

Dealing with Computer-Related Anxiety in the Project-Oriented CALL Classroom

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ABSTRACT

While research in CALL has stressed the motivating power of technology, little attention has been paid to the demotivating potential of new technologies in the classroom. CALL classes which make extensive use of new technologies (e-mail, the Internet, HTML editors, news groups, scanners and image converters) can also give rise to anxiety and frustration among learners. This anxiety can serve as an affective factor that inhibits language acquisition in some learners. This was found to be the case in CALL classes that involved students in collaborative research projects in which they published their projects as websites on the Internet. This paper undertakes a qualitative analysis of a class of German students who participated in project-oriented CALL trials (PrOCALL) in an Australian university environment over three years. It recommends a ‘meta-level’ approach to reducing computer-related anxiety and frustration whereby the technological implements of the classroom become the focus of analysis and critical reflection, in group activities as well as in individual assignments. By historicizing technological innovations, a critical appreciation of the new communications media can be fostered as the students explore their benefits. Students’ misgivings are placed in perspective and their anxiety around unfamiliar technologies channelled back into the project in productive ways.

1. INTRODUCTION

In many ways, emerging communications technologies such as the Internet and e-mail would appear to be the answer to the frustrated teacher’s prayer for more relevant and stimulating language materials for the foreign language classroom. All too easily, however, new technologies can give rise to frustration and anxiety that can inhibit the process of language learning. CALL classes which rely heavily on the latest HTML editing and Internet technologies are particularly vulnerable. So are classes that involve students in collaborative research projects that use multiple computing tools (PrOCALL). In all of these types of classes the pervasive role of technology can

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produce anxiety or trepidation in learners. Anxiety around computers acts as an affective factor which negatively influences language acquisition. If students are to engage with new computing technologies in a major way, teachers need to develop strategies for establishing, nurturing and sustaining the students' relationship to technology (Murray, 1998, p.250). This paper discusses ways of reducing computer-related anxiety among foreign language students. Our findings are based on a qualitative study conducted over three years with a German ProCALL class. We argue that students' fears can be placed in perspective if students are encouraged to develop a healthy critique of the information technologies they are using. By designing 'meta-level' activities that reflect on technological innovations inside and outside the classroom, students' fears can be minimized and an appreciation of the benefits of new technologies fostered.

2. TECHNOLOGY IN THE PROJECT-ORIENTED CLASSROOM

2.1. A German ProCALL classroom

These observations are based on our experiences of conducting a project-oriented CALL class with tertiary students of German at the University of Melbourne. The class was trialled over three years (1997, 1998, 1999) with second-year students who had commenced university study with approximately five years of secondary German. The duration of the project was one 12-week university semester and each class was one hour in length. These classes constituted a third of the total language component for German students; in addition to this subject students also selected cultural, literature and linguistic options that made up a compulsory background subject. The project was initially introduced in 1997 as a five-week experiment towards the end of the semester. In all years there were approximately 50 students enrolled in the subject. The students were divided into three separate classes with class sizes ranging from 22 to 6 students.

The aim of the project was to engage students in collaborative group work in which they researched topics and then published the results in the form of group Web pages. The websites were written entirely in German and were approximately 1000–2000 words in length, depending on the number of students in each group. In addition to this one-hour class, students had tuition in reading and listening comprehension as well as more formal grammar and speaking practice. In previous years, they had been required to write two

longer pieces in German of 600 words in length. In all years the ProCALL project replaced the language essay component as an assessable item.

The project had a research and a written production component. Students were encouraged to use the Internet as a research tool as well as more traditional resources such as libraries. In the first year, some students preferred to use conventional print source material but by 1999 almost all made extensive use of the Internet, even those who confessed to finding limited resources on their chosen topic. Students presented the results of their project in the form of an HTML document that made use of text and images and a prescribed number of hyperlinks. The teachers posted all of the Web pages onto the university server following completion of the project at the end of each semester.

For the first two years a broad theme was chosen by the teachers which allowed students some freedom in choosing a sub-topic based on their interests and their findings on the WWW. In 1997 the theme was 'foreigners and xenophobia', and in 1998 'political parties and the political system in Germany' was chosen, to coincide with Federal elections in Germany in which a change of government was expected. In 1999 students were allowed to work on any aspect of German culture that interested them.

