VIRTUAL  VERSUS CLASSROOM

LANGUAGE TEACHING

A comparative study of the learning outcomes and student responses between two English reading comprehension groups

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1. INTRODUCTION

Finland is known as a ‘wired society’. According to Slevin (2000: 41) by 1999 Finland was the most ‘wired’ country in the world, with over 35 per cent of its population online. The United States had just over 30 per cent of its population accessing the internet in 1999. In August 2000, 74% of the Finnish population had mobile phones. The development of information technology has enhanced the national productivity per capita in Finland since 1996 (Helsingin Sanomat, July 12, 1999).

The 1990s was a time of explosive growth in information and communication technology (ICT). The growth culminated in the birth of the graphic interface, after which a lot of different Internet-based learning environments and learning tools have been developed.

The rapid advancement of internet-based learning environments is not accidental. With the development of microcomputers and technology in general, the rate of information transfer has increased, hypermedia applications have increased and more and more people have had access to technology, and with less cost. The mere existence of ICTs has helped in the development of teaching technology applications.

The idea of an information society and its development lies behind the rapid growth of teaching technology applications. This can be seen in many ways, e.g. the Finnish Government invests great sums of money in advancing the use of information and communication technology. Computers are being bought for institutions and Internet
connections are being created to them. When Finland was planning a specific information society strategy in the mid 1990s, it was thought that the use of ICT in education would considerably speed up the development of a Finnish information society. Based on the planning by the Finnish Ministry of Education, the Government granted additional funding for ICT and creating Internet connections for schools, polytechnics and universities. What makes this funding significant is the fact that these institutions had more money for acquiring ICT devices than ever before, while at the same time public education suffered great budget cuts in other sectors.

In their comprehensive study of the use of ICT in Finland, ‘The Challenges of ICT in Finnish Education (1999), Sinko & Lehtinen write:

‘it would seem that the application of ICT can enrich traditional university education and narrow the gulf between traditional academic studies and the changing demands of working life. With innovative use of technology, universities can train their students in the key skills called for in modern working life, such as teamwork, networking, internationalization, project management, communication, solving complex practical problems etc., without compromising on their basic task of academic education.’ (Sinko & Lehtinen, 1999: 124)

Castells and Himanen (2001: 99) point out that generally there is a great deal of knowledge and development put into ICT in Finland, but what is lacking is that too few projects have been applied to producing actual courses or other products.
1.1 Information and communication technology

Information and communication technology affect both the teacher's and the student's role. Although efficient learning and studying, whatever the method, demand independent processing of the material by the student and also inter-student processing (i.e. reading, reflecting, doing exercises, communication, interaction, practice, writing etc.), it may happen that in traditional face-to-face teaching methods the students can sometimes be only seemingly present because they are sitting in the classroom physically. In the new learning environments the student must be mentally present, which means: if you do not think, read, process, produce and comment in an active way, you do not exist at all. It becomes easier to neglect the lessons, but contradictorily, learning becomes impossible if the student does so. On the other hand, learning always presupposes the student's activity and presence whether the learning method is traditional or new.

The idea for this study arose from discussions with Professor David Bickerton, of the University of Plymouth. I became interested in the kind of practical learning results that might be achieved by internet-based instruction as compared to the results of traditional instruction. I was also interested in trying out a new teaching method, and finding out how students would respond. I had been using the groupware program TopClass Version 3.1. for teaching EU terminology, and I therefore thought it possible to create a reading comprehension course using TopClass. I emphasize that my approach in the use of information and communication technology is just one among numerous approaches to language teaching and learning via the Internet.
One of the aims of this study was to compare the learning outcomes as well as the student attitudes and reactions within two groups of students performing the same learning tasks, one in the classroom and the other via the Internet. The teacher was the same for both groups. One of the research questions has been to find out whether it would be possible to achieve as good or even better learning results using the Internet as compared to the traditional teacher-taught method. Statistical methods have been used to compare the learning outcomes. Moreover, it was considered that it would be of interest whether it would be possible to establish differences between the groups, e.g. gender differences that might affect the use of an Internet course.

The primary purpose behind this investigation is didactic. Manninen & Matikainen (2000: 18) note that Internet-based learning environments offer, at least in principle, flexible learning opportunities independent of time and place. They enhance access to education, to rich learning materials, enliven learning, and support the students' self-regulated learning. They think that learning becomes more open; and the cost-effectiveness of education will be improved.

On the whole, it seems that there is a need for comparative research experiments in the area of Internet-based language teaching, although, according to Tella (1994), two different kinds of courses cannot truly be compared. Comparison may not be relevant in the long term, but at this stage when the University is planning to transfer many of the courses to the internet, and now that the Finnish Virtual University has been established, we need to know how learning via the Internet differs from classroom learning, e.g. is it as efficient or even more efficient; how Internet teaching/learning changes the students’ and teachers’ roles; what kind of responses the students give to the new medium. The lack of relevant research may
have retarded the process of incorporating information and communication technology into language teaching. (Sinko & Lehtinen, 1999).

I shall first present the study literature, and then the activities of Helsinki University Language Centre and its students. The main part of the study then falls into two, statistics and the surveys. After that I explain the first computerized English reading comprehension test at the Language Centre. Then I shall discuss the teacher’s role in Internet teaching, as well as to the two groupware teaching tools that I have familiarized myself with.

It is to be hoped that this study will give ideas to other language teachers who are interested in information and communication technology and thus enhance cooperation and the dissemination of ideas.

1.2 Why the term ‘virtual’?

I have heard quite a few workers in the field being apologetic for the term ‘virtuaaliopetus’ (virtual teaching), ‘virtuaaliyliopisto’ (virtual university) and ‘virtuaalikielikeskus’ (virtual language centre) (e.g. Liisa Huovinen from the Ministry of Education and Peppi Taalas from Jyväskylä University).

However, Matti Sinko, the director of the Finnish Virtual University, at the Virtual University seminar in Tampere on June 26, 2001, stated that this term has been chosen because of practical reasons. He, too, was somewhat apologetic for the term but justified this by saying that ‘virtual’ is internationally accepted.
It is worth considering what the term ‘virtual’ means.

According to Hurme-Pesonen-Syväoja: Englanti-Suomi Suursanakirja (English-Finnish General Dictionary), (2000) the word ‘virtual’ means 1. tosiasiallinen, varsinainen (‘the virtual ruler of the country’) 2. (fys) virtuaalinen, oletettu, (tekn) tehollinen (virtual current or voltage); näennäis- (virtual cathode), virtual image (opt) valekuva, virtuaalinen kuva 3. (atk) näennäis- (address; call), -yhteys.

Hurme-Malin-Syväoja: Uusi Suomi – Englanti Suursanakirja (Finnish-English General Dictionary) (2000) gives only one meaning for the word ‘virtuaalinen’: virtual (fys; image, kuva; quantum, kvantti); and virtuaalisen työn periaate: virtual work method. This refers to a physical or technical use of the word.

Collins Cobuild English Language Dictionary (1988) only gives the general meaning for ‘virtual’. It is used to suggest that something is in effect what you say it is, although it is not formally recognized as such e.g. ‘The workers remain in a perpetual state of virtual slavery’. This meaning is usual in the field of humanities.

Webster’s Encyclopedic Unabridged Dictionary of the English Language (1989) gives an example of the meaning in optics: ‘noting an image formed by the apparent convergence of rays geometrically, but not actually, prolonged, as the image formed by a mirror (as opposed to real)’.

I believe that the use of the term ‘virtual’ arises from the fields of physics, electronics, computer science and optics. Englanti-Suomi Tekniikan ja Kaupan Sanakirja (English-

Heikki Kynäslahti (2001) made an extensive study into the meaning of the word ‘virtual’. He notes that ‘(w)hen we say today that something is virtual, we assume that information and communication technologies are heavily involved in what we are talking about’ (2001: 62). I accept this explanation and think that ‘a virtual class’ is realistic but not real; it has the same elements as the traditional class, i.e. the teacher (or instructor), learner (or student), learning material and tasks and tests. In the virtual environment there is communication and interaction as in the traditional class, and it does not lack the social aspect. However, it must not only be seen as a copy of the actual class. The virtual class is different from the traditional class because it is created with the help of technology. When people are online, they have a foot in both real and virtual time-space (Slevin, 2000: 7).

Because of the term’s natural science etymology and for practical reasons, I accept that ‘virtual’ (virtuaali-) in the context of teaching and learning is appropriate, although I think the term ‘web-based teaching’ (verkko-opetus) is also quite adequate. I think we can call a course ‘virtual’ if it utilizes modern information and communication technology to a considerable extent, and if there is a symbolic or a real class that represents the learners as if it was an optical image. I shall use the term Internet for the most part of this study and later the term ‘Net’ meaning the same.
According to Slevin (2001: 104) it is worth regarding virtuality and real life as not competing areas of interaction; instead we should try to get the best of both worlds. In this study both areas are being used. It can be said that, in the case of the virtual class, the shared virtual experience strengthens the significance of the real and physical experience. According to Tella et al. (2001: 210) virtuality can bring something new to the physical experience, which may be experienced as genuine and significant.
2. LITERATURE REVIEW

2.1 Introduction to literature review

Immonen (2000, in Matikainen & Manninen, 2000: 16) describes the four generations of distance education: 1. Correspondence study, from the 1840s onwards in Britain (Verduin & Clark 1991) and since 1912 in Finland (Varila 1991) 2. Mass media equipment made use of; school radio starting around the 1930s, school TV around the 1950s. 3. The two-way interaction made possible by modern information technology and multimedia equipment. Telephone, e-mail and the first video-conferencing applications made both synchronous and asynchronous interaction possible. This phase is sometimes called the telematic phase of distance education. 4. The modern open use of technology which utilizes information networks in education. This interaction between the instructors and learners means guided didactic conversation restricted only minimally by physical boundaries.

Tella (1994: 40) makes a conclusion on the history of using information and communication technology in teaching from as early as the 1950s. He refers to the debate in the 1960s and 1970s on whether the pupil learns a foreign language in a language laboratory better than in an ordinary classroom. After this, he says, it became natural to take the computer into the focus of interest. But as to the effectiveness of computer-assisted learning he says that, unfortunately, a comparison of the effectiveness or superiority of one method
or tool over another has proved to be almost impossible. According to him it is very difficult to build a comparative research setting the results of which could be reiterated in new research settings. He notes that new teaching tools at first seem to have fascinating features that make some teachers, and perhaps students, too, believe that learning will improve by using these new tools. Tella reminds us that Hirschbuhl (1978) has called this kind of new tool 'a dream machine of education'. He continues that comparative research of this kind is based on the false assumption that teaching methods can be varied without modifying the teaching content or strategies. His conclusion is that no teaching instrument or tool as such seems to have an intrinsic power to enhance or improve teaching or to intensify learning. It was not possible to indisputably prove the benefits of the language laboratory nor will it probably be possible to prove the benefits of the computer, claiming that the learning outcomes are better.

In order to determine whether computers help learners, Mäkinen (1992) performed an experiment where the students read pharmaceutical English texts while listening to tapes of the same texts, and found no improvement on the students' reading comprehension. There were some beneficial effects, however, such as change of classroom routines, student peer work, familiarization with new technology, and enjoyment.
2.2. Teaching applications of information and communication technology

Seppo Tella (1994: 49) established useful categories in the use of ICT applications in teaching. The first category is technical computing which lead to separate computer studies in schools, excluding teachers of other subjects. Computer courses were given by teachers who were interested in programming and in producing computer-assisted teaching programs. This is a specialist area but the following three categories are well suited to teachers in general who have an interest in ICT but who emphasize the fact that the teacher is specifically an expert in teaching.

The second category is computer-assisted teaching. In Finland, there have been computer-assisted teaching programs since the early 1980s. Their use has not, however, been very extensive since whole teaching programs could not be based on them; they have either not been at the right level, comprehensive or specific enough for the groups they were aimed at. They have mainly been used as useful supportive and additional elements in classroom teaching, e.g. CD-ROMs in special education. According to Tella, the present view is that many of these programs have been based on the behaviouristic-objectivistic theory of knowledge, which has now largely been replaced by the constructivist theory of learning (Duffy & Cunningham 1996: 170-177), and thus they have hindered the use of computers in the teaching of subjects extensively and openly. According to Tella, some researchers even regard this kind of learning process as being totally controlled by the program and mastered by the teacher.
The third category is to use ICT as a working tool. With the use of this new technology it is possible to create tools which may broaden intelligence capacity and give way to creativity for teachers and learners. These tools include e.g. word processing programs, filing and data programs, paint and graphic programs and electronic mailing systems. Working tool programs differ from computer-assisted teaching programs in that they are content-free and independent of subject area. They are useful for a long period of time. According to Tella (1994: 52), it is appropriate to integrate ICT in the form of working tools into teaching methods which are used at present. It is possible to make learning more varied, individual and effective than traditional learning. He notes that process writing has only really become possible with the use of word processors.

The fourth category includes most advanced use of ICT and is an open multimedia learning environment. Therefore, the learner can work independently at his or her own pace using the computer, the Internet and other tools. He or she can search information and solve problems without the restrictions of a predetermined model, which is often the case with the aforementioned working tools. In the open learning environment the focus is not so much on the teacher's or the institution's as on the learner's needs and interests. The open virtual learning environment offers diverse possibilities for realizing the new constructivist learning theory according to which the learners construct their own knowledge (Jonassen, 1995; Tella 1997).

My TopClass experiment falls within the area between the third and fourth categories of ICT because it is Net-based but not open to the extent defined by Tella. Yet, the students are not required to construct their own knowledge in the general sense of the constructivist theory, they are rather asked to respond to pre-defined questions on the texts and the vocabulary.
Today, most interest in ICT in education is focussed on the open learning environment, i.e. the fourth category, (e.g. Sinko & Lehtinen, 1999; Matikainen & Manninen, 2000). There has been a great deal of research in Finland on theories of the open learning environment (e.g. Tella, Nevgi, Tirri, Mononen-Aaltonen), and many teaching experiments, e.g. in polytechnics (Hara et al, 2000), psychology (Nevgi, 2000), adult education (Manninen et al., 2000), social psychology (Matikainen, 2000) and medicine, education and law (Sinko & Lehtinen, 1999: 110). Later, we shall look at reports on ICT teaching experiments in language teaching.

