for programs to be truly interactive. Computers do not understand students' spoken input and are not intelligent enough to assess the appropriateness as well as the accuracy of the students' written or spoken production. Adaptive technology, such as computer-adaptive testing, attempts to evaluate the student's weak and strong points, and guide the learner among a range of options relevant to his or her needs, but it is still very unsophisticated. We are still well short of what Underwood has coined Intelligent CALL or ICALL (Underwood, 1989).

Secondly, there has been a problem of quality of language learning programs. Either programs are developed by teachers, and very often lack the necessary technological sophistication, or programs are developed by commercial developers who often base their investment on commercial precepts rather than sound pedagogical principles.

Thirdly, the use of commercially available language products is often extremely difficult to integrate into a course curriculum because commercial programs are usually not editable. It is a case of 'take it or leave it'. The

vocabulary, the level of grammatical difficulty, the cultural orientation chosen in a program will not suit all student populations and all learning contexts. Research has shown that the effectiveness of a CALL program in language learning depends closely on the degree of integration of the program within the curriculum (Dunkel, 1991). The concept of *authoring shell* may be a possible answer to this problem. Shells are small programs usually providing a very targeted functionality, for example, a listening comprehension activity, but allow teachers to enter their own teaching materials. The language materials because they are selected by the teachers themselves have a lot more chance of being tailored to the students' level of ability and interest. There have been quite a number of efforts from University language departments to develop language shells for use with their own students, but to envisage a wide application of such programs across institutions would require the allocation of training and development time to teachers willing to use the shells in their classes.

Internet and Computer Mediated Communication

Another potential way of achieving this integration is offered to us by the expansion of the use of the Internet, and the resulting computer mediated communication (CMC). Computer mediated communication has the potential of revolutionising language teaching and learning. Stand-alone computers cannot achieve meaningful communication, networked computers can, thanks to the people sitting in front of them. The Internet puts in touch learners and teachers of the same language across the world, one-to-one communication, or one-to-many; it allows direct contact with speakers of the target language. Text-based messages can be shared, but also images, sounds, and video. Authentic, ever-changing, up-to-date documents can be accessed at any time from anywhere in the world.

Because it allows access to real, non-pedagogical information from the target language and culture, and real communication with speakers or learners of the target language, Cyberspace will become the biggest resource in language teaching and learning. New curricula, new methodologies, new techniques will have to be established in order to harness this ever growing resource. We will come back to this issue, let's now investigate the information and communication potential of the Internet.

The Internet is a network of networks. The Internet was created by the US Defence Department in the middle of the cold war to provide data and communications services in case of a nuclear war. You can take out any part of the Internet and the rest will continue to work. If you shut off all of the connections over the Atlantic Ocean the data would automatically re-route itself around the globe to get from the US to Europe. This lack of any physical centre is mirrored by a lack of any administrative centre. Every individual and organisation that connects to the Internet has complete

control of their network and their computers. No one is in charge of the Internet. It is Anarchy in its true sense. It is the first global community.

The primary use of the Net today is still to provide access to information. For language learners, this information is 'authentic', that is to say that it has not been created for teaching purposes, is mostly up-to-date and creates the feeling of going there, going to the source, the foreign country, the target language speakers. The Internet is not like a library. Although you can look up information on the Internet it is important to remember that it is not anyone's job to put the information there. Even the indexes and search tools that people use to find information suffer from the lack of rules about indexing and organising information, hence the new research methods that our students, and indeed ourselves, will have to develop.

Nowadays there are three major ways of accessing information over the Internet:

- Telnet, which allows people to log into other peoples' computers and consult information on their hard disc, such as library catalogues;
- FTP (File Transfer Protocol), which allows people to move files from one computer to another;
- the World Wide Web (WWW), which is the newest protocol for organising information on the Internet. It is based upon the hypertext model which represents information three dimensionally. Pages of information are linked to each other through buttons. These buttons can link anything to anything, which is why it is called a web. Current WWW browsers have now integrated Gopher, FTP, and Telnet and now gives its users direct access to almost every aspect of sharing information on the Internet without having to use other protocols. The home pages can have text, graphics, sound, or video on them, but the Web's multi-media functions are currently limited by the speed of the Internet which is just barely capable of handling these types of data, even though with the advent of new software, such as Java, this problem will progressively recede.

Another feature of the WWW is its interactivity. A world wide web page can be formatted as a form into which the user enters information which is sent back to the author. It is common to use forms to search for keywords or locations of information on the Internet. Forms have been used to generate generally poorly designed, behaviourist language tests on the Web. Another way for students to take advantage of potential interactivity is to publish their own home page and link it to existing pages.