2.2. The use of technology

In the course of the semester students were exposed to several different, but relatively simple, computer applications such as Word 6, Netscape 4.0, Claris Homepage 2.0 and Adobe PhotoShop or updated versions thereof. In 1997 many students had never used the Internet as a research tool, but in 1998 there were considerably more who were familiar with surfing and conducting Web searches. The most challenging task for the teacher was of course the introduction of a WYSIWIG-HTML editor, which was new to virtually every student. Claris Homepage 2.0 was chosen because of its small size (requiring only 5 megabytes of RAM) and its ease of use, which was partly due to its limited functionality. In the last year of the trials a gif converter and scanning software were made available, and students were introduced in class to the basic functions of Adobe Photoshop. In the final year students were also instructed how to upload their projects at the end of the semester onto the university server using Fetch 3.0. The use of e-mail constituted an optional component of the course. Students were encouraged to e-mail their teachers as well as to contact individuals and institutions in German-speaking countries via their websites. Students could include printouts of these communications in their assessment portfolio. In 1997 students also participated in a news group

set up with German students at the University of Bochum, who were studying Australian cultural studies.

2.3. Factors affecting anxiety and ‘technophobia’

For many students, almost every aspect of the ProCALL class was new: the flexible curriculum, the decentring of the teacher (Debski, 1997, p.48), the freedom of choice and the extensive use of computing technology. A recurrent source of anxiety with some students was the relative degree of freedom that computer-oriented project work afforded them. This was compounded by the overwhelming wealth of information students found on offer on the Internet. Students often discovered that they had to sift through large amounts of texts in the foreign language, most of which turned out to be of little relevance to their topic. Factors such as these contributed at times to a sense of disorientation. Most students participating in the project were used to more conventional curricula, which are designed to minimize learner frustration by the careful sequencing of language topics. If used to a more structured curriculum or syllabus, students may not be immediately comfortable with a learner-centred approach that does not have a predefined curriculum.

In addition, they may not be aware of acquisition processes going on while ‘surfing’ the Internet, and find their usual strategies for learning vocabulary inappropriate when sifting through material on the Internet. Moreover, if students are unfamiliar with project-driven learning either at secondary school or tertiary level, the added burden of having to manage new technologies in addition to managing a group project proved a source of anxiety for some.

The most significant source of anxiety among students stemmed from the extensive use of unfamiliar technologies. In the classroom we discovered that there were a few learners who had little knowledge of and/or little interest in computers. There were also learners who were even hostile towards computers. A slightly larger group were those whose self-esteem in relation to operating a computer was low and who approached the semester with some trepidation for that reason. Finally, there were those who had reservations about acquiring seemingly complex HTML editing skills in the context of a foreign-language classroom.

Because the ProCALL class requires the learning of computing skills as a prerequisite or a non-negotiable adjunct to the process of language learning, the impression can arise among some students that the emphasis in the ProCALL class is not on language learning but on mastering technical skills. The time needed to explore the Internet and learn HTML editing protocols can be

perceived to be either time wasted or time that could have been more usefully employed on learning grammar or vocabulary in a more structured way. In particular, students who had low levels of computer literacy, or who self-assessed themselves as having poor to fair computing skills, felt at a disadvantage.

In interviews conducted after the completion of the project in 1998, one student, Anne, saw time spent on computing as distracting from valuable and limited time that she could have spent learning the language in a more formal setting. She commented:

It was really important to learn about the Internet and how to get pages and a lot of learning how to access the Internet, what you can do on it, what you can create but, in terms of language learning, you concentrated on, once you'd written the essay, there was very little language interaction because you were just with your computer and not talking . . . The reason I'm doing German is to learn German and not how to learn Claris Homepage which is what I found the emphasis kept falling back on which was natural because you had to go through it slowly to make sure everyone understood.

Mike is another instance of a student with low self-esteem in relation to computers who was dubious about the project from the start: 'Before I came into class this year my Internet and computer skills in general weren't that crash hot. I found computers really frustrating and I don't like them that much'.

Not all students with little prior experience with computers found the technical demands of the course onerous. Bella is an example of a middle-ground student for whom the benefits outweighed the drawbacks. She describes the classroom experience as follows:

At the start I was very negative and felt that I hated computers and that I wasn't studying German but then it did get better. It was a lot less stressful than other assignments.

Bella was helped by a partner who was far more computer literate than herself. As a result she did not perceive her lack of knowledge of computers to be an insurmountable obstacle in the course. It seemed in fact as if the presence of the computer served to alleviate her usual anxieties about learning the language.