2.3. Closed and open learning environments

Kiviniemi (2000:10) argues that in practice learning environments rarely represent all aspects of either closed or open learning environments. He presents some differences of the closed and open learning environments citing Manninen & Pesonen (1997: 270), Table 1, next page.
Table 1. The closed and open learning environments according to Manninen & Pesonen (1997)

<table>
<thead>
<tr>
<th></th>
<th>CLOSED</th>
<th>OPEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Motive</td>
<td>external</td>
<td>internal</td>
</tr>
<tr>
<td>2. Decision to study</td>
<td>because of external pressure or necessity</td>
<td>self-determined</td>
</tr>
<tr>
<td>3. Mode of study</td>
<td>traditional, course-based</td>
<td>self-study</td>
</tr>
<tr>
<td>4. Defining of objectives</td>
<td>trainer, organization, society</td>
<td>self</td>
</tr>
<tr>
<td>5. Time</td>
<td>meetings that have been agreed upon in advance</td>
<td>freedom from time, studying at one’s own pace</td>
</tr>
<tr>
<td>6. Place</td>
<td>studying tied in a certain place</td>
<td>freedom from place, studying anywhere</td>
</tr>
<tr>
<td>7. Learning content</td>
<td>the same for all</td>
<td>individually tailored</td>
</tr>
<tr>
<td>8. The nature of the information learned</td>
<td>clearly defined problems and answers, based on specific subjects; the objectivity of knowledge</td>
<td>large entities requiring applying and problem-solving; the relativity of knowledge</td>
</tr>
<tr>
<td>9. Context</td>
<td>institution</td>
<td>reality</td>
</tr>
<tr>
<td>10. Connection to real world</td>
<td>no connection</td>
<td>problem-based learning and project-based studying</td>
</tr>
<tr>
<td>11. Availability</td>
<td>students are selected, entrance examinations</td>
<td>open to everyone interested</td>
</tr>
<tr>
<td>12. The way of realizing the study</td>
<td>course-based</td>
<td>self-study</td>
</tr>
<tr>
<td>13. Studying pace</td>
<td>pre-defined</td>
<td>self-regulated</td>
</tr>
<tr>
<td>14. Tool/methods</td>
<td>one way of delivering/acquiring information</td>
<td>several alternative or complementary tools</td>
</tr>
<tr>
<td>15. Collaboration</td>
<td>self-study, thinking and reflection happen alone</td>
<td>collaborative, interactive learning</td>
</tr>
<tr>
<td>16. Assessment</td>
<td>by an outsider</td>
<td>self-evaluation</td>
</tr>
</tbody>
</table>

There seem to be several discrepancies between the learning environments of Manninen & Pesonen (Table 1) and the way I have used TopClass environment in my teaching experiment. Above all, the learning environment in this study is closed and not open, i.e. the course is protected by username and password. Nevertheless, within the coursework, the students had access to the World Wide Web and could utilize it freely.

The motive of the student, Table 1 (1), seems external but it is the student who has internally decided to begin to study at university level; thus the motive in my study can be regarded as internal. The same applies to the decision to study (2). The mode of study (3) in my
experiment is basically traditional and course-based with some elements of self-study. The objectives of the course (4) are according to the requirements for the Degree in Pharmacy, which state that the students are required to acquire the level of the knowledge in one or two foreign languages which enables them to read textbooks, follow their field and develop professionally. Time (5) falls in between the two extremes: there were three sessions the group meeting each other and the teacher, and the students were free to do the Internet computerized tasks whenever it suited them within the given time frame. The freedom of place (6) is a much-debated item: it promises more than it can give. Learning is always tied to some place. As regards the content (7), the learning material was the same for all the students. It is not possible for the teacher to tailor-make individual learning content for 33 students who only study to achieve one and a half credits. In this course, it can be said that the nature of the information learned (8) was closed. There were clearly set problems; the students had to find answers to given questions in my course, and the ‘knowledge’ can be said to be objective in the sense that the aim was to find the intention of the text writer and a pharmaceutical term always has a definite ‘objective’ meaning. If a science course is as wide as, say, 20 credits, the student can be expected to apply the information and formulate new entities from the existing material. In that case we can speak of the relativity of knowledge, but at the Language Centre we are teaching language as a tool. It was not that the context (9) in the case of my TopClass experiment was only the institution, but texts from the real world of pharmacy English were taken as the focus of interest and the students were applying their knowledge of the real world all the time when reading the texts and doing the exercises. They were not disconnected from reality by any means (10). Studying in this context is problem-based but not actually project-oriented (keeping in mind that the course only gives the students one and a half credits). Availability (11), is self-evident: the students had been chosen to study pharmacy, thus the course was strictly for them. As to the
way of realizing the studies (12), the course-based method was chosen because I found it practical and interesting. Moreover, from the didactic point of view, my role is to give the students relevant input. I thought the students would appreciate the fact that the instructor controls the course. The same applies to the pace of study (13): it is predefined with some freedom in the timetable. The tool (14), TopClass, was available and I wanted to use it in order to see how it would work and what the response would be. The Internet work was complemented by face-to-face meetings. It was not possible to have a multi-media course. It can be said that this TopClass course entailed more reflection and thinking alone than collaboration (15) as each student did the tasks individually (some did peer work, though). As to assessment (16), it is a fact that the teacher is in charge of evaluating the students’ work.

What is missing in the above table is the teacher’s role. I shall present my notions about the teacher’s role and how I supported the learners in Chapter 9.

2.4 Effects of ICT in learning

When we look at goal-oriented strategic planning, it is important though difficult to pinpoint the effects of ICT in education exactly because of several reasons. First, the nature of ICT is ever-changing. Thus far studies on ICT in education seem to have been mainly based on earlier generations of computers, and the pace of development in computerization, network and software technologies is so fast that there will most probably open up many possibilities which we do not yet know of. Second, Sinko & Lehtinen (1999: 33) note that impact studies have concentrated on the immediate short-term effects of ICT on learning, learning skills,
motivation and student attitudes. They emphasize that essential parts of the learning and teaching effects of ICT are indirect and that they are revealed only as gradual changes in systems, ideas and teaching practices as well as social processes in the classroom. Third, it must be kept in mind that some studies might give an overly positive picture of the effects of using information technology, as Kulik & Kulik (1987) have pointed out.

One reason for this overly positive picture of the effects of using ICT in teaching might be that this new method is tried out by the most committed and enthusiastic teachers, which is not necessarily the case with the control group. Kulik & Kulik reiterate the potential error that may arise due to a great deal more effort being put into planning teaching which utilizes ICT than into the teaching of the control group. Sinko & Lehtinen (1999:34) state that the first summary articles describing the empirical studies made in the late 1960s and early 1970s on the effects of computer-assisted instruction show that computers seem to help in training basic skills. Furthermore, Stennets (quoted by Sinko & Lehtinen, 1999: 34) came to the conclusion that 'the use of carefully planned computer-assisted drill and practice programs, when combined with teaching by a teacher, was more effective than traditional teaching alone'.

However, on the whole, it is well-known that studies made on the effectiveness of computer-assisted instruction yield conflicting results. Sinko & Lehtinen note that several author have shown that traditional teaching has yielded better results than computer-assisted instruction while others have found the very opposite. They compile the essential findings based on nearly 60 publications from the 1980s and early 1990s, and summarize the positive effects of computer-assisted learning in the following way:
‘Computer-aided instruction produced better achievement effects than traditional instruction alone.

The use of computers and word-processing software lead to writing performance superior to traditional pencil-and-paper work, as manifested by longer writing samples, greater variety of word usage, more variety of sentence structures, more substantial revision, greater responsiveness to teacher and peer feedback, better understanding of the writing process and better attitudes towards writing.

The use of computers in teaching also led to positive changes in attitudes towards school and learning in general, as well as in motivation.

The studies showed that using computers in instruction yielded different results for different student populations: low achievers and handicapped students benefited more than comparatively high-achieving students; positive effect were greater with young students than with older ones; students with low socio-economic background benefited more than those whose parents were wealthy and highly educated; boys benefited more from computer-aided instruction than girls.

The positive effects of computer-aided drill and practice programs were especially visible with respect to simple cognitive tasks such as retaining learned material and doing various routine tasks. (Sinko & Lehtinen, 1999: 36).

Similar findings have been reported e.g. by Kulik & Kulik (1987) and Khaili & Shashaani (1994) who found that students generally learned more in classes where they received help from computers. The achievement of students participating in computer-assisted instruction were higher than of the control groups, the students needed less instructional time, they liked their classes more, and they developed more positive attitudes towards computers and learning’.

As noted above, the comparison of computer-assisted learning and traditional learning has yielded conflicting and bewildering results, but Sinko & Lehtinen (1999:40) report that in
Finland the best results for computer-aided learning are obtained at the upper secondary and tertiary levels. Sinko & Lehtinen (1999:34) summarize the early reviews of 300 surveys of the effects of computer-assisted instruction from the late 60s and early 70s as compared to traditional classroom teaching. These surveys resulted in the well-known notion of ‘no significant difference’. This might be the reason why there have not been many comparative studies on the effectiveness of the use of ICT in education in Finland.

On the whole, the comparative research experiments in the area of Internet-based teaching have not proved that learning through a new instrument is more effective. Sinko & Lehtinen (1999: 44) report that 'learning situations implemented with ICT produce wholly new kinds of processes for activities and learning which have not even been sought in traditional teaching and whose effects cannot be directly compared with the outcomes of traditional instruction'. They agree with Tella in that comparison is not needed:

'We have begun to see the role of ICT in teaching and learning to be such a varied and complex phenomenon that it no longer even seems relevant to ask whether the use of information technology promotes learning. There is no single way in which technology influences learning; rather, there are hundreds of different ways. It is impossible to look at the effects of technology alone, separated from ideas about instruction, learning and learning environments, as technology is now intertwined with all of them'. (Sinko & Lehtinen, 1999:44).

The above authors think that it is irrelevant to deliberate whether students learn better when using ICT. It is the combined effect of the instruction and learning environment that counts; and there is no single correct way of using ICT in education; there are as many ways as there are users.
Computerized language tests in English have been in use since the TOEFL tests in 1998 which are now available on CD ROM (Alderson 2001). Alderson (1996) points out that computers have much to offer language testing: not just for test delivery, but also for test construction, test compilation, response capture, test scoring, result calculation and delivery, and test analysis. They can also, of course, be used for storing tests and details of candidates. This means that computers can be used at all stages in the test development and administration process. For me the most interesting features are the easy test delivery, test scoring and test analysis.

2.5 Gender differences

Although gender differences are not in the focus of this study, it is interesting to find out how female student respond to virtual teaching. Slevin (2001: 41) points out that before the end of the 1990s Internet users were predominantly highly educated and affluent white males living in the metropolitan areas of the industrialized world.

Sinko & Lehtinen (1999) reported that several authors have found that boys benefited more from computer-aided instruction than girls. According to these authors, in general, boys' attitudes toward ICT are more positive than those of girls.

The same applies to men: Sinko & Lehtinen (1999: 62) report that in Finnish comprehensive schools, male teachers judged their mastery of information technology (IT) to be significantly better than did female teachers. They think men also had a more relaxed attitude toward IT than women. Men and boys use IT at home more than do women and
girls; and in all age groups, men feel more competent. (Sinko & Lehtinen, 1999: 177). Sinko & Lehtinen point out that the standards that men and women use to evaluate their own skills may be quite different. They think that women may underestimate their skills more often than men. Sinko & Lehtinen (1999: 63) continue that in spite of the remarkable gender difference in the use of and attitudes toward IT, only very few students had reservations when they had to use IT in their studies.

There is general concern that girls are less interested in IT than boys:

'It may even be so that the increase in its (IT) use only strengthens the difference between the sexes and makes some disciplines which use a lot of IT unattractive to girls. The mere increase of equipment and its use may not solve the problem of gender difference, but solving it presupposes changing beliefs concerning technology and developing methods that motivate girls, too.' (Sinko & Lehtinen, 1999: 223)

This problem has been tackled in Finland in several arenas. E.g. the chief researcher of Sonera, Marja-Liisa Viherä (in ote-opetus & teknologia 3/2000) has pointed to three factors that are needed to motivate girls and women to use IT. These factors are: 1. organization through thinking, 2. connecting through emotion, and 3. manifesting your role in life. According to Viherä, these are fundamental needs of both men and women for them to understand the surrounding world and to find their place in society. The need for organization will be fulfilled when one can develop one's thinking in conversations and acquiring knowledge together with others. The need for connecting will be fulfilled through emotion when one participates in the physical, mental and social environment. Here interaction plays a crucial role, since everyday activities, doing tasks and acting out roles all
need interaction and communication skills. Information technology should serve some basic human needs for people to become motivated in using it.

There is a general belief that information and communication technology is male-dominated and has learning methods that favour males. Girls become excluded from modern technology because only 30% of the high school students who choose the long course in mathematics in Finland, are girls (Salonen, ote-opetus & teknologia 3/2000), and mathematics is the foundation of modern technology. What is needed is a change in the contents of IT courses and mathematics which are more motivating and interesting for girls. Girls perform better in learning tasks which do not emphasize competition but favour cooperation (Näätänen, ibid.). In a comprehensive school in Vantaa, Finland, there was an experiment where a computer science class was arranged, consisting of only girls. (Nortomaa, ote-opetus & teknologia 3/2000). They could learn to use IT for their own purposes, concentrate on items they found important and speak in their own peer language. Girls seem to be intimidated in a group where they might show possible inadequancies in front of boys. Another example comes from Oulu University, Finland, who have decided to double the intake of girls in computer science thus doubling the work force in information and communication technology (Taloussanomat 29.11.2000). This could be understood due to the lack of skilled work force in the electronics industry rather than a policy equalizing gender differences.
### 2.6 Other aspects in addressing information technology

The Ministry of Education established the Finnish Virtual University in 2001, and it covers 20 universities and polytechnics. The Ministry is also considering including IT as a subject in schools (Helsingin Sanomat 19.10.1999). I think we have to be critical in our thinking: technology is only a tool, not an end in itself. Niiniluoto (1996: 39) has pointed out six value criteria which can be used when assessing information and communication technology: effectiveness, economy, ergonomics, aesthetics, ecology, ethicality and sociality. Niiniluoto notes that the technology professionals are taught mainly to pay attention to effectiveness, which means effectiveness in relation to the intended use; and to economy, which means economic effectiveness and profit. In other aspects, IT has been taken into account: for example in work psychology, user-friendliness and ergonomics. The visual aspect in using IT has been taken into account in the area of arts and design, architecture and applied aesthetics. Only after the appearance of the green movement in the 1970s has ecology gained ground. Ethicality concerns the functional possibilities of tools, and the way they are produced and used. Sociality or society-friendliness is an aspect that must be taken into account when using IT because social effects are often difficult to foresee as they are typically co-effects or remote-effects of total technological systems.

However, new tools which are economically effective can be stressful, unpleasant, contaminate the environment, morally unacceptable, or socially detrimental. In assessing the effects of new phenomena, we have to take qualitative aspects into consideration. Therefore, in this study the feelings and responses of students towards virtual learning will be dealt with in Chapter 7.
3. HELSINKI UNIVERSITY LANGUAGE CENTRE

Helsinki University Language Centre, Finland, is an extensive teaching unit consisting of 67 full-time teachers plus 58 part-time teachers and 8 administrative personnel. In 1999 the Language Centre provided instruction in 19 languages; the teaching programme consisted of faculty-specific courses for the individual faculties, as well as general courses (Year book of the Language Centre 1999). The budget of the Language Centre was 3.7 million euros in 1999.

