The Computer in the College Classroom: Improving English Language Skills

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Introduction

Insofar as education, formal or otherwise, is integral to society, the development of educational principles, approaches, and tools has a history stretching back to the beginning of human civilization. This history has seen few truly significant revolutions, the most important until now having been the introduction of an effective system of book production in the 15th century. But with the advent of computers (and an accompanying pace of development that has been truly phenomenal), we have witnessed the dawning of a new age, an age of radically new methods providing for the searching, gathering, storage, retrieval, manipulation, and presentation of data. These, together with the computer's instant access to the most up-to-date information, its global multi-path communication capabilities, and its versatility with regard to operating in tandem with other machines (microphones, cameras, videos, etc.), have introduced entirely new ways of learning and, some would claim, even of thinking.[1] Consequently, as this paper will show, the use of the computer has become one of the single most important concepts in the field of education today. Finally, a brief word about the title: the word 'classroom' must not be taken too literally; indeed, as will become apparent, the notion may eventually become redundant. And although this paper is presented from the viewpoint of an English teacher, it should be remembered that the computer's applications are equally valid for the study of any foreign language.

Educational Rationale

The importance of the computer derives from its special properties as an educational tool. These properties involve, first of all, the efficiency, convenience, and comprehensiveness of the information-related activities outlined in the introduction.

In addition to these, we have the computer's multimedia capabilities, namely its ability to take individual forms of media (text, graphics, photographic images, video, animation, and sound) and combine them within a single program to produce an integrated format highly amenable to manipulation. The interactive role of the student that has followed automatically from the convergence in digital form of these various media is of particular significance, as will be seen later.

A third crucial feature is the non-linearity of the computer's capacity to handle information. With the introduction of the multimedia approach, restrictions on the physical ordering of material have finally been removed, and what was formerly presented to students as text has become presentable instead as hypertext. This means that the student does not have to be presented with material in a fixed order (such as happens with a printed book, for instance, or with a set of printed graphics, or a video clip on tape), but can instead be given the option of moving freely between one part of an integrated program and any other part of that same program, according to the student's own needs and desires.

From all these special properties, a number of consequences with important pedagogical implications have become clear. One such is motivation, the importance of which in the learning process has been extensively researched and is now widely accepted.[2] The versatility of the computer's capabilities and the comprehensiveness of the material that it provides access to can cater, as was suggested above, not only to the learner's needs but also to the learner's desires and interests. Taking for granted the natural link between interest and motivation, no one who has witnessed the level of absorption and total involvement created by a computer in a well-directed language class can doubt its motivational power.[3]

A second important consequence involves the notion of autonomy. This has been a central plank of a great deal of recent methodology, particularly at the post-secondary level. One example of this is the Open Learning approach, the learner-centred philosophy of which stresses not pedagogy but 'androgogy', whereby students are perceived as bringing to the learning process their own body of knowledge and experience, together with an individual personality, acquired and developed outside the formal process of learning. It acknowledges that a teacher can be just as effective -- sometimes more so -- in the role of guide and resource organizer as in that of omniscient guardian of knowledge.[4] This forms part of the wider circle of the communicative approach, where there has been a wholesale shift away from the traditionally passive role of the student to a much more active one. Specifically what kind of active role is taken by the student using the computer as a medium for instruction will become clear in the various user-oriented paradigms presented later. In the meantime, study after study has shown that students who take responsibility for what they learn improve more rapidly than those in the traditional student role.[5]

One further important consequence of the special properties of the computer involves its reach. By virtue of its connectivity with counterparts around the world, and as a result of the most recent advances in telecommunications, it is now possible for students to reach out to other students around the world more or less at the touch of a button, and increasingly so without undue concern about economic considerations. This globalization of the classroom has enabled and encouraged communication to a degree that has hitherto been impossible. With the current emphasis on communication as an essential in the teaching of language, the computer as a tool to enable such activity to take place at both the local and the global level is unprecedented in its potential.