2.4. Computer anxiety as an affective factor

It has long been acknowledged in second language acquisition theory that affective factors can adversely affect language learning, as can linguistic, cognitive and socio-cultural variables (Gardner, 1985; Krashen, 1981, 1982, 1985; Larsen-Freeman & Long, 1991; Stern, 1983; Stevick, 1976). Stephen Krashen rates anxiety as one of the three factors that affect the process of language acquisition along with motivation and self-confidence. While much about Krashen's Monitor Theory has been contested in empirical studies (Larsen-Freeman & Long, 1991, p.240), Krashen's notion of an 'affective filter' (Krashen, 1982, p.30) appears to have withstood the test of time rather better. According to this hypothesis, positive attitudes can lower the affective filter, helping input to pass through. Conversely, a negative affective disposition, or a filter that is 'up', can present barriers to learning. Unfortunately, Krashen did not elaborate further on whether affective variables can cancel each other out, leaving it up to other researchers in the field to find an acceptable measure of the way positive and negative variables interact (Chastain, 1975; Kleinmann, 1977; Larsen-Freeman & Long, 1991, p.247; Scovel, 1978). The interest in affect as a factor in second language learning has also spawned a range of pedagogies specifically designed to reduce student tension and to promote a stress-free environment (Terrell's Natural Approach, Asher's Total Physical Response, Lozanov's suggestopedia). The use of techniques to reduce computer-induced anxiety is, by contrast, a field that has received little attention to date.

It is suggested here that anxieties about the use of computers can contribute to raising the affective filter in the classroom. Computers can compound existing fears of failure in relation to learning a foreign language, producing what Scovel has termed 'debilitating anxiety' as opposed to 'facilitating anxiety' (Scovel, 1987, p.139). This can apply to weaker learners as well as to high-achieving students. Alternatively, the introduction of the computer as an additional variable into the classroom may promote anxiety where it was not previously present. This may cause good students such as Ann—who normally managed to keep her anxieties in check—to respond negatively to the introduction of a strong computer component into the German class.

The problem of student attitudes and even resistance to computers is only partly a transitional one. As the home market becomes saturated with micro-computers, students will become more adept at manipulating both text and images. But even with increased computer competence, students in the multi-functional, multi-skilled ProCALL classroom will be faced with many technological challenges—challenges which are likely to increase rather than

decrease. Our approach is based on the understanding that complete standardization cannot be provided by the computer environment. Dealing with technical difficulties will inevitably be part of the classroom experience, even as students and teachers gain in computer literacy. In fact, as the 'wow' factor associated with new software and hardware wears off, elements such as technical failures, software incompatibilities and 'old knowledge' may increasingly intrude into the CALL classroom (Murray, 1998, p.250). While step-by-step guides to using software and hardware can be very useful, and can alleviate many problems as they occur, these still presuppose a readiness to consult manuals. Our own experience shows that competent computer users frequently consult a manual only as a last resort. Apart from having a short shelf life due to the constant release of new programs and upgrades, guides unfortunately do not function as a magic wand that a teacher can wave at learners whose computer has crashed or whose floppy disk is stuck.

The 'meta-level deductive approach' outlined below is aimed at assisting teachers to integrate any number of complex computer applications successfully into the foreign-language classroom. It suggests strategies and activities which can be incorporated into the classroom in order to minimize learner and teacher frustration. The recommendations are designed to aid instructors adequately to prepare the groundwork before and during class time so that students' learning experiences will not adversely be affected by technical problems. A 'meta-level' approach is especially necessary if the class does not form an optional component of the curriculum, as was the case with our trials. Where students can self-select options and streams, it can be presumed that participants have consciously chosen the class partly because of its strong computer component. While these classes will undoubtedly also encounter glitches along the way, it can be safely assumed that these students will generally be better disposed towards computing.

3. DEALING WITH COMPUTER ANXIETY

By encouraging students to reflect on various aspects of the new communications technologies and media throughout the course, teachers can go a long way towards addressing student fears in productive ways. If activities are built into the course structure that provide a forum for reflection and consideration, 'technophobic' students will feel that their attitudes and views are taken seriously. Moreover, the whole class stands to benefit if teachers are successful

in fostering a critical appreciation of the new media. In the following section we extrapolate from our experiences over a three-year period and outline strategies we found useful in encouraging a critical relationship to the new communications media. These address ways of achieving basic computer literacy in a sustainable way: i.e., one that promotes self-learning rather than greater teacher dependency. Our recommendations consist of meta-level strategies and activities—that is, ones that pertain to the media and technology used in the classroom—as well as some practical advice on the use of software and hardware. They can be categorized under the following headings:

- historicizing computing technology
- new technologies and instrumental rationality
- the social ramifications of new information technologies
- exploring the ‘global village’
- publishing on the WWW
- practical considerations of access, computing skills, compatibility, standardization, class size, group work and design

3.1. Historicizing computing technology

Because of the pervasive presence of the computer in the PrOCALL classroom, we found student acceptance to its dominance was improved when computing technologies were placed in an appropriate historical and/or cultural context. Ideally, a brief history of cultural perspectives on the use of computers could be incorporated into early classes. This can be done during the initial phase when students are familiarizing themselves with resources on the Internet. A good starting reference is the site on <http://www.letsdeviant.com/technotheorylinks.htm>.