The Language Centre’s responsibility is to arrange language studies as prescribed in the degree requirements of the University of Helsinki. The students are required to study at least one foreign language besides their native language, i.e., Swedish or Finnish. Unlike all the other language groups at the Language Centre, English teaching is undertaken by two groups: oral skills teachers and reading comprehension teachers. The oral skills teachers are native speakers of English and the reading comprehension teachers are Finns.

I point out that the Language Centre offers language teaching to the different faculties of the University of Helsinki and a few minor universities in Helsinki area. It does not provide instruction for the language department students.
3.1 English Reading Comprehension (ERC)

According to Virkkunen (1992: 6) English Reading Comprehension, or understanding a written English text, means extracting the required information from the written text as efficiently as possible. The aim of the English reading comprehension courses is to give the students the competence they will need to deal with texts in English during their studies and in their future working lives; in the case of the present target group, the specific area is pharmacy.

This model of teaching English reading comprehension courses follows roughly the one started at the University of Jyväskylä in the early 1970s as cited by Virkkunen (1992: 3). However, the teaching methods at Helsinki University Language Centre have been greatly improved since, especially through the work of Mäkinen (1987), Virkkunen (1992), Karlsson et al. (1997), and Lehtonen (1998). Virkkunen did research on affixation, Mäkinen studied the cloze test, Lehtonen wrote her PhD. thesis on consciousness-raising in foreign language vocabulary learning and reading.

3.2 Pharmacy English

The target student groups in this study are two second-year pharmacy English reading comprehension groups at Helsinki University Language Centre. This Internet teaching experiment was done during the autumn term of 1999.
The English reading comprehension classes for the students of pharmacy usually contain an average of 25 students. The students take the English reading comprehension course in the same groupings as they take their drug preparation classes. The students and the English reading comprehension teacher meet for 13 2-hour sessions, where the students are first taught study skills and the main features of academic texts. Then the students read between 10 and 12 from 600 to 1000-word pharmaceutical texts in English for meaning, which are checked through exercises with the teacher. During the course, the group also examines English grammar and word formation (e.g. affixes and pharmacy terms) using booklets written for these purposes. The language of instruction is Finnish although some English is used in conversation. English oral skills courses are taught by native speakers of English.

The aim of the English reading comprehension classes is to train the students in reading subject-specific professional texts in English in order to cope with their studies and, later, with the English they need in their professional lives. Therefore the texts are exclusively from the field of pharmacy. The abilities of the students are evaluated by continuous assessment during the course, and an end-of-course final examination. The pharmacy English reading course is quite short; it only consists of 26 contact hours plus homework (1.5 credits), and the classes are rather large. I have been teaching these students since 1983, and have done an experiment of ‘Reading While Listening’ (Mäkinen, 1992) with them. In general, I found them disciplined, yet flexible, and pleasant to teach. They responded well to the ‘Reading While Listening’ teaching experiment. These are some of the reasons I decided to try something new.
3.3 Earlier Internet work at Helsinki University Language Centre

Several teachers at our language centre have used the Internet for teaching purposes for many years now, including Donald Smart, Peter Wagner, Tom Toepfer, Pekka Kaikumo, Tuula Lehtonen and Leena Koskinen. Koskinen and Lehtonen gave ICONS (International Communication and Negotiation Simulations) courses for students of different faculties for several years. These courses were moderated by the University of Maryland.

A real breakthrough started in 1996 when teachers at Helsinki University Language Centre, Ulla-Maija Fiilin, Lis Auvinen and Donald Smart became involved in a national Internet-based learning materials programme. This programme was supported by the Ministry of Education and it included four institutes: Helsinki School of Economics and Business Administration, Tampere University Language Centre, Turku University Language Centre, and Helsinki University Language Centre. This team, co-ordinated by the Media Centre of Tampere University, produced Internet pages for English and Swedish language instruction (Mäkinen and Smart, 1999: 340). For Swedish, Fiilin and Auvinen produced a web-based Swedish language grammar course (Språknät), as well as a Swedish political science Net course. Fiilin and Auvinen were awarded the Helsinki University Teaching Technology prize in 1997 for ‘Språknät’, which was considered the best implementation of computer assisted teaching at Helsinki University that year. The ‘Språknät’ web site contains grammar, exercises, discussion, thematic modules, texts, dictionaries and research projects (Lindblom-Ylänne, 2000: 159). The Swedish for political science Web-Course (Auvinen) aims at improving communicative proficiency in both written and oral skills. Further, on the Web, there is a course in Swedish called ‘Människan i arbetslivet’(People in Work) by Auvinen, Peltonen and Ohinen-Huttunen. These Internet courses are still being held and
developed, and Fiilin and Auvinen are planning new courses for the Internet: ‘Kultur’ (Culture), ‘Samhälle’ (Society) and ‘Arbetsresor’ (Business trips).

As an English reading comprehension teacher I had given a course on EU terminology in 1996 in traditional classroom settings. I considered whether this course could be given virtually. I discussed this with Donald Smart, an English lecturer at the Language Centre, and he introduced me to TopClass. I began to teach the European Union terminology course through TopClass on the Internet in autumn 1998. The aim of this course was to introduce students to the specialised Finnish and English terminologies of the European Union and it is based on official European Union documents which cover all the institutions of the EU, and which are not subject to copyright (Mäkinen and Smart, 1999: 341). This course, now called ‘EU Terminology on the Net’, is still part of the Language Centre programme 2002-2003. During these years, students from various faculties, e.g. humanities, law, science, social science and dentistry, have taken the EU Terminology net course. Later, I decided to implement TopClass program in teaching English reading comprehension to students of pharmacy, physics and the humanities.

3.4 Background to the present study
Because of the decrease in Helsinki University budget and the increasing intake of students, the Language Centre has had to find solutions to meet the increasing demands for its services. One of the new solutions is the Autonomous Learning Modules (ALMS) system created by Karlsson et al. in which teachers negotiate curricula with their students. The principal idea in this system is that an autonomous student should have the ‘ability to take charge of his/her own learning’ and for this to happen the learners need to take ‘responsibility for all the decisions concerning all aspects of this learning’ (Holec, 1981:3).

However, Mozzon-McPherson (1999: 117) argues that an uncompromised form of autonomy can never be put into practice for many reasons. ‘One of these is the formal education culture which still invests authority and knowledge in the teacher. This makes it hard to initiate and maintain a constructive interactive learning conversation as the teacher-learner relationship is one of power rather than solidarity’. The assertion that teachers have the power and authority in the teacher-student relationship is commonplace in the literature (e.g. Karlsson et al, 1997; Kjisik and Nordlund, 1999).

Contrary to the above opinions of Holec and others, it can be argued that the student is never really independent. ‘It is the kind of dependency which changes’ (Widdowson 1990: 189). Widdowson makes a distinction between authoritarian and authoritative teaching. An authoritative teacher ‘exercises authority in transactions by virtue of the achieved role of an expert’ (ibid.: 188), and the authority is based on professional qualification, not on the right to teach. Widdowson cites Barry Taylor who makes this clear. Taylor notes that an authoritative approach should aim ‘at the need to maintain a non-authoritarian presence throughout this process so that students can feel secure and non-defensive to enable them to
learn not because the teacher demands it of them, but because they need to in order to accomplish their own goals’ (Taylor 1987: 58).

Along the same lines, Tella (1997: 29) quotes Underhill’s (1989) division of power into four uses:

*Authoritative power*, exercised for and on behalf of the learner by others (usually by the teacher). This kind of power is conceptually contradictory, as the teacher often uses the power in order to help the learner to become more autonomous.

*Autonomous power*, exercised by the learner himself, whose autonomy the teacher tries to facilitate and support by yielding some of her own power to the learner.

*Authoritarian power*, a degenerate version of authoritative power, exercised by the teacher, consciously or unconsciously, over the learner without paying enough attention to his interests. The learner is taken as an object, rather than as an autonomous and reflective subject.

*Abdicated power*, a degenerate version of autonomous power, exercised by the learner to whom it has been given inappropriately by the teacher who is unable or unwilling to exercise it herself. The teacher attempts to yield some of her authority to the learner, who is not able or capable of assuming the responsibility of his own deeds.

In Underhill’s and Tella’s interpretation ‘authoritative power’ and ‘autonomous power’ are the types of power whose sound balance form a competent and legitimate situation. This, I think, is an example of the heuristic concept of good, which comes from as far back as Aristotle: Good practice lies between exaggeration and doing too little. Not enough attention has been paid to the positive side of power; there needs to be a balance where power is concerned. I think it is authoritative power that teachers and any educators as well as, say,
parents necessarily must possess is order be able to guide and bring up their students and children to ultimately become independent of their instructors and parents. Uljens (1997: 18) puts it in the following way: ‘The practice of education always aims to become something unnecessary: the aim is to support the individual in developing to a point where the educated individual, in a manner of speaking, manages alone.’

As to ICT and its use in education, I think we should beware of ‘abdicated power’ and give too much power to the students because students may become frustrated and do not benefit from the tuition if the teacher gives all the responsibility to them. Moreover, good students may not achieve as high as they might under the teacher’s supervision and guidance.

Actually, I think in teaching adults virtually the power aspect is irrelevant. I understand that the choice of suitable working methods by the teacher for students is in a fundamental sense value-related (Uljens, 1997: 16). However, I argue that teachers always face the ethical question of which method to use. I think that the teacher, who exercises authoritative power, always thinks about the students’ needs and aims first, although he or she then is entitled to choose the method that best suits his or her personality as a teacher. As Widdowson pointed out, we can never avoid the aspect of power in relationships where there are people of different status. Tella et al. (2001; 204) note that in the 1990s educators started to understand

that individualization in the area of education might also lead to too strong learner-centredness and thus hinder the birth and working of a learning community.
I wish to point out that, in this study, the primary focus is on teaching, and the secondary focus on learning outcomes. My intention was not to do research on studying or the learning process.

4. THE PRESENT STUDY

This study aims to compare the learning outcomes between two groups of learners, although Tella has noted that it is impossible to compare the learning outcomes of two different teaching methods. I agree with him to some extent, but I find it useful and interesting to see the results of two totally different approaches. I think comparing these two teaching methods in this study is possible since the same learning material is taught to both the virtual and the control group, and the virtual students are not working strictly independently in an open learning environment. The teacher is the same in both approaches. Along this process I also developed virtual English teaching material for students of pharmacy. I wanted to determine whether I could produce effective material for Language Centre courses which would meet the required standards. Even though in the area of teaching through ICT the focus has shifted from teaching to learning, I chose this viewpoint in order to feel confident that my teaching method is appropriate for the students’ learning needs.

This study represents action research because here I carried out research on my own work as a teacher. It was not so much research on other people as research on my work by myself (Falck, 1996: 60). My role was complex: I wrote Internet material and a computerized reading comprehension test to the virtual students and instructed them in the virtual course. I taught the control group and wrote questionnaires and collected data from both courses. I will explain my view on action research below.
4.1 The aims and objectives of this study. The research problems

The present study was made keeping in mind the needs and goals of the students in learning pharmacy English, as well as the need to modernize and rationalize the language course, and cost-effectiveness. With the emergence of new active learning methods which take advantage of new technologies, I agree with Tella et al. that ‘in the future the teachers’ task will be to teach new generations to learn more quickly, to teach them to independently create new kinds of information systems.’ (Tella et al., 1998: 21). I wanted to find out how well a virtual course would work, and how the students would respond, especially because 99% of the Pharmacy students were female. Earlier it was thought that women are not as interested in the Internet as men, but Slevin (2001: 42) notes that the proportion of women using the Internet in industrialized countries in late 1990s was nearly 40%.

The study, which involved writing and using an Internet course, was motivated by the fact that there was virtually no computer-assisted language learning materials for undergraduate Finnish pharmacy students. This can be attributed to the fact that the production of teaching materials for computer use has been technologically-driven to a large extent and pedagogical or scientific expertise and goals have had very little effect on content as pointed out by Leer (Sinko and Lehtinen, 1999: 31) in the detailed expert report to the OECD.

In this study, the following guidelines for designing a virtual course given by Peterson (1999: 70) were roughly followed: design meaningful real world tasks, encourage exploratory learning (narrowly), and provide feedback
It was felt important to have varied and meaningful tasks from the real world of pharmacy English usage. Feedback was also thought to be necessary, but this virtual pharmacy English course was not exploratory in Peterson’s sense because I had written the tasks in TopClass and the students did not necessarily need to use the Internet more widely. Tella et al. (2001: 213) advocate that the needs of the users have to be taken into account when planning a virtual course. In this experiment I made an effort to take the needs of the students, those of the Department of Pharmacy, and my own as a teacher, into account.

The research problems were:

Problem 1. What has to be taken into account when teaching English reading comprehension to students of pharmacy via the internet and using TopClass.

Problem 2. How will the learning outcomes of the virtual group and the control group differ?

Problem 3. How will the students and the Department of Pharmacy respond to the virtual teaching method new to them?

Problem 4. Is it possible to test English reading comprehension learning material using TopClass groupware tool?

4.2 Methods and materials
4.2.1 Methods

As to methodology, I refer to the categories developed by Richards and Rodgers (1982). They see ‘method’ as defined in terms of three levels: approach, design, and procedure. The first level, approach, is the theory of language and of language learning that the researcher has as a starting point.

Since this study is focused on teaching language skills to an existing learning community, I have written several tests which the students undertake in order to practise and develop their skills. My role here has been to create intellectually challenging tasks to help the student in this learning process. I share Oxford’s (1990) language learning theory, which is divided into two categories, i.e. direct and indirect strategies. The direct strategies are: memory strategies, cognitive strategies and compensatory strategies. The indirect strategies are: the meta-cognitive strategies, affective strategies and social strategies. Some workers in the field advocate that the meta-cognitive strategies are crucial and that they have not been given enough attention. My view is that the direct strategies are needed extensively in this type of virtual language learning. E.g. pharmacy students need memory strategies in order to memorize new pharmacy terms and phrases; they use cognitive strategies as techniques for tackling new texts, and they need compensatory strategies, such as guessing and inference, when reading professional texts.

Today’s most prominent theory of learning is Vygotsky’s constructivist learning theory. Vygotsky himself explains what he means by the zone of proximal development in the following way:

‘The zone of proximal development is the distance between the actual developmental level as determined by independent problem solving and the
level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers’. (Vygotsky: 1978: 86)

The zone of proximal development is charged with the learner’s potential for moving towards higher levels of development. This occurs under the guidance of more knowledgeable peers or by the expertise of an instructor. Duffy and Cunningham (1996: 183) point out that neither the teacher nor the student owns the zone of proximal development, ‘rather, it is something that is established dynamically’. Learning is an active process of constructing knowledge and reflecting on experience rather than acquiring knowledge; and instruction is a process supporting that construction rather than communicating or transmitting knowledge.