Computer mediated communication (CMC) is the expanding function of the Internet. Computers, modems and communication networks provide the technological infrastructure of CMC.

> Computer-mediated communication is the set of possibilities which exist when computers and telecommunications networks are used as tools in the communications process: to compose, store, deliver and process communication.

(Mason, 1990, p. 22)

Computer mediated communication can happen in the classroom on a Local Area Network and at the University of Sydney we are using the local network within the classroom to get students to resolve problems or execute tasks by communicating to either a designated partner, a group of students, or the whole class. But CMC brings to language learning a lot more than that, and allows interpersonal dynamics and activities that the classroom cannot offer. These activities happen either in delayed time, as in computer conferencing (CC) which is a form of delayed-time text-based messaging, or in real time, as in audioconferencing (AC) or video conferencing.

A very interesting example of the use of *video-conferencing* in language learning is the HIPERNET[2] Project. The HIPERNET project has developed an integrated networked multimedia system for distributed language learning by remote users across the city of Cambridge. The project is based on the assumption that collaborative task-based learning is an appropriate paradigm for foreign language teaching. The role of the HIPERNET system is to facilitate collaborative learning by providing appropriately structured multimedia course materials, and by allowing videoconferencing between pairs of students, and between student and adviser. Thus the specification of the system means that learners need access to multimedia resources and to each other over the network. This project is an excellent example of the integrative and structured use of both traditional and interactive media, and shows how interactive media can be organised to create collaboration between learners outside the classroom.

Apart from video conferencing, CMC covers a range of different facilities:

- Electronic mail is the most common. It allows messages to be sent to electronic letterboxes for named individuals. Within the email technology, there are a few other facilities such as computer conferencing, list serves, or newsgroups, which represent different ways of sharing text-based messages. Email technology is being used in projects, such as the writing projects, presented in a panel presentation in the 96 Computers and Writing Conference by J Adams, L Chapman King, and J Castner[3], which aimed at improving student writing by sharing students' writings over email and applying peer assessment. Email communication provides students with access to a wide range of writing abilities and greater flexibility to read and critique the texts. Students are exposed to a large diversity of

writing styles and strategies which they compare with their own, and through the critical analysis of their peers' writings, progressively learn how to avoid unsuccessful writing;

- Apart from mail-based facilities, Internet Relay Chat (IRC) provides another way to interact over the Internet, through simultaneous communication. IRC is a system where host computers all over the Internet create public 'channels', or virtual rooms where people gather and can talk simultaneously on the Internet. When a person types something, every other person in that channel sees what they typed. Any participant can create channels, or chat rooms, and they have the right to choose who is allowed in the channel and what the guests can do. IRC is very dynamic. A person can connect through one of the IRC hosts and create a channel, host a lively conversation between people from all over the world, then destroy the channel. The only shortcoming is that users cannot as yet use diacritics, which is a major problem for foreign languages. The number of people that can enter a channel is not limited. According to Hentschel, on an average evening, there are at least 20 000 users on 5 000 to 60 000 channels on both sides of the net;

- Another way to interact in real time with people over the Internet is through MUDs, MOOs and MUSEs. MUDs, originally Multi User Dungeons and Dragons, or nowadays Multi-User Dimension, are a way for people to come together in imaginary worlds. They are a multi-participant virtual reality and have a user interface which is entirely textual. These imaginary worlds have locations and items that can be manipulated by the participants. A more serious version of MUDs are called MOOs (Object-Oriented) and MUSEs (Multi-User Simulated Environments). These are virtual environments that are not for game playing. A recent experimental use of MOOs and MUSEs is as virtual classrooms. These classrooms support group conversations and can have blackboards with text which all of the participants can see. All interactions happen in the target language.

The French MOO is set in the streets of Paris and includes rooms where people meet. Visitors can look around and find out if there are other people in the room, and start a conversation with them. Everything is in French; and the MOO offers specific language learning activities.

- A Bulletin Boards System (BBS) provides its subscribers with both communication and database structures. A BBS is usually created over a common area of interest. Subscribers access the

BBS by modem or through the Internet. Within the BBS, they interact on topics chosen by a subscriber, every message is archived in folders which can subsequently be searched by new members. They also consult information published by the administrator of the BBS or any subscriber with publishing privileges. Unlike MOOs, BBSs are not an open environment, and they are a good example of virtual communities.