A historical perspective should stress both the benefits to humankind as well as the sustained resistance to technological innovation throughout the ages. Teachers may encourage students to explore the varied ways in which technology has been received in modern times. Technological innovations, like all forms of modernization, have not always enjoyed such wide acceptance within the community. Throughout human history technological changes and revolutions have periodically been accompanied by scepticism, anxiety and cultural pessimism. Much of this has fostered a healthy tradition of critique of technological progress and its attendant forms of ‘instrumental rationality’. In Germany, for example, this scepticism found its most prominent advocates in the philosophers and social commentators of the Frankfurt School of Critical Theory.

A fuller appreciation of this historical context can be developed in adjunct or parallel background classes. Indeed, if this material is covered in other sections of the course, teachers can draw on this cultural knowledge in the course of the project. In one of the years, an option on the media was included in the textual studies section of the course.

3.2. New technologies and instrumental rationality

It could be argued that in many ways the insights of the Frankfurt School of Critical Theory from the 1930s onwards still hold true for the information age. Particularly in the area of emerging information and communications technologies there is a growing awareness that innovation is not necessarily user- and needs-driven but is increasingly propelled by the concerns of multinational corporations. Innovations in information technology offer ample evidence of virulent forms of ‘instrumental rationality’ whereby the tool for achieving human progress appears to have usurped the end. Among the negative aspects of this form of ‘instrumental rationality’ in the area of computing are a greater dependency on computers and the latest versions of software and hardware. This may produce uniformity, leading to a reduction in choice and, potentially, a ‘streamlining’ of individuality. Multinational companies effectively create new consumer needs and desires—such as the need to upgrade to the latest version of software—often by offering more functions and improved performance than the average user may not want or need.

It could be argued that capitalist societies are still engaged in the business of actively creating needs and desires in the population that in turn institute new forms of social control and domination (Namenwirth, 1999, p.145). In 1964 Herbert Marcuse observed in *One-Dimensional Man*:

Such needs have a societal content and function which are determined by external powers over which the individual has no control . . . No matter how much such needs may have become the individual’s own, . . . no matter how much he identifies with them and finds himself in their satisfaction, they continue to be what they were from the beginning—products of a society whose dominant interest demands repression. (Marcuse, 1964, p.5)

More than any other technological development in recent times, the Internet has transformed time and space, replacing it with a ‘NowHere’ that confuses the here and now with the real elsewhere in time and space. As Friedland

and Boden (1994) point out, time is collapsed and space dissolved as 'different institutional orders organize and understand space and time differently'. As they remind us, 'forces of communication are also forces of domination', and technological regimes serve as new forms of coercion, surveillance and control.

A critical PrOCALL classroom should encourage students to explore the effects of such technologies as e-mail and the Internet on the way we experience time and space. Parallel to this, students and teachers can be stimulated to develop an 'ideology critique' of technological rationality in the tradition of the Frankfurt School and to apply this critique to the latest developments in the information superhighway. In later trials we introduced log books in which students were encouraged to comment on their experiences with the new technologies in German and challenged to write their own 'ideology critique' of the technologies they were using. This served two functions. First, students were able to practise new computing vocabulary acquired in the course of the lessons. Second, they could give vent to their exasperation at some of the more frustrating aspects of the technology.

Log books were introduced in 1998 as an assessable item. This proved to be a good way of monitoring student progress and morale. They also provided avenues for student feedback on the course. In one homework activity students were asked to reflect on the best and worst aspects of technology in their log books. It was the self-confessed technophobic students who performed best in this activity. This student wrote at length about his sense of exasperation with 'Macs' in eloquent and expressive German. He had found himself alone with the dreaded computer in one class early in the semester. In a log book entry for that week he was able to turn this situation into a humorous narrative, in which he likened his encounter with the computer to a 'kafkaesque' experience. The log book afforded him a welcome opportunity to air his frustration with the technology. But it also allowed him to rise above the experience and to place these experiences in a cultural and historical context.

3.3. The social ramifications of new information technologies

A historical appreciation of technological progress can be expanded to address the manifold social consequences of an ever greater reliance on innovation in information technology. The class may wish to reflect on the fact that technological progress in the first world is also bought at a price: social alienation and the creation of a new class of information-illiterate and information-impoorished citizens who represent the new underprivileged in the information age.