Nevertheless, my approach is one in which the student practices his or her direct language learning strategies. To me it is clear that the teacher has to use his or her authoritative power in planning and directing the learning process. ‘Passing knowledge’ is not even possible.

The design of this study is that of a quasi-experimental type (Creswell 1994: 130). There are the control and experimental groups, but they are intact groups, i.e. the subjects are not statistically randomly assigned to the groups, instead they were put to the groups in alphabetical order by the Department of Pharmacy.

Thus there were these constraints on my choice of research methodology, as my teaching experiment should not encroach on the students’ pharmacy studies. My research methods had to be designed around the students' regular course work. This meant that I could not use conventional empirical methodology in all my work. Specifically, the way in which the students for the experimental and control groups were ‘randomised’ poses a question and
makes this study quasi-experimental. On the other hand, even if it had been possible for me to have the students conform to a strict empirical experimental design, it would still have been impossible to isolate many factors which might have interfered with the results. E.g. some of the students attended English oral skills courses during the experiment which might have had an effect on the final results. Furthermore, even if the groups had been grouped in a statistically randomised way, the groups would have been different because of other reasons, e.g. different timetables, attitudes and different amounts of other work.

One can say that the subjects were selected conveniently (Creswell 1994: 127). In this way, the entire intact groups assigned to me were able to participate in the study. The design of this method can be considered ‘a compromise design’ (Cohen & Manion, 1994: 169) a term used in educational research where the random assignment of classes or groups is impracticable or impossible. Cohen & Manion (ibid.: 168) state that ‘(o)ften in educational research, it is simply not possible for investigators to undertake true experiments’. In this case I had to be content with these constraints.

In sections 4.2.2 through 4.2.9. I shall explain the linguistic content, specification for the selection and organization of the content, i.e. materials used, and explain the roles of the learners and the teacher in this study.

The third level, procedure, is concerned with techniques and practices in a method. It may well be the case that the procedure in this study was predefined and driven by the tool, TopClass, and the question types and features it has. However, I was concerned not to be too technology-driven but wanted to write subject-specific content tasks and questions in the computer system in order to meet the requirements of the Pharmacy English reading comprehension course laid down by a Pharmacy Department statute. For several years I
have regarded TopClass as a good resource for the Language Centre and wanted to use it experimentally. The procedure will be dealt with in detail in sections 4.2.3 through 4.2.5.

**Action Research**

Action Research is an umbrella term for approaches where the researcher’s intention is to have an influence on the working of the target population and make an intervention in it using scientific means. Falck (1996) notes that action research is typically carried out by research oriented practitioners such as teachers. Cohen and Manion (1994) define action research as ‘small-scale intervention in the functioning of the real world and a close examination of the effects of such intervention’ According to them the ‘principal justification for the use of action research in the context of the school is improvement of practice’ (ibid.: 192). Cohen and Manion list seven areas where action research can be suitably used. They are:

- teaching methods – replacing a traditional method by a discovery method (1)
- learning strategies – adopting an integrated approach to learning in preference to a single-subject style of teaching and learning (2)
- evaluative procedures – improving one’s methods of continuous assessment (3)
- attitudes and values – encouraging more positive attitudes to work, or modifying pupils’ value systems with regard to some aspect of life (4)
- in-service development of teachers – improving teaching skills, developing new methods of learning, increasing powers of analysis, of heightening self-awareness (5)
- management and control – the gradual introduction of the techniques of behaviour modification (6)
- administration – increasing the efficiency of some aspect of the administrative side of school life (7)

(Cohen and Manion, 1994: 194)
All these areas apply to the present study:

**Teaching method:** I wanted to introduce a new teaching method to be used along with the traditional method to partially replace it.

**Learning strategies:** in virtual learning the students might be integrated into the whole virtual community.

**Evaluative procedures:** the program TopClass may improve the routine evaluation of student achievement.

**Attitudes and values:** I aimed to map the student attitudes and responses to the new learning method.

**In-service development of teachers:** this study is part of a wider in-service training programme the aim of which is higher quality of teaching and learning.

**Management and control:** I wished to perform an experiment to determine whether a computer program would help in managing a language course.

**Administration:** with the use of ICT the workload of administration could be eased.

Generally, in scientific study, to maintain objectivity the researcher has to pursue to study his or her object without interfering with its functioning. This demand for objectivity is not as strict in action research, because in this research the researcher is not distant from the research object; on the contrary, the researcher may even be a part of the research process.

For this reason, action research has been criticized on the grounds that it lacks scientific rigour: its objective is situational and specific, the sample is restricted and unrepresentative, the researcher does not have control over independent variables, and the findings are not
generalizable but are restricted to the environment in which the research is carried out. Part of this may hold in the case of this study, but action research can be justified when it is done by a practicing teacher who tries to make it extensive, less personalized and open. Cohen and Manion (ibid.: 192) state that features which make action research a very suitable procedure are its flexibility and adaptability. In this study, it was found expedient that the teacher, who would be doing the teaching, would also do research. This was action research in the sense that the teacher was empowered to make research decisions and implement them herself (Tesch, 1990: 14).

In this case we can speak of participating observance where the researcher tries to solve a specific problem together with members of the community s/he is studying. This problem solving is central in action research. Very often the researcher is, with his or her exceptionally active role, trying to solve a relatively practical problem concerning the community. The researcher may bring the research participants, into the research project as full members, and they may together aim at common goals and improvement of the working of the community. Thus, the following definitions can be connected to action research: research, intervention, striving for improvement and the subject nature of those studied (Eskola & Suoranta, 1998: 129). Kalliola (1996: 59) sees the change for the better as the ideal of action research. The fact that the researcher is trying to solve a practical problem and that s/he has an active role make the researcher’s position in research problematic: how can we distinguish between research and other activities? Furthermore, how can the researcher write a valid report to satisfy the scientific community when s/he is the researcher, catalyst and agent of change?

In the present study, action research took place in the actual educational context, and I assumed all these roles. I am aware that it is difficult to draw a line between these roles
when the same person was the catalyst, teacher and the researcher investigating whether professional practices might be improved by using a novel method.

In my teaching experiment, I wanted to eliminate bias in two ways: 1. I used the same reading material tested during the previous academic year for both groups, 2. I did my best in teaching both groups as skillfully as possible and based on my own experience. There was a risk that the virtual group would not be taken care of properly since this was the first attempt of teaching through the Internet, and because I was writing the Internet exercises at the same time as I was teaching the control group. The course given to the virtual group was not pre-tested or piloted.
4.2.2. TopClass

The Internet authoring program TopClass was used in this study and is a product of WBT Systems (a Dublin based company). I used TopClass because it was available in the Language Centre and I found it a good resource and interesting especially from the point of view of reading comprehension. This program was chosen by Donald Smart (an English lecturer at Helsinki University Language Centre), and the licence was bought in 1997. TopClass works within the metaphor of a classroom. It recognises three types of users: administrators, instructors and end users. There is one administrator of the system who assigns passwords to instructors. The instructors can then assign their students to courses in various ‘classes’. The course material is placed into the system in HTML form. TopClass imposes a modular structure on course designers. The program has eight predefined question types which the course designer can use to test his/her students’ understanding of the material. Most of the question types can be marked by the computer. The other types can be sent to the instructor for marking via the built-in mail system. TopClass assigns unique homepages to each user; thus there are three types of homepages. The administrator has the most features and the students the least on the home page. (Appendix 1)

TopClass has a built-in comprehensive tracking system, which depends on the users’ unique usernames and passwords. The tracking features allow the instructors to evaluate all aspect of his/her Internet course. The system also has a built-in group discussion feature, so that members of the class can communicate with each other. It also has a bulletin board feature, which instructors can use to send messages to their classes. The program is sold in various configurations depending on the number of concurrent courses. The licence, which our Language Centre has, allows 50 concurrent users.
The hardware: The program, which is currently TopClass version 3.1, runs on an iMac, housed in the Language Centre’s computer administrator’s room. Our Internet server program is Webstar, a product of Starnine. The present author and Donald Smart have discussed the use of TopClass in an earlier paper (Mäkinen and Smart 1999).

Various Finnish companies, including the leading Finnish information technology company, Nokia, (personal communication from Petra Wager of Nokia, August 23, 2000) use TopClass to train their personnel. Nokia uses TopClass because of its safety, reliability and technical flexibility. According to Wager, TopClass belongs to the same group of Internet-based Integrated Distributed Learning Environments (IDLEs) as Lotus Notes and Docent. TopClass is a groupware tool for teaching/learning.

TopClass home page is presented on the next page.
4.2.3 The students and their work

Pharmacy students are each year placed by the Pharmacy Department into four drug preparation laboratory groups in the alphabetical order and the students attend the English reading comprehension classes in the same groupings. So these four laboratory courses and four English reading comprehension courses alternate during the term. The former two courses started at the beginning of September and the latter on the 20th of October. It was not possible to re-organize Pharmacy studies and set up totally new groups for experimental purposes.
One of the groups starting on October 20 was chosen as the virtual group and the other as the control. The two groups were taught by the same teacher in order to avoid differences in didactic approach.

On October 20, 1999, both groups met the teacher in class, where she introduced the students to the research setting. They were given the study materials (i.e. 10 Pharmaceutical texts, a grammar booklet, an affix booklet and a list of 300 pharmaceutical terms). Both groups were given the same initial test, which was a ‘semantic cloze’ test called ‘Drugs and insomnia’.

The work of both groups lasted for six weeks. The virtual group was given a rough weekly timetable. For each virtual group session the teacher had prepared reading comprehension and vocabulary questions (from 40 up to 70) for one of the texts within the TopClass environment; the students studied one chapter of the grammar booklet and checked the answers from TopClass class Announcements; and they worked with given affixes from the affix booklet (which is self-checking as to the answers). There were ten units (and texts) in the program, the texts were given in paper form, but the questions on the texts were on computer.

The control group worked with the same material, meeting the teacher 10 times. The working method with the control group was as learner-centered as possible, although the teacher used conventional methods, too. The students read the texts in class, the questions were dealt with together with peers and the teacher; the affix and grammar exercises were checked together. I pursued to point out the same or similar words and structures in class as
the virtual group had to work on. Both groups took the same final test on December 1, 1999. The test consisted of 5 parts (Appendices 4-6):

1. Cloze (Pharmacotherapy of Depression), 2. Pharmacy terms to be translated from English into Finnish, 3. Affix section, 4. Structure section, 5. Verb section. This test was a traditional pharmacy English reading comprehension test with the exception that there could be neither ‘an open-ended questions’ test type nor a summary to be written. These types of tasks cannot be corrected by the computer.

I wrote the virtual group tasks and taught the control group, so differences between the two groups due to different teaching styles were eliminated as much as possible. The students in the two groups were not randomly chosen in a strict statistical sense. However, the groupings made by the Department of Pharmacy can be regarded to be random enough for the purpose of this study. I made several didactic decisions for both groups which are shown in table 2, next page.

<table>
<thead>
<tr>
<th>Distribution of materials</th>
<th>Virtual group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ten pharmaceutical texts, an affix booklet, 300 pharmacy terms and grammar exercises were given to the students at the start of the course</td>
<td>The affix booklet, 300 pharmacy terms and grammar exercises on paper were given to the students at the start of the course. One pharmaceutical text was handed out at each of the ten face-to-face sessions.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Studying method</th>
<th>Virtual group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Studied autonomously within TopClass learning environment.</td>
<td>Worked with the teacher in class.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teacher’s duties</th>
<th>Virtual group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Write the reading comprehension questions in TopClass, monitor the students’ work using TopClass system.</td>
<td>Monitor the students as they did the reading comprehension questions, affix and grammar exercises.</td>
</tr>
<tr>
<td>Learner’s duties</td>
<td>Read the texts, answer the questions in TopClass. TopClass marked the answers automatically. Do tasks in affix and grammar booklets, check the answers in the class announcements.</td>
<td>Read the texts in class. Discuss the answers with the group and the teacher. Check the affix and grammar answers in various groups in class.</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Studying</td>
<td>Alone or with partners. Cognitive, structured but free of time and place</td>
<td>Collaborative work in class.</td>
</tr>
<tr>
<td>Initial test</td>
<td>Cloze test on paper. The same for both groups.</td>
<td>Cloze test on paper. The same for both groups.</td>
</tr>
<tr>
<td>Final test</td>
<td>Computerised test. Identical with the control group's test.</td>
<td>Test on paper. Identical with the virtual group's test.</td>
</tr>
</tbody>
</table>
4.2.4 The introductory sessions and the initial test

Tella et al. (2001: 236) note that it is customary to give an input or orientation session when the internet course is about to start. I followed suit.

On October 20 both groups met with me in class and I introduced them to the research setting. They were given study materials (i.e. 10 pharmaceutical texts, a grammar booklet, an affix booklet and a list of pharmaceutical terms). Both groups were given the same initial test, which was a ‘semantic cloze’ (i.e. a modified multiple-choice test, see Mauranen 1987) based on the article ‘Drugs and insomnia’.

In order to obtain some background information of the students’ previous English studies, they were asked to provide the following information:

1. their final school mark in English
2. their Finnish Matriculation Examination grades in English
3. how many years they had studied English.

The length of the course for both groups was six weeks.

4.2.5 The working of the groups

The control group

The group worked with the same material during 12 sessions with the teacher. The working method with the control group was a mixture of traditional and new, learner-centred methods. The students
read the texts in class, the questions were dealt with both in peer groups and teacher-led groups; the affix and grammar exercises were done as whole class exercises.

The virtual group

The group was given a rough time-table (Appendix 13) which detailed the tasks they were expected to complete each week. For each virtual group session the teacher wrote, within the TopClass environment, from 40 to 70 reading comprehension and vocabulary questions for each unit of text. The students did one chapter of the grammar booklet and checked the answers from TopClass Class Announcements; and they worked with the set affixes from the affix booklet (which contains an answer section). There were ten units (and texts) in the course, the texts were given in paper form, but the questions on the texts were computerized.

4.2.6 The attitudes of the students before the virtual course

The prospective virtual students' attitudes towards learning via the Internet were assessed using a questionnaire survey before they started the course. The students were asked about their previous use of computers in language learning and their attitudes towards virtual learning in general. They were asked the following questions:

1. Do you have a computer at home? (Answer: Yes/No)
2. For how long have you been using a computer?
   (Answer: a. not at all, b. about one year, c. 2 to 3 years, d. longer)
3. Can you search for data on the Net? (Answer: Yes/No)
4. Have you used the Internet for your language studies? (Answer: Yes/No)
5. What is your attitude towards a virtual pharmacy text course?
   (1 = I’m against, 2 = I’m somewhat dubious, 3 = I’m indifferent, 4 = I’m slightly interested, 5 = I would be glad to participate)
6. What do you expect the outcome will be when/if you participate in an on-line course?