Taxonomies of Role

Although the history of computer use in the field of education is still very young, several taxonomies of the role of the computer in the classroom have already been suggested. Some of the earliest distinguished computer uses according to the type of software being used. The use of the computer was perceived in structural terms as a provider of, for example, simulation, programmed learning, drill and practice, presentation and expansion, or artificial dialogue.

More recently, categorizations that address a different dimension have been suggested, viewing the computer in terms of its function as, for example, tutor, tool or tutee. In such an analysis, the computer as tutor is characterized by modes of instruction (presenting stimuli, providing guidance, eliciting and assessing performance, giving feedback, etc.), as tool by its ability to improve efficiency (word counting, doing statistical calculations, maintaining databases, etc.), and as tutee by its utility in promoting cognitive ability (by eliciting and improving the analytical and problem-solving skills of the student who is required to learn programming techniques).[6]

While both of these types of taxonomies offer useful insights into the role of the computer in the classroom, they fail to clarify the all-important *user* element of the computer in education. Furthermore, where some recent analyses expound the usefulness of the computer qua tutee (as in Taylor-type analyses[7]), there is a failure (a) to take account of the latest software, which is making computer programming progressively simpler (and therefore less demanding in terms of the above-mentioned analytical and problem-solving skills), and (b) to recognize that the imposition of computer-language programming courses on students is likely to work as a de-motivating factor and hence have a negative effect on the learning process.

In view of the shortcomings, then, of such taxonomies, a new taxonomy is required that obviates the need to analyse types of software, or to view computers in a role isolated from the interrelationships between itself and the people who use them, and between the people themselves. In this paper, therefore, the role of the computer vis-à-vis its user(s) and the nature of the relationships that develop naturally from that role will be regarded as central. As far as education is

concerned, such an analysis produces six logical paradigms, encompassing all the single and double permutations of teacher and student: the Single Teacher Paradigm (T), the Teacher to Teacher Paradigm (TT), the Teacher to Student Paradigm (TS), the Student to Teacher Paradigm (ST), the Student to Student Paradigm (SS), and finally the Single Student Paradigm (S).

The New Taxonomy

(a) The Single Teacher Paradigm

Strictly speaking, the first of the six paradigms does not take place in the classroom. However, in view of the importance of preparation and class management in a teacher's life, and for the sake of completeness, it is included here. The single most useful aspect of the computer for many teachers lies in its superior word-processing capabilities. Class materials, examinations, and research materials can be produced with ease and efficiency. Fonts, styles, corrections, reordering, importation of graphics and so on are all accomplished with minimum effort. Add to this spreadsheeting (so often regarded by teachers as an application suited solely to business and industry), and the alphabetization of class lists or sets of vocabulary becomes instantly available. With databasing, information on individual students, class groups, grammatical patterns, language usage and so on are easily and comprehensively managed. And for purposes of individual research, the computer is invaluable: search engines built into CD-ROMs, for example, can now carry out research under the guidance of the user to accomplish tasks that have hitherto been utterly unthinkable by hand;[8] and instant access to vast libraries around the globe means that the teacher's research is aided by having available, quite literally, a world of information.

(b) The Teacher-to-Teacher Paradigm

The four main areas outlined in the T paradigm are essentially solitary activities using information sets devised or collected by the teacher alone. Furthermore, such activities (including item searches in manually compiled databases) are not new, and have traditionally been conducted as part of the normal workload of the teacher/researcher. The emphasis in the T paradigm, therefore, was rather on convenience and efficiency rather than anything qualitatively different from previous times. The TT paradigm, on the other hand, offers something that is a radical departure from what has hitherto been possible, viz. the linking of teachers into a global network. This is achieved through the much-heralded Internet, and offers three distinct areas of activity: the exchange of materials, interactive global-wide discussion, and the seeking of opportunities for collaborative work.