The Arts Information technology Unit of this university has created a BBS[4] which aims at giving support to teachers using, or planning to use, Information Technology in their teaching. A current project involves the three NSW school systems, aiming at introducing secondary school teachers to IT, and provides a communication and support framework to teachers, IT experts, and educationalists.

Internet relay chats, MOOs and MUSEs, and Bulletin Boards are very promising when used with language learners. IRC is ephemeral but MOOs and BBSs create in fact virtual communities, ie. cultural aggregations which emerge when the same people communicate with each other over a period of time in cyberspace.

Concept of learning

What now constitutes learning? Is it mastery of a body of knowledge, critical thinking ability, communications skills, the ability to find needed information, the ability to interact with others? The objectivist behaviourist approach to learning which involves simplifying reality in component elements that have to be acquired in a linear fashion is no longer sustainable on its own. There is now a wider recognition that graduates need to have acquired skills, such as critical thinking and effective communication, along with abilities such as the ability to find relevant information or to work well with others. With computer mediated communication which challenges the concepts of when and where students learn, reality is the meaning a learner attaches to experience from inside themselves. What is important is the processing and interpretation of information. Learning is a change in an individual caused by experience (Mazur, 1990). The major weakness of traditional instruction is that it focuses on knowing 'what' rather than understanding 'why' and 'how' (Spiro et al., 1991). The learner interacts with the learning activities of any instructional technology to construct a mental representation of the specific domain and to make inferences based upon representation processing. The innovation of computer-based interactive media as a new kind of instructional vehicle tries to make learners active constructors of knowledge, rather than passive recipients of knowledge structured for them by others (Papert, 1990).

The new instructional media, multimedia/hypermedia, empower the symbol systems and mental processing capabilities of learners. However,

this does not mean learners are left to their own devices. A very frequent criticism of technology-based systems like Hypermedia is that, while it is supposedly giving users control over the learning process, it lacks feedback and guidance. A new approach, called 'Guided Discovery method' is trying to address this issue. On the one hand, too much teacher mediation results in removing self-discovery opportunities. On the other hand, too little teacher guidance and direction can leave learners without the means of discovery. A computer-based guided discovery learning context provides learners with sufficient background information, formative evaluation activities, and individualised assistance.

Despite the popularity of computer-assisted learning, there is little empirical research on discovery with interactive courseware (Litchfield & Mattson, 1989; Maor, 1991; Rivers & Vockell, 1987; Shute & Glaser, 1990). Past studies emphasised performance measures, not process measures. Only a few studies focused on guided discovery learning methods in computer-based environment. The need for research of this kind is important.

In language learning more and more attention is being given to the concept of negotiation. Negotiation is the interactive process by which language learners make sense of the target language. Research (Long and Porter, 1985; Pica and Doughty, 1985) has shown that interaction with non-native speakers contributes the most to the learning of another language. Learners render the target language comprehensible through meaningful and motivated interaction with fellow learners. This has major implications for computer mediated language learning. Although multimedia technology can represent language in a more richly contextualised and interactive format than other media, the technology cannot provide individual learners with practice in the active negotiation of meaning. In this light computer mediated communication and the creation of virtual communities of learners of the same language take all its significance. In the classroom care should be taken to add the communicative dimension to language learning with multimedia by pairing students at the computer and using open-ended programs.

There is a large body of research which links collaborative learning with the development of critical thinking. According to Johnson and Johnson (1986), there is persuasive evidence that cooperative teams achieve a higher level of thought and retain information longer than students who work quietly as individuals. The shared learning gives students an opportunity to engage in discussion, take responsibility for their own learning, and thus become critical thinkers (Totten, Sills, Digby, & Russ, 1991). Vygotsky (1978) also states that students perform at higher intellectual levels when asked to work in collaborative situations than when asked to work individually. Group diversity in terms of knowledge and experience contributes positively to the learning process. Computer mediated

communication can play a significant role in providing interactive partners to our language learners and group diversity.

The extensive use of CMC will require the development of new strategies by the learner. It has been suggested that the unique nature of the CMC environment presents new cognitive challenges which require an expansion of previous models of the cognitive processes involved in learning. Teachers should incorporate 'meta-cognitive learning strategies, ie. concurrent reflections about process, in order to collect feedback and legitimise learning anxieties' (Burge, 1994).

Implications on curriculum design

Computer mediated learning will lead to the re-examination of the traditional curriculum. Miller and Olson (1994, p. 137) suggest that successful integration of technology in schools occurs in the context of an 'awareness of the role of the teacher and the existing curriculum'.