7. Open-ended answers. (Appendix 7)

First of all, this was a pilot study which I had planned well in advance, but not actually written the exercises into the program. The students had not been informed about the study before the first lesson, so this idea of a new way of learning came as a surprise to them. However, they took it calmly; I could see neither great enthusiasm nor disapproval in their expressions. Ten students who came late to the control group, wanted to join the virtual class. They were accepted and this makes the grouping all the more coincidental.

4.2.7 The results of the before-the-course questionnaire

Ninety-seven per cent, i.e. 32, of the prospective virtual students completed the questionnaire. These are the results:

Home computers, and length of use of computers: 50% of the students had a computer at home. Only one of them had never used a computer for any purpose. Ten students had been using a computer for about a year, 12 students for 2 to 3 years, and nine of them had been using it for longer than three years.

Ability to search for data and expectations: Most of them (29) claimed they could search for data on the net; but 27 had not been using the Internet for their language studies. As to their general attitude towards starting a virtual English reading comprehension course, none were against the idea. Seven said they were somewhat dubious, and three were indifferent. A total of 22 told they were slightly interested and only two noted they would be glad to
participate. In their own words, as many as 10 students wrote that ‘it will be interesting and useful to use the Internet for searching information’; and that it will also ‘be good practice because in the future we will be using computers a lot’. This was the prevailing expectation.

**Independence of time and place:** The second most common expectation (5 remarks) was that they thought the new on-line course could be taken independently of time and place (‘not a tight schedule’). Answers such as ‘I will learn things being active myself’ (2) and expectations of autonomous learning (3) can be regarded as wishes of independence of time and place, too. Thus a few of them expected to have a chance of learning more autonomously, yet four of them wanted to have 'guided learning' or ‘individual guidance'. There also were some single answers, such as a wish of learning a new way of studying, as well as one student writing ‘it can be fun and different’.

**Learning vocabulary:** In learning languages, students very often stress the importance of learning vocabulary. In this questionnaire, too, one student expected mainly learning new vocabulary only, and two others mentioned that they would be expecting to learn more words in English. It is natural that they should expect this because they instinctively expect vocabulary learning to be easy by computers.

**Methodology:** Four students commented on methodology: ‘it will be interesting to see how the course works in practice and how the new method differs from ordinary language learning’.
Neutral: There were five remarks that can be regarded as neutral, such as these two: ‘I have no expectations because I don’t know what the course will be like’ and ‘I’m not sure, I have not studied on-line before but it could be interesting’.

Reservations: There was one clearly negative answer: ‘it will be difficult because I don’t have a computer at home’. Two other students were concerned about the fact that there were so few computers at the university, so the virtual course would not probably be a success. Still two other doubters expressed their opinion that there should be a computer course before starting a virtual course and instruction on how information can be accessed from the Net.

4.2.8 The texts

1. 'Part-time workers in pharmacy: A role for women' (International Pharmacy Journal, Volume 13, NO 1, 1999)
2. 'Addiction in the health professional' (The Pharmaceutical Journal, Vol 357, August 17, 1996)
3. 'Coughs' (by Tracey Lee Edinburg, in SA Pharmaceutical Journal- June 1999)
4. 'Treatment of malnutrition in refugee camps' (The Lancet, Vol 342, August 7, 1993)
5. 'Mad Cow Disease' (by Max Sherman, in Pharmacy Times, July 1996)
6. 'Pharmacists as counsellors?' (by Judith A. Rees, in The Pharmaceutical Journal, August 17, 1999)
8. 'Women and Migraines' (by Ann W. Latner, in Pharmacy Times, September 1995)
9. 'Foot Care' (by Faye Brookman, in Pharmacy Times, July 1996)

These texts (Appendix 2) were used as part of the learning material for both courses:
I had written the tasks for these ten texts (and Units) for the virtual students into TopClass. The first five questions of Unit four are given here as an example (next page).

**Figure 3.** The ten units of the virtual Pharmacy course and the beginning of Unit 4

The names of the units can be seen on the left, and on the right hand side there is the beginning of Unit 4, which starts with vocabulary questions. The total marks for the unit was 40.

### 4.2.9 Time spent on virtual exercises.

Every member of the virtual group had to be active in their studies, unlike in the classroom situation where some students are more active than others and some individuals can be
totally quiet during a lesson. After the course, the virtual students were asked how much
time they spent on their Internet exercises. They reported that they had spent from 40
minutes up to 2 and a half hours per unit, the average being 60 minutes. This figure does not
include the time spent on the grammar and affix exercises.

5. EVALUATION OF THE LEARNING OUTCOMES: THE FINAL TEST

I decided to have the first attempt at a computerized final test (Appendices 4-6) after the
virtual English reading comprehension course because there had not been major problems
with the program, or with the students' attitudes. The test had to be planned so that the
computer could check it, thus I had to use similar tasks to what had been used during the
course itself (and not to have open-ended questions section at all).

Both groups had the same final test on December 1, 1999. The virtual group did this by the
computer and the classroom group on paper. The test consisted of five parts:

1. A cloze section (Text: Pharmacotherapy of Depression), 24 pts.
2. Pharmacy terms to be translated from English to Finnish, 20 pts.
3. An affix section (see Virkkunen, 1992), 10 pts.
4. A structure section, 10 pts.
5. A verb section, 10 pts.

This test was not totally similar to traditional pharmacy English reading comprehension tests
used at the Language Centre, which consist of three sections: 1. Text with open-ended
questions, 2. Cloze-test, and 3. Affix test. (In recent years other English teachers have varied
the examination composition and used other test types, e.g. summaries, critiques and
learning diaries). However, this three-section test type had been used with the students of pharmacy until autumn 1999.

Figure 4 shows the beginning of the final test, starting with the cloze section.

![Cloze Section Example](image)

**Figure 4.** The test starts with the answer alternatives for the cloze section. The students could click the appropriate alternative. The text with the blanks was on paper.

Figure 5 (next page) shows a part of the terminology section in which the students had to write the Finnish equivalent of the given English term. As mentioned above, the students were given a list of 300 pharmaceutical terms to study.
Question 25
Now you will have 20 terms out of those 300 in the list. You will see the terms in English. Write the Finnish translations. Verbs in the basic form as 'crycle', nouns in the singular as 'panyte' ++ Number 1: deadrun
For 1 points

Question 26
to gauge
For 1 points

Question 27
to swallow
For 1 points

Question 28
temperature
For 1 points

Question 29
thermometer
For 1 points

Question 30
scale
For 1 points

Figure 5. Part of the term section showing how the terms to be translated are displayed on the screen in the test. The picture below shows the List Matching section.

List matching of 10 English and Finnish verbs
contribute lievittää
aggregate lievittää
provide lievittää
acknowledge lievittää
impact lievittää
persuade lievittää
enhance lievittää
alleviate lievittää
require lievittää
respond lievittää

For 10 points

Figure 6. List Matching section, i.e. the verb section.

The first section was a cloze assignment. Mauranen (1987) extensively researched both the traditional or standard multiple-choice cloze test and the more recent semantic cloze test.
Her conclusions were that the standard multiple-choice test primarily measures general proficiency while a semantic cloze is a more valid reading test because the words to be deleted have been chosen so that to do the test well, the student needs to understand the text context more widely (Mauranen 1987: 70). The text, 'Pharmacotherapy of Depression' consists of about 1000 words; 24 words had been deleted and the students were given a four-answer alternative per each blank.

6. THE STATISTICAL ANALYSIS

6.1 The materials analyzed

The research material is composed of a total of nine variables which were obtained from 58 students.

The analysis material was obtained from two groups of students: 1. those who studied in the traditional way (the control group) and 2. those who studied through the Internet (the virtual group).

Special thanks to Mr Jaakko Korpela, a student of statistics at Tampere University, for helping me with this statistical section. He has used the SPSS program for the analysis.
The starting level of the students' English was examined using the following pieces of information:

1. the marks they obtained in English in their final school reports, 2. their English matriculation examination grades and 3. the number of years they had studied English for. The other two background variables are the students' ages and sexes. The main interest and the research problem in the analysis is how the students performed during the courses. In these courses, there were two tests, an initial and final test. The results for both groups were used in the analysis.

**6.2 Description of the data analysis in the context of the statistical problem**

One of the research questions of this study is to compare the learning outcomes of two different groups of Pharmacy students. The research material is made up of data for 58 students, so the study sample was quite small. The groups can, however, be considered student groups of regular size. The great majority of the students were female: out of 58 students there were only three male students.

**6.3 Analysis of the tests**

At the beginning of the course the students in both groups were given an initial test and at the end of the course they did a final test. The maximum score for the initial test was 35, and that for the final test was 70 points. Let us examine the results of the tests.
6.3.1 The initial test

The means and standard deviations for the initial test are shown in Table 3.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>21.1</td>
<td>25</td>
<td>5.1</td>
</tr>
<tr>
<td>Virtual</td>
<td>24.3</td>
<td>31</td>
<td>4.9</td>
</tr>
<tr>
<td>Total</td>
<td>22.9</td>
<td>56</td>
<td>5.2</td>
</tr>
</tbody>
</table>

The table shows the mean score of points for both groups. The virtual group has a mean which is 3.2 points higher than that of the control group. But, because the standard deviations of the groups are more or less equally big (the deviation being 0.25 units), the variation of the test scores can be regarded to be similar in both groups. So, the virtual group did better in the initial test.

6.3.2 The final test

We then move on to examine the results for the part of the final exam.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>51.52</td>
<td>25</td>
<td>7.64</td>
</tr>
<tr>
<td>Virtual</td>
<td>54.55</td>
<td>33</td>
<td>7.97</td>
</tr>
<tr>
<td>Total</td>
<td>53.24</td>
<td>58</td>
<td>7.91</td>
</tr>
</tbody>
</table>

The table shows the mean scores for both groups in the final exam. The virtual group achieved a 3.0. points higher mean. There are no big differences in standard deviations between the groups.
In this exam, too, the virtual group had a higher mean. Also as it can be seen that the standard deviations are more or less similar (the deviation being 0.33 units) it can be concluded that the virtual group really did better than the control group (in the final test, too).

6.3.3 Background knowledge of English

We will now examine what background knowledge of English the students had before starting the course and how it affected the results obtained. In order to do this the grades the students obtained in English at the matriculation examination and their school grades in English in their last school report were examined.

The students’ Finnish Matriculation Examination (equivalent to the British A-level) English grades, the English mark in their latest school report, and the number of years they had studied English were elicited from the students. There are six categories for passing the Matriculation Examination. They are, in the order of superiority: L = laudatur, E = eximia cum laude approbatur, M = magna cum laude approbatur, C = cum laude approbatur, B = lubenter approbatur, A = approbatur. There is one category for failing: I = improbatur. Students who have failed in English do not normally enter university. This rating varies a little over the years, but the Matriculation Examination Board tries to keep it relatively stable from year to year. (Personal communication with Pirjo Havana at the Finnish Matriculation Examination Board, October 2, 2000)
The matriculation examination grades in English:

\[
\begin{array}{cccccc}
\text{Matriculation Grade} & 0 & 1 & 2 & 3 & 4 & 5 & 6 \\
\text{Count} & 14 & 12 & 10 & 8 & 6 & 4 & 2 \\
\text{Percent} & 20 & 18 & 13 & 12 & 10 & 8 & 4
\end{array}
\]

**Figures 7a and 7b**

Figures 7a and 7b show the distribution of matriculation exam grades in English based on normal (a) frequencies and relative (b) frequencies.

These graphs illustrate the frequency distribution of the matriculation grades in English for both groups. Fig. 7a shows a distribution which is based on the number or frequency of each observed grade class. But, because in the virtual group, there were 8 students more than in the control group, the picture is somewhat distorted. Therefore, the same distribution is shown in Fig. 7b based on the relative frequencies. The figures have been normalised, in other words, each column represents the portion of the specific grade expressed in percentages.

On visual examination of the graphs, deviations between the groups can be detected. In the case of the virtual group, the distribution seems to concentrate neatly around the centre of the scale, whereas the grades of the control group are scattered more over the whole scale. Also, there were no Laudatur students in the control group.
The students’ grades of English in their last school reports are presented in Figures 8a and 8b.

Figures 8a and 8b. The distribution of the students’ High School English grades based on the observed (a) and relative frequencies (b).

As before, the distributions based on the observed frequencies and relative frequencies are presented here, so that differences in the group sizes do not interfere with visual comparisons of the graphs.

For the English grades of the school reports, the situation seems to be opposite to what was observed for the matriculation grades. Now, the grades in the virtual group centre evenly between 7 and 9; only a few students having some other grades. On the contrary, the grades in the control group are now centred around the central point of the grades. But, there were no students with who obtained a mark of 10 in the control group. In conclusion on examining the graphs, it can be seen that before they started the course the virtual group as a whole had a somewhat higher level of achievement in English than the control group, and the virtual group did better in the final test, too.
6.3.4. How many years the students had studied English

When examining the students’ background knowledge of English, it is also interesting to know how many years of English the students had studied.

**Figure 9.** Years of English studies at school by both groups.

The control group students have, with the exception of one student, studied English at school for 10 years. The distribution in the virtual group is considerably greater. The mean for the control group here is 10.08, with a standard deviation of 0.4. The mean for the control group is 9.21 and the standard deviation 1.6.
6.3.5 Age of students

Let us have a look at what the age structure of the students was.

![Count](image)

**Figure 10.** The age structure of the students by groups.

There do not seem to be great differences in the age distribution of the groups. In the control group the mean age was 23.16, standard deviation being 3.14. And, in the virtual group the mean age was 22.58 with a standard deviation of 3.45.

6.3.6 A more detailed analysis of the final test

Next, we shall have a closer look for the part of the final test at how the means of students with the same matriculation examination grades differed from each other by group.
Table 5. The mean score from the final test

<table>
<thead>
<tr>
<th>Group</th>
<th>Matriculation grade</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>A</td>
<td>44.17</td>
<td>6</td>
<td>6.27</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>51.00</td>
<td>5</td>
<td>4.90</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>53.00</td>
<td>7</td>
<td>7.39</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>58.20</td>
<td>5</td>
<td>4.55</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>53.00</td>
<td>2</td>
<td>11.31</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>51.52</td>
<td>25</td>
<td>7.64</td>
</tr>
<tr>
<td>Virtual</td>
<td>A</td>
<td>35.50</td>
<td>2</td>
<td>4.95</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>51.83</td>
<td>6</td>
<td>4.54</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>54.08</td>
<td>12</td>
<td>7.15</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>56.14</td>
<td>7</td>
<td>4.45</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>63.00</td>
<td>4</td>
<td>3.56</td>
</tr>
<tr>
<td></td>
<td>L</td>
<td>62.00</td>
<td>2</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>54.55</td>
<td>33</td>
<td>7.97</td>
</tr>
</tbody>
</table>

In Table 5, the students have first been differentiated according to their groups and then according to their matriculation examination grade; and then the means of the final test have been calculated in these groups.