From these people's perspectives Bill Gates' vision of the information super-highway is anything but a utopia; the dangers of a binary dystopia and a 'two speed' society (Namenwirth, 1999, p.145) are lurking everywhere (Pippin et al., 1988, pp.215–24). As the information-rich acquire more and more information 'capital' (Bourdieu, 1990), societies which are reliant on these technologies are at risk of creating greater social divisions, stratification and inequities.

By acknowledging the many pitfalls of technological innovation, teachers may find that students are more receptive to the benefits of these technologies. Insights into the changing nature of communications media, the increasing globalization in the information age can also help foster a curiosity towards the WWW, even among its sceptics. Communications technologies may be about repackaging information in new and different ways, but many technological innovations seek to add to older technologies. They do this by providing a form of communication that was previously impossible. The Internet and e-mail may create a new class of computer literate, but they also create bonds between social communities in ways that were hitherto unimaginable. By focusing on information technologies as mere conveyors of information, we often do not take into account fully their social impact on individuals and communities. Many new technologies, for instance, 'emphasize a vision of the future that more fully engages users as social animals, as individuals with distinct personalities'. Communications technologies have different merits for different groups of people: for some they can overcome isolation and help forge links with like-minded enthusiasts which span across continents and countries (Gordin et al., 1996).

In this context a variety of attitudes to new information technologies can be discussed, ranging from institutionalized uses of computing in university CALL courses to the subcultural phenomenon of cyber-identities, cyber-punk and cyber-feminism.

3.4. Exploring the 'global village'

Project-oriented CALL classes offer students the opportunity of tapping into the 'global village' of the Internet while in the classroom. The Internet becomes far more than a mere resource or source of information about the target culture. It becomes the means by which students can participate in a truly international community of German speakers. This is a feature of the Internet that students such as Anne, cited above, did not immediately appreciate. Instead, Anne saw communication via e-mail with people in Germany more

as an incidental spin-off to the course. Anne, we may recall, was the student who expressed frustration at wasting time on learning computing skills. She confessed later in the interview, however, that she found the project 'definitely interesting'. This was in part because she had found 'an overwhelming amount' of interesting and useful information on the Internet. It was also due to the e-mail contacts she had developed with German universities in the course of the project. She even cited this aspect of the project as 'one great thing that has come out of it'. When asked about the final product and the ability to share her project with other people she became almost effusive:

Yes, it's fun. It's like you've done your page and I've never done that before and you kind of look at it at the end and you make your links and you think, 'Oh, wow, this is actually quite easy to do'. It is exciting to get your page on the Web and having actually created something physical, not like an essay that your teacher's going to read, you've actually got something there that other people can see, which is really cool.

Mike and Bella both cited getting to know their way around the Internet as one of the benefits of the course. Mike was the average student who expressed anxiety about the heavy reliance on computing in the class. It was the discovery of foreign-language sources on the Internet that finally convinced him that the project was well worth the effort:

I have found that when you get into it, when you start to learn how you can use the Internet for research, the amount of information you can get out of it is unbelievable . . . the information you can get off there and the different sources and different ideas from different people gives you incredible insights into different kinds of culture and information that you need.

As demonstrated by the case of Bella, it was found that students' fears of technology were neutralized when they discovered the value of the Internet for learning the foreign language. It did this mainly by providing additional motivation to learn the language and to use their language skills.

If some classroom or homework activities focus specifically on students' findings on the Internet, learners will be more aware of the long-term benefits of the Internet for their learning of the language. In later trials we included written activities that required students to make lists of their favourite or most

useful URL addresses, to comment on their presentation and content and to share these reviews with others. These sites were then incorporated into the final websites as links.

3.5. Publishing on the WWW

We found that the most consistently motivating factor that helped students overcome their fear of computers was the opportunity to publish their projects on the Internet. They were using their language skills in a purposeful context to converse and interact with real speakers of German on the WWW. While this was in itself highly motivating, it presented its own particular set of problems.

The World Wide Web is an international community of readers and writers in which information is disseminated often without the mediation of publishers, agents and institutions. Because of this it is a forum in which authors can be called to account for their views by complete strangers on the other side of the world. In the first trial of the project students did not consciously write for an Internet audience and tended to present their ideas much as they would in a conventional assignment or essay for the teacher. In subsequent years, more time was devoted to explaining the 'generic' differences between writing conventional essays for assessment and publishing essays on the WWW. It was pointed out that students were in fact writing for two audiences: firstly, for the teacher, since the work is still assessed; and secondly, for an international, culturally diverse, but non-specialist audience. Students need to be warned that the new audience brings new obligations. Ill-conceived opinions, prejudices or unfounded assertions aired on the Internet can be an invitation, indeed a provocation, to others to respond. Even well-researched material can attract the ire of a reader on the other side of the globe, particularly when it touches on culturally sensitive issues.