With an ever-increasing number of educators and education-related concerns connecting to the Internet, the amount of teaching materials available -- ideas, approaches, lesson plans, etc -- grows daily.[9] There are now numerous sites where fascinating, up-to-date, as yet unpublished material sits waiting for adoption by teachers around the world.[10] Other sites offer opportunities to consult with colleagues anywhere in the world, discussing problems and solutions of mutual interest, or conferring in general on any topic relevant to education. And since the Internet links people around the world, teachers can now, in an unprecedented departure from previous practice, seek out like-minded colleagues for collaborative projects with their classes, regardless of where the individual classes are based.

(c) The Teacher-to-Student & Student-to-Teacher Paradigms

Although the TS and ST paradigms are logically distinct, they will be treated together because, although each may be regarded as unidirectional, the general pattern -- and certainly the

most useful one -- is to look at a two-way flow of communication. Thus, it will suit us equally well (and save space) to treat the two paradigms commutatively.

Together, they form one of the most exciting educational innovations made possible by the computer, for in their most obvious manifestation, distance learning, they have released both teacher and student from restrictions of space and time. This new concept of an 'omnidimensional cyberspace' means that teachers can now teach one or many, regardless of the individual student's choice of location and/or timing. This has already encouraged numerous effective distance learning programs to spring up. Of course, the idea of distance learning is not itself a new one, as witnessed by the long history of correspondence courses. But, unlike traditional correspondence courses, the new distance learning programs can operate either at a very brisk pace or at a very leisurely pace (or, indeed, at any pace in between, depending entirely on the wishes of those involved). They can also gather participants world-wide for synchronous study.

Let us consider, by way of illustration, the case of Australia, with its vast distances separating teachers and students. Until the advent of the computer, the radio was the principal means of uniting classes that were unable to come together physically. This proved helpful, of course, but provided no more than an audio channel for the participants. Now, with the computer's networking and video-conferencing capabilities, it is possible for the classes to operate in a much more interactive way, not only listening to the teacher and other members of the class, but actually seeing them on a real-time basis, allowing for a much more psychologically satisfying and educationally productive modus operandi. Furthermore, many such classes have now expanded beyond the shores of Australia itself, with students linking up with teachers and fellow students in other parts of the world in order to work together on collaborative projects. And, of course, the transfer of written work is carried out far more effectively -- gone is the need to rely on the once-a-week delivery of mail to the outback. This is an example of computer use at the precollege level (an approach adopted in the case of Australia in response to a physical need), but there is no reason why exactly the same approach should not be adopted by choice at the college level anywhere in the world.

Along such lines, a new system is being developed in Waseda University that will create a 'cyber-learning-space' where students in every faculty can take certain language lessons either synchronously or asynchronously.[11] The psychological bonus, it is hoped, will be students who are more willing to participate, who are communicating more naturally, and who are doing so more frequently. In practical terms, the system will cater better to students who have been absent, will aid in the distribution of materials, and will assist in the timely dissemination of information (such as sudden cancellation of traditional classroom-based lessons).

A different but equally significant argument that occurs within this paradigm is the value of the computer as a heuristic device. A good example of this is the task that teachers (for instance, language teachers) can set students to allow them to discover for themselves the patterns of usage in a target language. Such areas have traditionally been taught by simply stating facts, which are then passively absorbed by the student, often with little effect, at least initially. On the other hand, allowing students to discover for themselves such patterns (through, say, the collocational properties of certain words as evidenced in a large body of machine-readable text) is likely to have a far greater psychological impact. The parallel here to the use of the computer in individual research, as mentioned above, in the discussion of the T paradigm, is clear.

(d) The Student-to-Student Paradigm

Traditionally, little emphasis was put on student-to-student interaction, and even where it was in evidence, such as in many of the more recent communicative-based approaches, it was often in the form of artificially contrived pair-work interactions. The computer, and more particularly e-mail, changes all that.

In the first place, e-mail used as part of a writing course is a perfect vehicle for real, natural

communication. It does not concern itself with contrived or artificial texts; neither does it rely on a static textbook, several years old, which speaks only indirectly to the students. A course based on e-mail exchanges can be done speedily and efficiently, with liveliness, spontaneity, and an element of unpredictability that can help enormously in preventing a course from becoming stale. And, once again, we find an important element of autonomy that empowers the student and adds to the sense of achievement gained from completing the course.