Let us have a closer look at the results obtained. For the A students, the average of the control group is 8.7 points higher than that of the virtual group. But, for the B students, the average of the virtual group is 0.8 points higher than that of the control group. Similarly, among the C students, the virtual group has achieved a higher mean, now by 1.8 points. However, among the M students, the average for the control group is 2.1 points higher than that in the virtual group. Finally, for the E students, the virtual group have a 10 points higher mean.
6. 3.7 What was done statistically

We first performed a -test based on the results of the initial test. In the initial test the average score of the virtual group was 24.39, and that for the control group was 21.16. The difference between the two means is 3.23. We get a p-value of 0.01.

Generally, in statistics, results whose probability is quite small, e.g. smaller than 0.05, are regarded to be significant. Because the observed significance level for the initial test is as small as 0.01, it can with good reason be said that the difference between the groups was significant.

Let us then examine the results of the t-test based on the final test. Here the mean value of the virtual group is 54.55 and that for the control group is 51.52. Thus the difference is 3.03. We get a p-value of 0.08.

The significance level observed here is comparatively large so that it cannot yet, with good reason, be regarded as being statistically significant. On the other hand, it is relatively close to the boundary of 0.05, which is commonly roughly taken as the boundary of a significant result.

When we now take into account the statistically significant deviation calculated on the basis of the results of the initial test, we can regard these two sets of results as indicating that there were differences between the two groups.

We will now look for reasons for the deviations between the groups. We shall first determine whether the age structures in the groups can be regarded as being the same, or if
there were differences between the groups. We shall, again, use the t-test. The mean value of the age in the control group is 23.16, whereas that in the virtual group is 22.58.

On performing the t-test we get a p-value of 0.51 (which is a result of a two-way alternative hypothesis). This probability is so big that we cannot say that the age distribution of the two groups differed from each other significantly. Using the t-test we found significant differences between the two groups for the numbers of years they had studied English: the mean value of the control group was statistically significantly higher than that of the virtual group. However, we can see that this difference is not important from a practical point of view since it does not reveal anything about the students’ knowledge of English. As a matter of fact, in the descriptive section we found differences between the groups pointing to a state of affairs where the virtual group had earlier done better than the control group in their English studies.

6.3.8 A few final words about the statistical section

In this experiment two groups of English reading comprehension were compared; one of which completed the course via the Internet, the other one in a traditional classroom setting.

Division into these two groups had been accidental, not random in the statistical sense of the word. There were 58 students in the sample, which can be regarded as rather small. The foremost interest in this experiment was to find out whether students achievement via the Internet was equal to that of traditional classroom instruction.
At the very beginning, the virtual group was found to have scored higher in both the tests than the control group. However, after this, considerable deviations were found between the students’ school marks and matriculation grades in English. The deviations seemed to point to the fact that the virtual students would have previously done better at English than the control group. In years of English studies, the control group had a higher mean. The age distribution between the groups did not differ greatly.

We then examined whether the observed deviations between the groups were statistically significant. At first, for the part of the initial test, clearly significant deviations were found between the groups. However, for the part of the final test, the observed deviation could not be regarded as statistically significant. After that, it was found, however, that there were significant differences between the school and matriculation grades, too. Although the distribution of matriculation grades in both groups was found to be in harmony with the general distribution of matriculation grade distribution, the groups were not, between themselves, similar as to the grades and marks. The school marks and matriculation grades of the virtual group were found to be significantly better than those of the control group. So, this happened notwithstanding the fact that the groups were randomly formed. On the basis of this, it was to be expected that the virtual group would achieve better than the control group. Later, it was found that the groupings had not affected the students’ course achievement.

In the analysis section, we also examined the differences in age and years studied English. The age differences between the groups were not statistically significant, but the control group could be said to have studied English significantly longer. (For statistical details, see Appendix 14)
7. COURSE EVALUATION BY BOTH GROUPS

7.1 Questionnaire for both groups

The material for the student evaluation of the courses was collected using an evaluation sheet on December 1, 1999 straight after the students had taken the final exams. Evaluation plays a crucial role in the writing of traditional English language courses, especially when a course is new and not standardized.

At the end of the courses, (December 1st 1999) both the control group and the virtual group were given the same 6-question questionnaire. The structured statements they had to respond to were:

- The requirement level of the course (answer 1 if too easy, 3 if just right, 5 if too difficult) (Statement 1)
- I got a clear idea for what I shall need the items I learned during the course (Statement 2)
- I have grasped the concepts in the course (Statement 3)
- I learned things that will be useful in my studies or work (Statement 4)
- The atmosphere during the course was good (Statement 5)
- The teacher activated the students (Statement 6) (Appendices 9 and 10)
7.2 Virtual student course evaluation questionnaire

Response for the following nine statements were elicited from the virtual students only. They were also asked to write an unstructured evaluation of the virtual class. The structured statements were:

- The introductory session was successful (Statement 1)
- Ten units was just right (Statement 2)
- I feel I have learned to study using the Internet (Statement 3)
- Working using the Internet suits me (Statement 4)
- The information given during the course was adequate (Statement 5)
- The course was interesting (Statement 6)
- The course was useful (Statement 7)
- The teacher helped when I needed help (Statement 8)
- I could recommend this course to other students (Statement 9)

(Appendix 8)

The results for these statements will start next page.
7.3 Questionnaire evaluation results for all the students

Figures 11-16 show the results of the six structured questions put to both groups.

1 = too easy, 3 = just right, 5 = too difficult

Figure 11. Statement 1: 'The requirement level of the course was'.

Fig. 11. shows that generally both groups were fairly satisfied with the difficulty level of their respective courses. Four virtual students found the course somewhat too easy, and 4 students in the control group found the course slightly too difficult.

Figure 12. Statement 2: 'I got a clear idea for what I will need the things I learned during the course'.

1 = I completely disagree
2 = I mostly disagree
3 = don’t know
4 = I mostly agree
5 = I completely agree
In the virtual group, it seems that the students (55% answered either 4 or 5) could see how they will be able to utilize the material they had learned. This may be because of the fact that they also learned to use new technology in their studies. In the control group 34% answered either 4 or 5; but 9 students in the control group did not think the course would be very useful in their future lives.

**Figure 13.** Statement 3: ‘I have grasped the concepts in the course’.

The virtual students answered more positively again. None of the students thought they had completely grasped all the concepts in the course.

**Figure 14.** Statement 4: ‘I learned things that will be useful for my studies or work’.
Fig. 20 shows some interesting trends. Sixty-six per cent of the virtual group, and 49% of the control group students answered either 4 or 5. Two students in the control group did not regard the course as being at all useful. All experienced teachers know that in most compulsory courses there are always a few students who are not satisfied with anything. But, there were no dissatisfied students in the virtual group. All in all, the main aims of the courses seem to have been fulfilled: most of them thought they would be able to use the things they have learned during the courses in their professional lives.

**Figure 15.** Statement 5: ‘The atmosphere during the course was good’ Although the atmosphere during both courses was regarded to be good, the virtual students seem to have enjoyed their course more: 64% of the virtual students answered either 4 or 5; and 54% of the control group answered either 4 or 5.

**Figure 16.** Statement 6: 'The teacher activated the students'.
Fig. 16 shows that 3 students in the control group did not think that the teacher activated the class, although she was present all the time. (N.B. the group size was 25 students.) None of the students in the virtual group felt the same. It is interesting that the students in the virtual group did not know whether the teacher was activating them as well as did the classroom students. 30% of them felt, however that the teacher activated them from a distance. Perhaps the virtual group would have needed more activation, and now that the course material is finished, I will have more time for student guidance.

7.4 The virtual group questionnaire: Student evaluation of the virtual course

Ninety-four per cent of the virtual students completed the questionnaire.

The answers were scaled from 1 to 5, in the same manner as before: 1 being ‘I completely disagree’, 2 being ‘I mostly disagree’, 3 being ‘I don’t know, 5 being ‘I completely agree’

![Bar chart](image.png)

**Figure 17.** Statement 1: ‘The introductory session was successful’.

From the graph it can be seen that according to the students the instructions for the virtual course were given adequately.
Figure 18. Statement 2: ‘Ten units were just right’.

The graph shows that the majority of the students felt that the amount of material used was not too much for one credit.

Figure 19. Statement 3: ‘I feel I have learned to study using the Internet’. The graph shows that most students felt they had learned to use the Internet for their studies.
The majority of virtual students thought working with the new technology suited them.

This graph shows that the students seemed to have been adequately monitored during the virtual course.
The course seems to have been quite interesting. This might partly be explained by the novelty effect. Three students did not find it interesting, however.

Fig. 23 shows that the virtual course served the purpose of learning professional English. Again, three students disagreed.
Figure 24. Statement 8: ‘The teacher helped when I needed help’.

The virtual students felt they could rely on the teacher’s help. The mid-column is relatively high; it seems that they would have needed more of the teacher’s help.

Figure 31. Statement 9: ‘I could recommend this course to other students’.

This graph shows that most students thought the course had been worthwhile. (With the exception of those three students.)
After these nine questions, there was some free space in which the students could assess the course in an unstructured manner.

### 7.5 Results for the unstructured assessments of the virtual course

#### 7.5.1 The aspects the virtual students appreciated

As stated above, the virtual students were also asked to evaluate their course verbally by writing about their experiences on the questionnaire (Appendix 8). I had been sensing that the students were comparatively satisfied with the course, yet the strongly positive feedback was a surprise. Primarily, most of them commented that the TopClass program had useful features such as tests, a mailing system and the possibility of sending documents. Furthermore, they appreciated the immediate feedback and said that TopClass was user-friendly and pleasant to use because it was clear and easy to learn. Even students without computer experience managed well. There were statements, such as ‘working virtually is nice’, ‘virtuality is a good idea’ and ‘a nice experience’. In a word, they seemed to enjoy their Internet course.

They had most obviously earlier heard the phrase ‘independence of time and place’ as connected to virtual learning. Still, the great majority of them (74%) saw fit to express it verbally. They appreciated the possibility of being able to study when it suited them and that they could choose where to study: at home, in the pharmacy, libraries or in any of the computer rooms at the Department of Pharmacy. It may be because of the freedom that a few of them even said that ‘there was a relaxed atmosphere during the course’.
The texts, taken from Pharmaceutical journals, which were used during both the courses seemed also to appeal to the students: one third of them commented that they were ‘interesting’ or ‘of a high enough level’. They also considered the texts, grammar and affix booklets clear and well written, that they had learned a great deal and that the course had generally improved their English. Quite a few of them emphasized the fact that they had learned a great deal of the language in their own field, i.e. professional pharmaceutical English. They expressed views such as ‘virtual learning was a good way of pursuing language studies’, and ‘it made a nice change from normal study’. They generally regarded the amount of work as ‘sufficient’ for 1.5 academic credits. Some would even have liked more work, e.g. 600 terms instead of 300. ‘They will be useful in the future’, said one student.

Although my focus was not on student autonomy, nine students commented on the positive feature of autonomy. They said that the system gave them autonomy in addition to freedom of time and place. However, one student debated the idea of too much freedom: ‘virtual learning doesn’t suit a person who cannot compel him/herself to work’. I would not consider this a major issue, since in order to become a university student, a person must have self-discipline.

7.5.2 Student comments on practical arrangements

The server was on all the time but sometimes when the teacher was writing the tasks the students could not log in. This caused some embarrassment to the students, as did the fact that all the units were not in the program from the day the course started. However, at the
first meeting the students were given a schedule according to which they should work as the units appeared there week by week. Furthermore, it can be argued that learning is pedagogically more efficient if the students work steadily throughout the term. Five students said that they would have liked to have more and different kinds of exercises; two of them would have liked to have more units, ‘the course was too short’. There could be room for streaming the students here, but since the group is so big and the course only offers 1.5 credits, it is not reasonable to expect the teacher to do that.

I received suggestions of different kinds. Some wished that all the exercises, meaning grammar exercises, pharmacy terminology and affix tests would have been on the Net. (In the autumn term 2001 I did this; I wrote all the pharmacy terms and affix tasks into the program. Also the grammar booklet answer key was put there.) This will most probably give the students even more freedom and flexibility.

There were other students, however, who would have liked to have more teacher-control. They would have liked to meet the teacher a few times during the course, so that she could have explained difficult points. For one student ‘the physical absence of a teacher’ was ‘a problem’, but another student wished she could have had a tighter timetable. In future, as the units will be on the Internet from the very start of the course, the teacher will naturally meet the virtual class (or those who need it) a couple of times during the course. The same number of students, 4 or 5 represented these extremes.

The wish that the students could have done the exercises several times is reasonable. This time I allowed the students to do them only once, because that was the only way I could think of. There are, in the program, two ways of doing the tests/tasks; ‘once only’ and ‘save
answers’. The latter one allows the students to do the tasks as many times as they like, and this will be allowed the next time the course is offered. This will probably enhance learning and motivate the students even more. Only the final test needs to have the ‘once only’ alternative.

The texts used in these pharmacy English reading comprehension courses are general Pharmacy texts containing a lot of information about treating different complaints, e.g. migraines and foot pains, with drugs as well as two texts dealing with work in the pharmacy. They do not contain chemistry as a subject, which was the desire of a couple of students.

7.5.3 What the virtual students criticized

As compared to our earlier experiences (Mäkinen and Smart 1999) TopClass performed perfectly this time. But, in the evaluation sheets as many as 15 students complained that the program counted the final points wrong. This was either because the units were unfinished or I could not in some cases understand how the producer of TopClass had meant the points to be counted.
Finally, 10 single criticisms from the virtual students:

- ‘sometimes a lack of motivation’
- ‘one’s own laziness’
- ‘a lack of knowledge of how to be autonomous’
- ‘I didn’t like the affix booklet’
- ‘I thought the grammar exercises were too complicated’
- ‘a computer can’t substitute for a teacher’
- ‘the answer has to be exactly same as the one fed into the computer’
- ‘if one hasn’t got a computer of one’s own, one has to work at the department between the hours 8.00-18.00 Mon-Fri, and one can only reserve the computer for one hour’
- ‘it was OK, but I still hope that I can mostly study in other ways. I don’t want to live my life through the Internet!’