In the second and third years of the trials we found it useful to present students with a few cautionary tales of what can happen when students' work is not culturally sensitive. A striking illustration of the traps that await publishers on the Internet is the example of an irate German policeman who responded to a student's Web page over a year after the page was posted on the Internet. He was so angered by the students' allegations of widespread xenophobia in the German police force that he felt compelled to protest at the negative portrayal of his profession on the website. Because the students who had written the page had not included a contact address, he e-mailed the teacher responsible instead. Examples such as these should encourage students to take greater responsibility for their intellectual work.

3.6. Practical considerations

3.6.1. Access

In 1997 and 1998 it was a source of frustration for some students that they had difficulty obtaining access to computers on campus. In 1997 and 1998 e-mail and the Internet were still relatively new technologies and very few had access from home. Self-access to computing services on campus was restricted to inappropriate times or the computers available did not have the software needed to complete the assignments. As one student noted in frustration:

We met on a Sunday, to 'surf the Internet' and find 'our favourite website' but the University computers were down. (Wasted time and effort.) We gave our presentation a week later and didn't choose to meet on a Sunday again.

For others it proved difficult combining extra-curricula commitments with opening times of the laboratories, with one student remarking: 'Generally, finding times when we were both free and the computer lab was open was difficult.' Where access to electronic resources is not readily available outside the classroom, extra time needs to be allocated for the completion of tasks.

3.6.2. Acquisition of computer skills

Over the three years of trials a majority of students knew how to use basic functions in one or two programs, but had not explored the operating system or other functionalities of computers. While students should not be unduly burdened with unnecessary technological information, they should be provided with basic skills that allow them to work independently. A basic working knowledge of the operating system can help prevent many technical mishaps. Once students are able to successfully use the operating system, their knowledge of application programs will increase rapidly, as these follow similar routines. Here the approach known as 'monkey testing'¹ ought to be encouraged: after initial instruction, time should be allowed for students to explore the machines.

Knowing how to restart the computer is another obvious but important skill, as is how to eject floppy disks properly. Different routines exist for Macintosh and PC machines, and for Macintosh computers using the Eject command from the Finder menu is not recommended. In addition to this, it is important for students to know how to save work files correctly and to make back-ups. Students who are unfamiliar with Macintosh machines need to be taught the

1. 'Monkey testing' is an institutional stage during software testing. It is based on the experience that software users (i.e., monkeys) are still able to crash a program, even after it has been beta tested for several months by experienced users.

protocols of saving their files onto the desktop and then onto floppy disks. In 1997 one common source of frustration was that students could not locate files once they had saved them (and hence felt they had lost them) because the computer had saved them into one of the many application folders. On shared machines, students will need to save work files either onto floppy disks or other available storage media such as a dedicated university server.

3.6.3. *Compatibility and standardization*

The difference in platforms (commonly between Macintosh or Windows) was a significant factor affecting student acceptance of PrOCALL. While Macintosh computers can read PC-formatted floppies (but not vice versa), the referencing of files (or path name) is handled differently by the two systems. File names need to be kept to the (maximum) 8 plus 3 character convention (DOS naming convention; e.g., germanic.htm). When students switch machines or even platforms, path-referencing errors occur.² A frequent source of frustration among students was the discovery that images they had carefully saved during the previous lesson had disappeared from the application interface. Usually that meant that they had stored the images and the files onto the floppy disk and worked with those files from the floppy rather than from the hard disk.

As a general rule all students should work with the same homepage editor. As more students have access to HTML editors at home or in college, there will be the temptation to use a different HTML editor. To minimize incompatibilities, the teacher will need to set a number of limitations based on the HTML editor chosen and the time s/he intends to spend editing.

3.6.4. *Class size and group work*

For the teacher, assuming s/he has adequate computing skills, the problem of handling technophobia stands in direct proportion to class size. In a large class, where it is impossible to speak to individual students repeatedly, it is difficult to assess class morale behind the machines. For both teacher and student this can become a source of frustration, particularly since reservations about the new teaching format may develop unnoticed among students. Time for individual help and attention are of crucial importance (Michel, 1997). If appropriate avenues for regular feedback are also incorporated into the class structure, students' difficulties can be addressed in time. This can contribute to cohesion in the classroom, which may otherwise be difficult to achieve, due to the different mode of teacher-student communication prevalent in a PrOCALL environment.

2. There are commercial programs that can change this, such as shareware HTML rename! 1.21. This allows you to move files between DOS, Windows, Mac and Unix systems by changing file name, case, length and invalid characters, and fixing the appropriate links in the HTML code. It can automatically change every file name to fit a new naming convention. The website should then work on any operating system without broken links (see <http://www.visiontec.com/rename/>).