How does it work in practice? There is no set format. The full potential and versatility of an e-mail system is there for the innovative teacher to tap, limited only by his or her imagination. Perhaps the simplest example is the notion of merely getting students of English to exchange electronic mail with students in a wide variety of other classes/environments/countries (and perhaps with native speakers of the language working on cross-cultural projects and interested in finding out about, say, Japan).[12] This has the advantage of allowing students to work at their own pace (more quickly and efficiently than was formerly possible using exchange of correspondence with traditional mailing systems) in a realistic environment of genuine communication exchange.[13] The system can also be adapted for use in classes where the activity expands beyond that of writing alone. The methodological rationale given for one such project involved the combination of 'the benefits of normal conversation negotiation (emphasis on communication and negotiation of meaning) and freewriting (low anxiety filter: emphasis on communication rather than accuracy), plus the exploitation of culture gap.'[14]

Yet other projects can focus on higher-order skills that involve analysis and evaluation. A teacher in New York developed a writing project that involved student-authored biographies developed from interviews conducted by students with people picked at random on the street. These and similarly developed biographies created by students and teachers in other parts of the country were collated and posted together to create an informal 'Profile of America'.[15] Peer editing and collaborative composition have also proved efficient and stimulating ways of using the computer in the college classroom to teach writing skills.

How effective are such methods? There is convincing evidence that they can be very successful indeed. One study carried out to find the answer to such questions indicated that whereas in a traditional class discussion only 50% of the participants are likely to make a contribution to the discussion, the figure rises, in an electronic class discussion, to 100%. In a similarly positive light, when the question of teacher input versus student input was addressed (i.e. taking turns in contributing to the discussion), the former environment offered an average ratio of 85:15 while the latter, the electronic environment, saw a dramatic reversal to a ratio of 35:65.[16] With students becoming so much more active in the electronic environment, the advantages of employing the computer in the college classroom are very evident indeed.

(e) The Single Student Paradigm

With the S paradigm, we once again find one where the computer has created a situation that dramatically expands the student's horizons. The traditional form of self-study has essentially been that of reading. With the computer in the S paradigm, however, the student not only has the advantages of superior information management that were mentioned earlier, but also software that can permit self-checking -- most word processors today come with inbuilt spelling, grammar and style checkers that are not only time-saving but actually have didactic potential.[17] There is also an endless variety of instantly accessible, often interactive, material available to the student working on his own. This may come in the form of CD-ROMs,[18] the availability of which is growing at a very rapid pace, or in the form of study on the Internet. Certain websites have been developed that offer round-the-clock access to all manner of language-related educational material, catering for all students from the elementary to the advanced.[19] Add to all this the psychological benefits of constant discovery of, and interaction with, real rather than artificially contrived language, and the benefits of working with a computer are, once again, quite striking.

Evaluational Criteria

What criteria should be used to judge computer-related language learning classes, material, and courses? First and foremost the work done with the computer must satisfy the needs of a language course in order to merit use. If the class is to be a language class, the instruction must remain focused on teaching *with* the computer rather than *about* the computer. There is a tendency in some language courses to spend too much time teaching the students elementary computer skills. Important though these may be, it is the primary function of the language teacher to teach language. Although it is reasonable to spend some time at the beginning of a course checking to see that the participants are reasonably familiar with computer operation, valuable class time must not be lost on trying to teach all the requisite skills from the beginning. Computer skills must be recognized as distinct from language skills, just as mathematical and artistic skills are. And they must be taught in different classes, just as mathematics and art are.

Another important point is to avoid treating the computer like a glorified book. The computer screen is not there simply to replace the printed page. Some of the early software merely reproduced the shape of a book on screen, with pages turned by clicking on the mouse. Such programs were little more than tiresome gimmicks that made so little use of the computer's true potential that their educational value was very limited indeed.