7.5.4 Mail messages to the teacher

During the Internet course I received several spontaneous mail messages from the students. First, I got four spontaneous messages telling that they enjoyed working within the environment and liked the course. Second, although the students had quite often problems with the working of the program, there were only four spontaneous messages complaining about it. Third, there were three messages reporting that the system had ‘crashed’. (But those cases could be settled by the administrator, Donald Smart who activated the units again.) (see Appendix 12 for spontaneous mail messages)
Furthermore, at the Pharmacy Department evaluation meeting on December 15, 1999, the student representative, when asked about her feelings towards the past virtual course, told the members of the Department that she personally regarded this kind of reading course as motivating and successful.
8. THE FINAL TEST REPEATED

In the autumn term 2000 a second teacher (Susanne Grönroos) taught English reading comprehension to two new groups of pharmacy students and it was decided that those students take the same computer-assisted final test that was used in December 1999. These groups were taught by the second teacher in a traditional classroom setting. The reasons for these two groups doing the final test by computer were: 1. to get more experience for the teachers in arranging and administering a computerized test (in December 1999 there were no problems managing the test because the administrator, Donald Smart, was in charge); 2. in order to save marking time, and 3. to get feedback from the students about the computerized test. (That was not done in December 1999)

8.1 Student comments on the final test

There were altogether 68 new students who did the test in October 2000. This time I wanted to administer the test with the second teacher without the course administrator being present to help. The administrator was to be contacted by phone in case problems arose. Beforehand I (the teacher-researcher) and the administrator had batch registered the two groups into TopClass pharmacy final test, set the time they could have access to the test (one and a half hours per group), reserved the computer room in the Language Centre, and done all other preparatory work including the usernames and passwords of the testees. I also made enough copies of the first part i.e. the cloze text, because I thought it would be more convenient for
the students to read the text with 35 blanks on paper rather than on the computer screen. I had fed the cloze answer alternatives as well as the rest of the test into the computer.

After the students had completed the test they were given an evaluation sheet where they were asked to evaluate the computerized test verbally and freely using about five sentences.

The 68 students wrote a total of 220 comments. The analysis shows that there were 154 positive comments (70%) and 62 negative comments (28%); and 4 comments which can be regarded as neutral (1.8%).

8.2 Positive comments

Immediate results. The main advantage for the students was that they received the test results immediately. One third of the students spontaneously commented on the fact that it was good to have the results at once. There were comments such as 'a very good thing', 'especially nice', 'the best thing' and 'especially because one could see the result immediately'. So far, it has taken about two weeks for the teacher to mark the papers and send the results to the Department of Pharmacy. Usually the students come to the Language Centre to see the results, but nowadays most teachers give the English test results via the Internet.

Easy-to-do. The great majority of the students wrote that the computer test was easy-to-do. It was e.g. 'nicely simple', 'easier to do than on paper', 'much quicker' and 'practical'. They also appreciated the fact that they did not need to use pencil and rubber at all, and that they could easily change their answers by clicking another alternative. Moreover, a couple of students noted that they could save paper by this system. One student remarked that this
kind of testing suited her well and was practical when, as in the case of Pharmacy students’ English reading comprehension test, there is only a ‘pass’ or ‘fail’ as the result of the test. They felt the test results that the computer gave were objective and not biased by any means.

Novelty. There is a lot of discussion of the novelty effect of IT as a positive factor (e.g. Sinko & Lehtinen, 1999; Bickerton, 1999). In the evaluation of this computerized test only 5 per cent of the comments were on ‘novelty’ or ‘change’. The students wrote, e.g.: ‘this makes a nice change’, ‘a nice way of doing a test’, ’a really nice experience’, ’a very nice experience’.

A good method. Several (19/68) students noted that it was ‘a good system’ or ‘a (very) good idea’, ‘interesting’, ‘meaningful’, ‘useful’ or ’efficient’. One student thought this kind of testing is more interesting than traditional tests; another wrote that the test was ‘all in all a good method’, and yet another: ‘despite the problems, otherwise OK’.

Satisfaction. . I was told that the students were pleased with the clarity of the test. They noted that ‘it was a clear test’ and ‘a clearly planned examination’. Furthermore: ‘the instructions were clear at the beginning of each section’ and ‘there was no room for misunderstanding’. One student wrote: ‘one does not need a 10-page bunch of papers and get all confused’.
I was also encouraged to improve this computer test and use it again. They told they would be willing to do more tests of this kind in the future, ‘there could be more of this sort of testing’. On the one hand, they noted how convenient it was for the student to immediately see where s/he had made a mistake, and on the other, that the automatic checking system reduces marking.

They generally liked the idea that the cloze section was on paper and the answer alternatives only on the screen. Although this was their first computerized test, they maintained their confidence because there were the two teachers to assist them. They expressed their gratitude for this during the post-test interview.

**Appropriateness of the test.** Quite a few commented that the test was specific enough, appropriate and suitable for language testing. Its *level* and *length* were ‘just OK’. They felt they were tested on English of their own future profession.

**A few general remarks from the students.** The test was:

- of appropriate level (2)
- based on the course (1)
- good on the whole (2)
- specific (central terms and words were asked ; 1)
- suitable for language testing (2)
- appropriately long (1)

The great number of positive comments is significant because these students who gave this feedback had not been using TopClass during their reading course.
8.3 Negative comments

There were technical problems due to the fact that I had decided to administer the computerized test in order to determine how well I could do it. The administrator was to be reached by phone if difficulties arose.

The beginning of the test was stressful for both the instructor and the students. This can be seen in the comments of the students. There were altogether 62 negative comments, which make 28% of all the comments.

The majority of the negative comments on the final test concerned the practical arrangements of the computerized test. Since there were 68 students taking the test and the computer class can only take 20 students at a time, we had to divide them into three groups. We had given them a schedule according to which they were to come to do the test. Still, some students took more time to do it, which caused extra waiting for some other students. On the other hand, we could take in a new candidate as soon as a seat was left empty. Also, because I wanted to try and manage the test without the administrator’s help, there arose some technical, timing and login problems that irritated some of the students. ‘The test started late, but worked well after all’, said one student.

About one quarter of the students (15, making 23.8% of all the comments) said that the computer did not accept any other form of the Finnish translation of a term than the one that had been fed into the computer memory. This is a problem I knew would arise and which I had tried to avoid by choosing words with one specific formal meaning and those included in their list of 300 terms. So the computer did not accept, e.g. ‘turpoaminen’ for ‘swelling’
but ‘turvotus’; not ‘huuhtominen’ for ‘flush’ but ‘punoitus’; not ‘pureskella’ or ‘jauhaa’ for ‘chew’ but ‘purra’; not ‘lämpötila’ or ‘lämpö’ for ‘temperature’ but ‘kuume’. These criticisms were appropriate, and I have now added other possible and correct answers to several items in the terminology section.

Seven students did not like the cloze text with the blanks being on paper and the answer alternatives on the computer screen. They would have liked to have everything on the screen. Some of them noted, however, that this had only disturbed them initially. I had thought that it would be more convenient for the students to read the cloze text on paper; and I gave the students seven minutes time to read it before the test itself started. The screen had been found to be too small for both the text and the answer alternatives on the screen at the same time. Earlier one student had preferred to read the text on paper. The cloze text itself had been enlarged to 140 % for the sake of clarity.

Another negative comment was that of seat spacing; six students wrote that more space is needed between the seats in the computer class. One student wrote that she did not like the feeling that she would be suspected of cheating or looking at other students' answers. The computer room at the Language Centre has not been built for testing purposes; as there are no booths and the seats are quite close to one another. This lack of room, the novelty of the situation and testee changeover during the test meant that the teachers had to guide some of the students nearly all the time. This caused concentration problems for four students (6.3 %) who complained of the noise and the teacher talking to other students. This problem could be taken care of in several ways: 1. Two computer classes could be used at the same time, 2. The questions could be put randomly so that one student will not be doing the same section as his/ her neighbouring student. 3. Enough time should be reserved for each group.
and time should be left in between so that each member in the group can start at the same time. The teacher could also set the starting time e.g. 15 minutes earlier, so that all the computers would be ready and login would be quicker.

There were six students who expressed their reserved initial feelings, e.g.: ‘at first I was a little tense’, ‘I felt nervous/insecure/strange’. Some said that they were not used to computers, and others that this was their first computer exam. However, many of them commented that ‘it worked better than I expected’. Two students found either the verb section or the cloze section difficult, while one student found the test comparatively easy.

Two students would have preferred to do the test at the Viikki campus (10 km from the Language Centre) where the Department of Pharmacy is situated, as afterwards they had to rush to other lessons in Viikki. There is a new media laboratory at the Viikki campus and it would be more convenient for the students to do the test there. The reason for doing the test at the Language Centre computer room was that I had not had time to familiarize myself with the new media room since it had been built only very recently, but probably I shall hold future computer tests at Viikki.

There was one comment to the effect that: ‘maybe this tests the knowledge of language on a micro-level only’. This has been my principal concern since the computer cannot read open-ended questions, which have proved to show the students’ level of reading comprehension reasonably well. On the other hand, the course consists of only 26 contact hours and the students’ English can only improve to a certain extent. Therefore, it is expedient to do the testing with minimal labour, but maintaining the standard. There were three students who
took everything calmly and wrote: 'there are always some problems when you work with computers'.

Finally, another neutral comment: 'terms could be translated from Finnish into English'. I had chosen English into Finnish, as this has been the policy of English reading comprehension classes. The students are not expected to translate the terms from Finnish into English because they answer their test questions in Finnish even though some of their textbooks were in English. There were as many as 15 comments on the computer reading only one form of a word

8.4 The teacher's subjective view of the final test

8.4.1 Problems.

Before the first test day, October 11th 2000, the administrator and I had checked that the time for batch registration for Group 1 (32 students) from 8.00 to 12.00. But the test itself (which was first used in December 1999) had not been activated for the proper time. The administrator was called and he activated the test on his home server. This modifying process took about 45 minutes because of the novelty of the problem and the administrator working at a distance. The teacher did not want to ask the administrator to come to the test situation in person because actually assisting the test was not one of his official duties. Furthermore, the teacher had not been given authorization for changing the dates and times. If the administrator had been there the technical problems could have been solved much quicker.
When the second group did the test (October 16, 2000), there were login problems, too, because too many students were trying to gain access at the same time, and the starting time had been set at 8.30, not 8.00 because of miscommunication with the administrator. Therefore, after the login problems had been settled, the students had 10 minutes doing nothing. The group was large (34 students), there were only 17 seats in the computer room, and there were 5 students from Group 1 who came in to redo the test.

When the computer-assisted pharmacy English reading comprehension was held for the first time (December 1999), there were both the teacher and the administrator present and there were no such technical problems, which would have taken the students' time. Moreover, those students who did the computer-assisted virtual test in December 1999 were the students who had studied via the Internet and used TopClass for six weeks. This time, the students who took the computer-assisted virtual test (October 2000) had been studying the course in a traditional classroom setting.

8.4.2 Benefits of the computerized test

Although there were problems, TopClass is straightforward enough for a traditional language teacher to write the course and tests as well as administer the test independently. There need not be technical assistants working with the teacher as is the case with many other programs.

At the end of the test the teachers could personally give individual feedback to the students who had finished their tests. The students took varying times to do the test (from one to two
hours), so the teachers were there to explain and check problem words and give extra points if they were correct but not fed into the computer. The students appreciated that they could see where they had made mistakes and what kind.

Although the terminology section was problematic in that the word had to be exactly the same as the one fed into the computer, this ‘text question’ type where the students themselves have to write is a good method of checking the students' spelling. The same applies to the course itself: this program is excellent for spelling and vocabulary exercises.

The main advantage in a computerized test is that the teacher does not need to think of the correct answer more than once since the automatic system corrects the test. There were 68 students taking the test and I only once decided which was the correct answer in each item. The English reading comprehension teachers at the Language Centre have a huge amount of marking (up to 150 papers per test) due to the fact that we have to give the students a placement test when they enter the university. We have limited resources, so a virtual system would ease the teaching and testing especially in subjects like physics where profound knowledge is required.

All students were able to do this experimental computerized test and the system never went down, which was most rewarding.

8.4.3 Observations on the computerized October 2000 test
The same ratio of students passed the test as in previous tests that had been done on paper. Of course this test was neither validated nor standardized; it was created for the purpose of seeing how a computerized test would work.

The second teacher’s comments: The second teacher, Susanne Grönroos, was satisfied with the computer test and the way it worked. She also commented that this test measured what was taught during the course, which was gratifying for the students and herself. I had written the test keeping in mind the contents of the course. Together with the students, she noted that in this way a lot of paper could be saved. Another positive comment she made was that students could learn the results at once and that she did not have to mark test papers.

Time spent on the test was rather long. The test started at 8.00 and finished at 13.15, so altogether it took six hours to give an exam to 68 students. Invigilating and managing this test was exhausting, but the reward was that there was no marking papers later. From now on I can activate and administer the test myself. Of course, if the server does not work, I can receive help from our technical staff.
9. TEACHER’S ROLE IN VIRTUAL LEARNING

9.1 The virtual teacher in general

The virtual teacher has diverse roles. Basically, the teacher’s task in internet-based teaching is to come up with new ideas for the learning situation, design and implement new approaches and solutions which form the learning context. It is the students’ and teachers’, i.e. the users’, needs that form the basis for choosing a tool or solution since these form the learning environment and context. First of all, the teacher has to master the tool s/he is using and feel confident with the application; the students, to my mind, are flexible and they learn new things quickly. It is important to have a working rhythm, pace and divide the internet work into periods which are workable.

The internet teacher needs to have the capacity to organize and be a leader but this has to be done collaboratively with the students, which means that the teacher has to give up some of the power s/he may have previously had. Risk taking and feelings of insecurity are part of the virtual teacher’s work image as well.

The teacher is the professional who guides the learning process. The tools do not make teachers redundant, as was feared a few years ago. On the contrary, the teacher’s role is central; his/her role is that of a supporter of the learner and not the main actor on the scene. Tella et al. (2001: 225) have found 31 roles that the teacher is expected to fill. They are: organizer, coordinator, evaluator, encourager, listener, project manager, producer, resource-
person, content specialist, learning specialist, learning supporter, planner, coach, team member, safeguard, co-learner, moderator, consultant, actor, speaker of the programme, researcher, director, observer, motivator, needs analyst, participant, co-communicator, guide, therapist, salesman and story-teller.

Although Tella is of the opinion that foreign language learning methodology can benefit substantially from the integration of ICT into foreign language curricula, his view (Tella 1997: 47) is that the 'teachers (in open and distant learning) tend to become consultants or co-learners, whose earlier status diminishes or disappears completely'. He notes that the teacher should understand that 'the student should be allowed to communicate freely and at his own pace'. However, he says that. Tella cites Edmonson's notorious teacher's paradox: ‘We seek in the classroom to teach people how to talk when they are not being taught' (as cited in Ellis 1990: 85). Tella proposes that instead of teaching 'it might be more appropriate to talk of facilitating FL (foreign language) learners to make full use of the different communication channels and tools accessible to them through modern educational applications of media education' (Tella 1997: 49). However, at the moment, there seems to be a barrier since many of today’s language teachers have not been trained in ICT; the students may be more knowledgeable about the technology than the teachers.