The difficult task will be to make the transition from a teacher-centred environment to a learner-centred one, from a learning space delimited in time and place to the concept of anytime, anywhere lifelong learning. What really matters is how we use the technology. Distance learning has been called 'beamed education' because it often uses technology to 'beam' courses outside of the educational institution. The teacher-student relationship is basically the same, even though audio-cassettes and written correspondence have replaced face-to-face dialogue. There is very little student-student contact and collaborative learning. From the classic triangle Teacher-Student-Classroom, the last element has been removed, new technology has been introduced but is viewed as a replacement for the teacher in the same mentoring system. It is applying technology to traditional models whereas the use of interactive technologies requires the development of new instructional models which allow greater student independence in the learning process. Learning by doing will be emphasised, memorising will become less important. Learning how to learn, metacognition, will become the pivotal focus of curricula which will have to cater for learners with very different backgrounds and needs. Seymour Papert describes technological tools as 'objects to think with', not just to use.

Some have the vision of a learning infrastructure based on interactive, high performance technology producing immersive, real-world instructional environments that can smooth the school-to-work transition. An MIT initiative for Japanese Studies provide a very good example of such an infrastructure: JP NET[5], a global virtual community for Japanese language and culture specialists, is an attempt to provide an online infrastructure for an entire field, that of Japanese Language and Culture Education. It has established collaborative relationships between Japanese specialists to design textbook-independent materials for teaching Japanese. A large

textual and photographic database on Japanese culture is being created. A series of mailing lists have been established, for instance for secondary school teachers of Japanese around the world to communicate with each other. Lectures about Japanese Language and Culture are given by experts, anyone participating in JP Net can sign up.

The necessary re-examination of the language curriculum and the traditional teacher-student relationship does not mean that the current learning and teaching paradigm will cease to exist. As I mentioned in my introduction, unlike technology, education needs eclecticism and is very good at mixing the new with the old. Language learning especially can make use of a combination of technologies and provide choice for students with different learning styles, learning strategies and learning backgrounds. However, sound instructional theories and methodologies will need to be outlined if the integration of technology in language learning and the globalisation of language education are to take place successfully.

Conclusion

Information Technology is transforming the production, distribution, and consumption of knowledge. The implementation of IT in education raises the question, not of computer literacy for teacher and students, but of *information literacy*, that is, something broader, something that enables individuals not only to use information and information technology effectively and adapt to their constant changes, but also to think critically about the entire information enterprise and information society. Shapiro suggests that

> information literacy should be conceived as a new liberal art that extends from knowing how to use computers and access information to critical reflection on the nature of information itself, its infrastructure, its social, cultural and philosophical context and impact—as essential to the mental framework of the educated information-age citizen as the trivium of basic liberal arts (grammar, logic and rhetoric) was to the educated person in medieval society (1996, p. 6)

Computer-mediated communication is now a new interdisciplinary field with theories from rhetoric, psychology, management and gender studies. Cyberspace is being studied as a rhetorical and social place where communication, identity, and community are all mediated by the speed and anonymity of online communication. Although television and radio have had a significant impact on the rhetorical situations of human discourse, the interactive, simultaneous, global technologies of the Internet are being viewed as an even greater force, some say 'revolution', in how we communicate with each other. Computer mediated communication is different from traditional communication in many regards. In rhetorical studies, for example, communication is traditionally evaluated first by deciding if it is spoken or written. Yet CMC blurs the boundaries between oral and written discourse.

The current struggle of the computing humanist to incorporate computers into humanistic research will give way to the post-humanist struggle to incorporate traditional humanistic research into computer-mediated culture. Eventually Information Technology will become transparent. There will be an age where no-one talks anymore about hardware and software, when protocol problems have been solved and when the new issues are the ancient issues: semantic, rhetorical, and philosophical.

Endnotes

1. Information Technology, in this paper, will mainly refer to the computer and its networks. All the other technologies (video, satellite, telephone...) are integrated and will not be considered separately.
2. HIPERNET: <http://ncet.csv.warwick.ac.uk/WWW/temps/linguanet/cilt/search/149.html>.
3. Judy Adams, Lynnea Chapman King, Joanna Castner, 'Using Technology to Change the Face of Computer Mediated Instruction: Alternatives to Collaboration, Peer Groups, and the Essay as Sole Writing Product...' <http://english.ttu.edu/grad/Judy/CW96.html>.
4. The BBS is called HInT (Humanities and Information Technology).
5. JP NET: <http://www-japan.mit.edu/>.

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