Other important evaluational criteria include the nature of the interface (whether it is sufficiently user-friendly), the level of invention and stratagem (the temptation to enliven material by making it game-like may, if overdone, lead to material that distracts the student from the intended educational focus), and the accuracy of what is being presented (although the quality of CD-ROMs, as measured in terms of accuracy, can certainly match that of books [both being produced in many cases by large, reliable publishing houses], it remains true that the explosion of information available on the Net has led to the appearance of a lot of poorly written material).[20]

Balancing the Euphoria

It should be clear from what has been said that the use of the computer can revolutionize the teaching of language in the college classroom. At the same time, we must bear in mind that despite the exponential growth of computer technology over the last few years, there are still many problems to overcome. For one thing, computers are still, generally speaking, large and heavy, which makes them cumbersome to carry round. Good computers are certainly still expensive, beyond the pocket of many students. Consequently, many at university do not yet possess a computer and are unfamiliar with its operation. A warning has already been sounded about the problems of setting up a language class with the intention of using the computer as a teaching medium, only to find that little is done in the way of language study because so much needs to be done to impart computer skills. And owing to limitations in current technology, use of the Internet may be hampered by the overloading of available lines, leading to irritation and disillusionment. Perhaps most seriously, computer users face the problem of mechanical malfunction. As with any mechanical product, no computer manufacturer can guarantee perfect functioning throughout the lifetime of the product. Glitches must be expected in the computer classroom. Books, on the other hand, do not break down.[21]

At the human level, we find problems of a different nature. In keypal exchanges, for example, there may be a discouraging lack of response after some initially enthusiastic exchanges. Some teachers worry about the untamed nature (as mentioned in the section on evaluational criteria) of material posted with great haste and in large quantities on websites, material which lacks the pedigree of that found in properly edited and printed textbooks. (It might be added here that others worry that the use of the computer in the classroom will eventually lead to the demise of

the teacher altogether. Such fear is misplaced. As has been pointed out many times, the computer is a medium in which various methods and approaches can be implemented.[22] The human element of this implementation will never cease to be important. The computer will never be able to replace the teacher. Rather, it allows the teacher to supplement whatever approach or material has been adopted.) Finally, while student autonomy has been lauded here as progressive and beneficial, it is possible for too much to lead to lack of direction, and purposelessness. Thus, there is always the need for the teacher's guiding hand. In the final analysis, the effectiveness of the computer in the college classroom does not rest in the medium itself -- only in the use to which it is put.

Conclusion

Many of the problems mentioned in the preceding section will find a solution in technology as progress is made. We can confidently expect computers to become much cheaper (allowing more and more people to own one), more compact (making them lighter and more portable), and more powerful (making them speedier). We can also look forward to advances in artificial intelligence (allowing the computer to adapt to the idiosyncrasies of its user), to advances in speech synthesis and voice recognition (allowing both the computer and its user to address each other vocally), and to better and better software in areas such as machine translation (which has certainly made great strides over the last decade but is still a far cry from the capabilities of the human translator).

From the various aspects of computer use that have been outlined in this paper, it should be clear that the computer has become not only a *useful* tool but an *indispensable* one for quality education. The emphasis here is on the word 'quality'. No one claims that education is no longer possible without a computer. But teachers have a duty to do the best that they can for their students. And whatever activities can be done in the classroom *without* a computer can almost always be done better *with* a computer. It is the ability of the computer to improve the quality of classroom activity that gives it its pre-eminence.

We have seen, among other things, how the computer facilitates information management; how it offers collaborative learning opportunities; how it offers telementoring, thereby abolishing restrictions of time and space; that it is highly adaptable to the needs of the individual; that it offers instant opportunities for real language communication; that it empowers students in an era when access to information is at a premium. And, yes, it is true: students do not fall asleep over a computer. With all these advantages, it is difficult to maintain any longer that the computer is anything but indispensable. And to those who still believe that the role of the computer in the college classroom is something for the future, let it be said: The future is already here.