In 1999 one homework exercise in the middle of the semester was devoted to discussing the advantages and disadvantages of technology-supported group work. Among the benefits cited in one log book was the ability to share technological knowledge and expertise among group members. This was seen as balancing out the disadvantages of group work, such as needing more time to complete tasks. Students should be allowed to decide for themselves if all members of the group want to learn the computer skills necessary for the project or if they wish to divide up the tasks. Obviously, those students with low confidence in operating a computer can be relieved of the pressure to acquire the requisite new skills in editing and formatting, knowing that their partners are responsible for the technical side of the project. However, a certain degree of multi-skilling within the groups is desirable and will help keep students' expectations of what can be achieved in the classroom realistic.

3.6.5. Design issues

Before agreeing on the final design of their site, students should surf the Web to identify good and bad Web page design. A useful and entertaining site to introduce students to is <http://webpagesthatsuck.com>, which outlines principles of good and bad design. Unless extensive time is devoted to discussing issues of good and bad design in class, students will often instinctively gravitate towards the latest fashion in Web design, whether good or bad. In 1997 and 1998 there were no design rules in the classes and as a consequence some pages incorporated all the features of bad design. By introducing a peer review phase into the project, as we did in 1998 and 1999, students often corrected some of the worst design features of their pages without the teacher intervening.

In a language class, where issues of design are not the highest priority, one way of overcoming problematic designs can be to create a template for students. Standardization of software tools as well as page design can provide students with useful and comforting parameters within which to work. They should not, however, impede creativity or hold back those students with specialist interests or knowledge of computing who may wish to incorporate more sophisticated design aspects and functionalities into their pages. It is important to strike a balance between experimentation and standardization. The introduction of minimum standards with respect to software and design will also reduce the burden on the teacher, especially if s/he is expected to edit and test the pages at the end of the semester or upload them onto the WWW. Which basic requirements will be needed in each ProCALL classroom will depend

on the teacher's computer literacy or which additional resources are available. If the class is fortunate enough to have technical support available both during and after class time, students can be encouraged to realize some of their more ambitious design ideas. The presence of technical support to assist with image capture, manipulation and saving, scanning, storage of data and up- and downloading can go a long way towards easing the technical burden on teachers and students and reducing computer-induced frustration.

4. CONCLUSIONS

In summary, learner frustration can be minimized or at least put into perspective if the ProCALL classroom directly addresses the issue of the problematic nature of much technological innovation. If students are provided with a historical understanding of the limits and the benefits of technology and technological innovation, many preconceived notions and misconceptions about computing can be dispelled. The technological implements used in the ProCALL classroom can become themselves the object of analysis and critical reflection, whether in the classroom, in group activities or in individual assignments. Similarly, if the process of publishing Web pages on the WWW is thematized at various stages of the work on the projects, fears, reservations or short-term frustrations can often be channelled in productive ways back into the project. The persistence and resourcefulness required to manipulate hardware and software is, after all, not unlike the effort needed to master the 'tools' of a foreign language itself. Students may need to be reminded that the learning of grammar, like the learning of computing, is only ever a means to more effective communication. The contingency-based knowledge of computing or the trouble-shooting skills that students (and teachers) develop in the course of the semester are similar to the skill of manipulating grammatical structures in spontaneous discourse or communicative situations.

The acquisition of computer competence necessary for a ProCALL class needs to be seen as a prerequisite for 'plugging into the global village' and for participating in international learning communities. The ProCALL classroom is not only a classroom experiment, it is also a real-life experiment in which learners share their values, their belief systems and ideas with readers from other cultures and other socio-economic, ethnic and religious backgrounds. Because students' WWW projects may attract an indeterminate number of readers from any number of different backgrounds, the projects become

exercises in real-life intercultural communication. Such a classroom can therefore provide an ideal basis for the exploration of issues related to cultural diversity and intercultural communication. Again, the diversity of readers and users of the Internet can provide the impetus for critical reflection as can the technological medium for communication itself.

The German playwright Bertolt Brecht (2000, p.38) once remarked about radio that a person who has something to say and finds no listeners is in a bad position, but an audience which finds someone who has nothing to say is worse off. This adage applies equally to the PrOCALL class; here the students must have something meaningful to say and they have to breathe life into the message they convey. As an author of a website, one never knows who is 'listening' or 'watching' and when they will make themselves felt. And one never knows how one's message will be received. For that reason, the acts of communication via the Internet assume a real-life purpose and urgency beyond conventional exchanges between students and students and teachers in traditional language learning contexts. These acts of communication will always be the product of an institutional setting and a set of localized procedures that pertain to that institution as such. But they can make language learning activities more meaningful and rewarding for students by extending beyond the institutional confines of the classroom and spilling over into other real-life contexts and environments.

REFERENCES

- Bourdieu, P. (1990) 'The intellectual field: a world apart', in P. Bourdieu *In Other Words: Essays Towards a Reflexive Sociology*, trans. Matthew Adamson. Cambridge: Polity Press, pp.140–49.
- Brecht, B. (2000) *Brecht on Film and Radio*, ed. and trans. M. Silberman. London: Methuen.
- Cameron K. (ed.) (1989) *Computer-Assisted Language Learning: Program, Structure and Principles*. Oxford: Intellect Books.
- Chastain, K. (1975) 'Affective and ability factors in second language acquisition', *Language Learning* 25: 153–61.
- Debski, R. (1997) 'Support of creativity and collaboration in the language classroom: A new role for technology', in R. Debski, J. Gassin & M. Smith (eds) *Language Learning Through Social Computing*. Applied Linguistics Association of Australia, Occasional Papers 19, pp.39–65.
- Friedland, R. & Boden, D. (eds) (1994) *NowHere: Space, Time and Modernity*. Berkeley, LA; London: University of California Press.
- Gardner, R.C. (1985) *Social Psychology and Second Language Learning: The Role of Attitude and Motivation*. London; Baltimore, MD: Edward Arnold.

- Gordin, D.N., Gomez, L.M., Pea, R.D. & Fisherman, B.J. (eds) (1996) 'Using the World Wide Web to build learning communities in K-12', *Journal of Computer-Mediated Communication* 2 (3): (available at: <http://www.ascusc.org/jcmc/vol2/issue3/gordin.html>).
- Hogan-Brun, G. & Jung, U. (eds) (1999) *Media, Multimedia, Omnimedia: Selected Papers from the CETaLL Symposium on the Occasion of the 11th AILA World Congress in Jyväskylä (Finland) and the Vth Man and the Media Symposium in Nancy (France)*. Frankfurt am Main: Peter Lang.
- Kenning, M.-M. and Kenning M.J. (1990) *Computers and Language Learning: Current Theory and Practice*. New York: E. Horwood.
- Kleinmann, H. (1977) 'Avoidance behaviour in adult second language acquisition', *Language Learning* 27: 93-107.
- Krashen, S.D. (1981) *Second Language Acquisition and Second Language Learning*. Oxford; New York: Pergamon.
- Krashen, S.D. (1982) *Principles and Practice in Second Language Acquisition*. Oxford; New York: Pergamon.
- Krashen, S.D. (1985) *The Input Hypothesis: Issues and Implications*. London; New York: Longman.
- Landow, G.P. (1991) 'The rhetoric of hypermedia: some rules for authors', in P. Delaney & G. Landow (eds) *Hypermedia and Literary Studies*. Cambridge, MA: MIT Press, pp.81-103.
- Larsen-Freeman, D. & Long, M.H. (1991) *An Introduction to Second Language Acquisition*. London: Longman.
- Marcuse, H. (1964) *One-Dimensional Man*. London: Routledge & Kegan Paul.
- Michel, W. (1997) 'Unterricht im Internet' (available at: <http://www.rc.kyushu-u.ac.jp/~michel/ref/ref970706/evaluation/index.html>).
- Murray, L. (1998) 'Beyond the 'wow' factor: Evaluating multimedia language learning software from a pedagogical viewpoint', *System* 26: 249-59.
- Namenwirth, E. (1999) 'New Technologies: The Quest for Appropriateness', in G. Hogan-Brun & U. Jung (eds) *Media, Multimedia, Omnimedia: Selected Papers from the CETaLL Symposium on the Occasion of the 11th AILA World Congress in Jyväskylä (Finland) and the Vth Man and the Media Symposium in Nancy (France)*. Frankfurt am Main: Peter Lang, pp.139-55.
- Pennington, M.C. (1996) 'The 'cognitive-affective filter' in teacher development: Transmission-based and interpretation-based schemas for change', *System* 24 (3): pp.337-50.
- Phillips, M. (1987) 'Potential paradigm and possible problems for CALL', *System* 15 (3): 275-87.
- Pippin, R., Feenberg, A. & Webel, C.P. (eds) (1988) *Critical Theory and the Promise of Utopia*. London: Macmillan Education.
- Scovel, T. (1978) 'The effect of affect on foreign language learning: A review of the anxiety research', *Language Learning* 28: 129-42.
- Stern, H.H. (1983) *Fundamental Concepts of Language Teaching*. Oxford: Oxford University Press.
- Stevick, E.W. (1976) *Meaning, Memory and Method*. Cambridge, MA: Cambridge University Press.