Notes and References

(Caveat: In these Notes, there are several references to URLs on the World Wide Web. Although all were in use at the time of the presentation on which this paper is based, the fact that the web is in an ever-changing state of flux means that, since the presentation was given, some may have moved to a different location, while others may have ceased to exist altogether.)

(1) See Kulik, J. and Bangert-Drowns, R. 'Computer-Assisted Learning' in Entwistle, N. *Handbook of Educational Ideas and Practices*, London: Routledge (1990).

(2) See Ames, R.E. and Ames, C. (eds.) *Research on Motivation in Education* (Vols. 1 & 2), London: Academic Press (1984-5).

(3) I am not aware of any methodical study of the motivational effect of computer approaches

to language learning, but the anecdotal evidence is overwhelming. To give but one example: 'I suggest that an award should be given to the person who discovered the connection between e-mail and learning English. It's really like learning with lot of fun (sic).' (Taken May 25, 1997, from an internet posting by Jingmin Wu, China.)

(4) See Lewis, R. (ed.) *Open Learning Guides*, London: Council for Educational Technology (1984-6).

(5) For more on the importance of autonomy, see Boud, D. (ed.) *Developing Student Autonomy in Learning*, London: Kogan Page (1981).

(6) See Taylor, R.P. (ed.) *The Computer in the School: Tutor, Tool, Tutee*, New York: Teachers College, Columbia University (1980).

(7) Ibid.

(8) A simple illustration: one of my colleagues recently wondered aloud about how many adverbials there might be in English that derived from Latin and ended in the suffix -im (along the lines of *verbatim, literatim,* etc). The time consumed in a manual search of the O.E.D. for such information would be impossibly long. But a couple of minutes with the CD-ROM-based O.E.D. found nine such words.

(9) According to the Internet Society, the number of domains with an .edu extension (viz. sites that indicate an education-related website) grew in the twelve months following July 1994 from 850,243 to nearly one and a half million. For more information on statistics, visit <URL:http://www1.mids.org> or <URL:http://web66.coled.umn.edu/schools/stats/stats.html>.

(10) Visit, for example, <URL:http://www.teachnet.org> or <URL:http://ourworld.compuserve.com/homepages/English_Direct/service.html>.

(11) The system being developed is the CGI (Common Gateway Interface).

(12) As of 27 May, 1997, the Intercultural E-Mail Classroom Connections Website alone had subscribers from 49 different countries.
See <URL:http://www.stolaf.edu/network/iecc>.

(13) A recent keypal proposal found on an Internet education bulletin board ran as follows:
'I would like to suggest a way of correspondence between students like this. The teacher of the class collects short personal data (name, age, sex, major, interest) and e-mail addresses...If I hear from another teacher in another country -- which can really [be] anywhere, here in the Far East (Japan, Korea...), the Middle East (Arabic speaking countries), Europe or Latin America -- that he or she has a somewhat similar number of students also interested in correspondence, we the two teachers can exchange the lists and personal data of students. Then the teacher would give to each student in his or her class maybe 2-3 names and e-mail addresses taken from the list of the other class and would encourage...the students to start corresponding with these 2-3 students. The messages can be formal or informal, light or serious, academic or just entertainment. In any case, in such a real-life situation, they will surely improve their writing skill in English and widen their cultural horizon. Please, if interested, get in touch with me:
Colman Bernath, Department of English, Soochow University, Taipei, Taiwan
colber@mbm1.scu.edu.tw'

(14) From an e-mail exchange proposal by Robert Myles, Coordinator of English Courses, English and French Language Centre, McGill University

(15) Reported in Williams. B. *The World Wide Web for Teachers*, Foster City, IDG Books (1996), p.39

(16) Pratt & Sullivan (1994) (quoted from 'English Direct' on the Internet at <URL:http://ourworld.compuserve.com/homepages/English_Direct/service.html>)

(17) It is true that the lazy student can come to rely too much on such machine aids and never bother to learn correct spellings or grammatical patterns for himself, but this is not the fault of the computer. There always have been and always will be lazy students. The fact remains that the wise student can put language-checking software to intelligent use locating and learning from those areas (be they stylistic points or the spellings of words) which the computer indicates are incorrect.

(18) The educational publication 'English Network', for example (published on a monthly basis in Japan by ALC); the June 1997 issue was briefly reviewed in the JASEC presentation on which this paper is based. (Vid. inf., Note 20.)

(19) Visit, for example, the EF Englishtown website at <URL:http://www.englishtown.com> or, via the Internet TESL Journal at <URL:http://www.aitech.ac.jp/~iteslj/quizzes/sw.html>, sites where there are self-study quizzes, dictionary databases, culture-based exchange, webzines, chatlines, games, listening practice opportunities, song-based activities, and even a 'grammar safari'.

(20) With the current boom in the popularity of the computer and computer-related educational material, it is inevitable that the quality of the materials will show considerable variation. In the presentation on which this paper is based, three different kinds of material -- a textbook, a CD-ROM-based English educational magazine, and screen shots of a number of Internet websites -- were examined with regard to their strengths and weaknesses. The textbook (ostensibly about using the Internet to improve English language skills, particularly writing) was deemed poor in view of its monotonous presentation and, more damningly, because it could be used perfectly well without any recourse at all to the Internet, on which it was supposedly based. The CD-ROM-related magazine fared somewhat better. It provided both English and Japanese language versions on screen (with appropriate controls available such as volume and speed of utterance), was fairly intuitive in its use, made appropriate use of the computer as a randomizer, and enlivened the whole program with a suitable musical soundtrack. On the negative side, it was at times slow (which can lead to impatience on the part of the learner), some of the exercises were lacking in imagination, and it failed to offer any sort of incentive to succeed (beyond the basic reward of successfully completing an exercise). The best of the materials illustrated came from sites on the Net itself. The 'grammar safari', for example, allows students to search real language corpora, hunting for any of a vast array of lexical or syntactic data. Another site offered a multiple-user domain object-oriented site in which students could move around from room to room of a virtual university, taking on an assumed identity, and interacting with both people and objects.

(21) The difference between books and electronic documents (which often have no print equivalent) has given rise to a curious problem for scholars: How should Internet materials used in a research paper be cited? Various authorities have now begun to tackle the problem, but no consensus has yet been reached. The ISO (International Standards Organization) has issued what appear to be the most comprehensive guidelines, but there is still considerable debate concerning the relative importance of the various items that need to be considered: title, author, primary vs. subordinate responsibility, type of medium (online, CD-ROM, etc), place and date of (electronic) publication, date of update/revision, date of citation, availability and access location, etc. For more information, see the University of Alberta Libraries website, which has a page set up to deal specifically with the problem of electronic citation (<URL:http://www.library.ualberta.ca/library_html/help/pathfinders/style/stylecp.html>).

A similar problem relates to copyright issues. With the current plethora of material, there is a temptation for computer users to download huge quantities of text and feel at liberty to use it with scant consideration paid to the normal rules of copyright law. Some contend that the simple act of posting a work on the Net without an explicit statement of copyright protection should be perceived as a willingness to contribute the work to the public domain. Others argue just the opposite: any work should be regarded as copyrighted unless accompanied by a specific waiver of copyright. It would be reasonable to assume that the greater the potential commercial value of material -- material with obvious literary and/or artistic merit -- the more likely it would be to be granted protection by the courts. Factual information, on the other hand, and material gathered for purely educational purposes, might reasonably be expected to be given less protection. But very little action has yet been taken to test the legality of downloading freely. The safe route, of course, is always to assume copyright protection and seek permission through e-mail. A summary of research into this issue by the Intellectual Property Task Force of the Research Libraries Project, including a section on 'Universities as Users of Copyrighted Materials', is available at <URL:http://arl.cni.org/aau/IP1.html>.

(22) See, for example, Garrett, N. 'Technology in the service of language learning: Trends and issues', in *Modern Language Journal 75 (1)* (1991).

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