Some workers in the field advocate the idea of the teacher being a 'consultant' (Wager & Aalto, 2000: 18; Mononen-Aaltonen, in Wager & Aalto, 200: 177) or even 'a tourist guide'. Mononen-Aaltonen would like to see the teacher as 'a creator of dialogic communication' or 'the critical guide and directing spirit'. In her opinion courses should not have any proficiency tests and the learning cannot be pre-programmed.
I am aware that it is the constructivist learning theory, i.e. Vygotsky's model of learning (1978) that is today’s most prominent learning theory. It emphasises the importance of social interaction in learning and the social environment as an integral part of the process of cognitive change. An individual, in order to get to an upper stage of performance, has to work with a person who has a superior ability structure. Tella (1997: 45) suggests that the teacher be a knowledgeable coach, which sounds appropriate. Furthermore, Wager & Aalto (2000: 13) and Hakkarainen et al. (1999: 124) point out the constructivist theory claims that learning is, first and foremost, thinking and learning to think, as well as the co-construction of knowledge. It means acting together and constructing meaning together.

Some students have reported (e.g. Nevgi, 2000: 196) that freedom is a myth: you need to be somewhere, and you need to take the time to undertake the tasks. Freedom from time and place only takes new forms. Lindh and Matikainen (in Matikainen & Manninen 2000: 230) think that it is better to have a small amount of well-prepared material of high quality than a large body of course material which needs further testing.

Lindh & Parkkonen (ibid: 147) suggest that the teacher has to find the functional idea, the thin red line. S/he has to solve the problem of how to apply different ICT possibilities into his or her course. First the teacher has to decide which program or tool to use for his/her specific teaching situation, and then find individual and creative ways of using it.

The most important aspect from the teacher’s point of view is her/his belief regarding what teaching is, his/her educational rationale, values, goals and methodological solutions. S/he has to decide how best to implement ICT pedagogically if it is to be taken as part of the teaching. The teacher’s task is to make learning possible, facilitate learning, when using
ICT. But, Kiviniemi (2000: 142) notes that if the teacher cannot see any benefit or role of ICT when developing his/her tuition, s/he might as well do without it. Internet-based teaching really is not suited to all kinds of teaching, but if the teacher has found his/her own style and program, s/he can decide what is reasonable to teach through the Internet and then do it creatively and in an individual style. The point is what additional value ICT brings to the course. There is no one single right way to do these things.

The guidelines and timetable have to be clear for the learners, and the teacher needs to have planned the course in an orderly manner. Tirri and Nevgi (in Lindblom-Ylänne: 2000) noted that what the students most expected of the teachers was a good command of the subject matter, professionalism, and clarity of the courses; friendliness and empathy came only second, although they were considered important, too. The learner needs to be certain about what the new way of learning involves and how s/he is expected to act.

A university teacher has a relatively large amount of academic freedom and his/her role is central. Therefore s/he has to be able to justify his/her actions. S/he is, after all, an active developer of the society who has to face the change in the society and partly foresee the future of his/her students. The important element in being a virtual teacher is to be able to handle the conflicts of pressure and the insecurity involved with the outcome of the teaching process. In addition to this, s/he naturally needs to have the skills of a traditional teacher: s/he is an expert, a basic teacher and a collaborative teacher. S/he is also an organizer, communicator and motivator.
9.2 Being a TopClass teacher

I think that the teacher’s role is significant in all virtual learning. To date, I have used the Internet and TopClass in a rather mechanistic way, but perhaps this is justified since a lot of language learning is monitoring what the students have learned and what they remember, though in this case through pedagogically well-prepared learning material. Kiviniemi (2000: 126) says that when the teacher evaluates higher-level cognitive learning, then it is appropriate to use media such as essays and project work. But if the teacher is to evaluate what the learners have understood or what they remember of the material taught, then it is justified to use different kinds of tests, as I did in this TopClass teaching experiment. Internet-based or computerized tests (as those in TopClass) can be carried out quickly and they give immediate feedback to the learners as well as the teacher, which may give them both a great deal of gratification. In this teaching experiment the learning material was adjusted within the scope of the course. (See Appendix 11 for the student scores)

Mononen-Aaltonen (above) stated that the virtual course cannot be pre-programmed, which is an opinion I do not share. Quite the opposite may be the case: in a systematic instruction program such as TopClass, the teacher's pedagogical experience and knowledge of the language studied can be fully utilized. Students need to learn subject-specific language skills according to the regulations of the departments. To me it seems impossible for the students to efficiently learn pharmaceutical English from the Internet on their own. Students of pharmacy need to know specific terms and concepts in English as well as aspects of grammar. Most students have never before the course read pharmaceutical journals or
textbooks in English, however good their general level of English. In addition to the exercises written in TopClass they can be given the opportunity to explore the Internet as much as they may wish, since links to useful websites can be added to TopClass.

According to Tella et al. (2001: 208) in net-based learning social aspects may be totally disregarded, but on the other hand the web makes individual, tailor-made and individual instruction possible. The TopClass teacher can create individual courses to students of different faculties. The Internet is infinite, but it is time-consuming and frustrating for the student to try and find meaningful tasks in order to learn a specific area for example, pharmacy. It comes naturally that the teacher guides the students.

Since I used a ‘hands-on approach’ in this TopClass teaching experiment, I would like to add a metaphor of my own regarding the actual practice: the electronic sewing machine. When making clothes, it is sometimes necessary to sew by hand, but if you need to sew a lot using large pieces of material, it is likely to be quicker and more efficient if you use a sewing machine, preferably an electronic one. Once you have learned how to use it, i.e. the tool, you will not like to revert to older methods. In the case of teaching, using a computer system like TopClass, the teacher's hard work of marking the papers lessens dramatically and the instruction is made considerably lighter physically. The computer system takes care of some of the correcting routine. Thus, the teaching becomes more versatile and interesting. At the same time, though, the teacher needs to be innovative and didactically skilful.

It is the teacher's task, alongside with the ‘sewing’ (i.e. managing the Internet course) to guide the students to critically analyse the texts and arguments. The teaching of critical thinking may thus simultaneously serve the purposes of both the developing of
communications skills requirements for working life and understanding the basic concepts of scientific thought. (Rolin & Kakkuri-Knuuttila, 2001).

So, in cognitive development, negotiation and co-construction of knowledge play an important role, but in learning a language for specific purposes, e.g. pharmacy, often the meaning cannot be negotiated. One has to learn the terms and the specific language in order to cope with the specialist culture. This study may indicate that the experience and expertise of the teacher of English for students of pharmacy can be fully utilized in new ways by using modern technology. The instructor or teacher knows what kind of difficulties in learning the specific language his/her former students have had and s/he, having kept up-to-date in the field, knows what is currently relevant. An individual student, in order to get to an upper stage of performance, has to work with a person who has a superior ability structure and who can thus be a knowledgeable coach. In the Language Centre context the students cannot learn from more knowledgeable peers, which would be ideal. The students of previous years are occupied by other studies, and the English courses are very short. Therefore, there needs to be an instructor or a teacher who is more advanced in the area and who gives adult guidance without imposing his or her ideas on the students but rather cooperates with the students. A situation where more advanced practitioners instruct their less advanced peers would be ideal, and it would then justify learners learning autonomously.

Mononen-Aaltonen (above) stated that the teacher could become 'a creator of dialogic communication'. My experience is that the students do not like to use the discussion area in the context of language courses. Perhaps they do their ‘chatting’ in other forums or they see each other often enough to communicate face-to-face. Because I knew the core of many virtual courses is dialogue, I tried to initiate discussion a few times but the idea did not catch on with the students. Furthermore, when thinking of the teacher’s workload it was as well it
did not. Kiviniemi (2000: 117) cites Wiesenberg and Hutton who claim that on a web course in which a discussion list is used the teacher’s workload is double or even threefold as compared to an ordinary course. I think that a web course should make the teacher’s workload lighter.

Now we come to the use of physical and mental energy. When using a tool like TopClass the teacher needs a lot of time and energy to create a course but the actual teaching is lighter than ordinary classroom teaching because the teacher does not need to be so much involved in the teaching itself. As has been stated above, s/he is no longer the main actor on the scene but now there is the ‘wall’ of the tool protecting him/her. Also, mentally, the situation is not as hectic and demanding as the traditional teaching situation where the teacher has to use his/her own body, memory and mind as the ‘teaching’ instruments. Strangely enough, this kind of teaching is, to my mind, more rewarding to the teacher, because this learning environment gives the teacher ‘a window’ to what the learner has done and what s/he has achieved.

Indeed, Slevin (2001: 104) proposes that ‘rather than viewing virtuality and real life as two competing areas of interaction, we should try and get the best of both’. For Slevin ‘virtual’ is more material than real. I have arrived at the conclusion that a combination course works well: a virtual course which includes the element of contact lessons. In this study the students claimed that they experienced group cohesion and a pleasant social atmosphere. It seems that they learned from each other and from the teacher. I do not think the teacher has to become a mere consultant or a ‘tourist guide’. In TopClass teaching the teacher is first of all, the content writer, then the teacher/instructor who acts as a knowledgeable coach, and consultant because of the pre-determined nature of TopClass virtual courses.
10 WHAT WAS ACHIEVED:

First I repeat the research problems:

Problem 1. What has to be taken into account when teaching English reading comprehension to students of pharmacy via the internet and using TopClass.

Problem 2. How will the learning outcomes of the virtual group and the control group differ?

Problem 3. How will the students and the Department of Pharmacy respond to the virtual teaching method new to them?

Problem 4. Is it possible to test English reading comprehension learning material using TopClass groupware tool?

Here I wish to explain how the research problems were dealt with and what else was achieved.

1. A pilot study. This was the first attempt at the Language Centre of Helsinki University towards using the Internet for English reading comprehension. It was a successful teaching experiment; the system worked well and benefited both the teacher and the students. I learned that virtual learning suits adult students, who are motivated to learn, and that I enjoy virtual teaching. The first research problem was resolved and it was shown that an English reading comprehension course could be taught virtually to students of pharmacy.
2. Evaluation of learning (research problem 2) proved problematic. The learning outcomes of the groups were similar but neither of the groups did significantly better than the other.

3. Student attitudes towards virtual learning were mapped by the three surveys, observation and discussion. The students also learned about the Internet. The main goal was achieved: the system worked well and the Internet course was well received by the students and the Department of Pharmacy. Thus, this may be regarded as the answer to research problem 3.

4. It proved possible to arrange a computerized reading comprehension test: The final test created during this teaching experiment was the first computerized language test implemented at Helsinki University Language Centre (research problem 4).

5. The product. Virtual teaching material that can be used in the future. A complete English reading comprehension course was written to be used and improved later. Castells and Himanen (2001: 99) point out that generally there is a great deal of knowledge and development put into ICT in Finland, but what is lacking is that too few projects have been applied to producing actual courses or other products.

6. A new point of view in teaching English. Virtual teaching is challenging and interesting, therefore it seems difficult for me to return to traditional teaching. It would be a great intellectual loss to the Language Centre if we did not take advantage of the modern information and communication technology and resources that we have available. Only by experimenting is it possible to gain experience in novel ways of teaching.

7. One of the Ministry of Education’s goals was reached: student experience in a virtual language course that will probably lead to lifelong learning. The students referred several times to their future use of English and learning through the Internet.
8. Learning process. I learned about teaching through the Internet and about information and communication technology in general. The feeling of being part of a larger picture and development, i.e. implementing ICT into teaching, gave me great satisfaction. I have also enjoyed spreading to my colleagues my newly acquired knowledge and skills in this field.
11 VALIDITY

In this chapter I shall consider the question whether my study meets the requirements of validity and trustworthiness. Have I been measuring what I think I measured? Can the results be generalized? I shall try to analyze the validity of this study from several viewpoints.

Validity is a concept which is difficult to attain. Cook and Campbell (1979: 37) state that ‘one could invoke many types of validity when trying to develop a framework in which to understand experiments in complex field settings’. They (ibid: 80) argue that ‘it is unrealistic to expect that a single piece of research will effectively answer all the validity questions surrounding even the simplest causal relationship’. They always use the modifier ‘approximately’ since one can never know what is true. ‘At best, one can know what has not been ruled out as false’.

Cook and Campbell (1979:37) introduce a theory of four kinds of validity: internal validity, statistical conclusion validity, construct validity and external validity. The priority among the types of validity varies according to the kind of research that is being conducted.

As to internal validity, Cook and Campbell (1979: 37) note that ‘internal validity refers to the approximate validity with which we infer that a relationship between two variables is causal or that the absence of a relationship implies the absence of cause’. They emphasize that internal validity is of great importance since the raison d’etre of experiments is to facilitate causal inference. In other words, experimentation is a useful way of gaining knowledge about cause.
I shall first have a look at the internal validity of this study. I am concerned about the question whether the experimental virtual teaching made a difference in this study. At Helsinki University Language Centre we had not previously given virtual courses and I wanted to experiment with a virtual course in order to see what the outcome would be. It turned out that the virtual group did not achieve significantly higher than the control group in the final test, which was expected on the basis of their higher scores in the initial test and earlier school achievement. This implies that there is an absence of relationship: virtual learning was not the reason for higher achievement. This result is difficult to rule out as false, and hence it can be regarded as a sign of internal validity. Cohen & Manion (1994: 172) state that ‘the experiment can be said to be internally valid to the extent that within its own confines, its results are credible’. The virtual students did not do poorly; and it is credible that they only made moderate progress.

According to Cook and Campbell (1979: 80), statistical conclusion validity is concerned with sources of random error and with the appropriate use of statistics and statistical tests. The statistical tests in this study were evidently used appropriately, but there is a flaw in the randomness of the sample. I admit that if the sample in this study had been taken strictly randomly, the study itself would have become considerably more valid. The justification for not taking a random sample was that this study was part of regular teaching, and the students’ pharmacy studies could not be encroached on, therefore I believe this study was action research. In action research the groupings are investigated intact rather than as artificial teaching/learning groups. Statistical matching was not possible in this situation. This teaching experiment falls within the scope of quasi-experimental design.

The same applies to construct validity: if the groups had been given the same test initially and finally, the study would have gained in validity. In that case I could have claimed more
strongly that I had measured the same skills. The reason I did not give the same test is practical: English reading comprehension teachers very seldom give the students exactly the same initial and final tests, although we assume that we measure the same skills in these tests. The English reading comprehension initial and final tests at the Language Centre are similar but not exactly the same.

‘External validity refers to the approximate validity with which we can infer that the presumed causal relationship can be generalized to and across alternate measures of the cause and effect across different types of persons, settings, and times.’ (ibid.: 39). So, external validity deals with the usefulness of research for potential audiences and attempts to determine in which populations or settings the demonstrable effects can be generalized. (Cohen & Manion, 1994: 170, Kynäslahti 2001: 167). I feel that this study meets the requirements of external value constraints because Finland has an information society in which nearly all citizens have access to the Internet, and because the virtual classroom is now emerging as a new educational phenomenon. Studies of this kind are needed because the Ministry of Education in Finland, the University of Helsinki and its Language Centre all encourage more and more learning material and content to be put into the Internet and ultimately for the students’ use. There is also call and support for this kind of research as regards the National Finnish Virtual University and the National Virtual Language Centre, which are at their initial stages at the moment. This study is in accordance with their strategies; for these reasons I can propose that the external validity and relevance of this study are high.

The results I obtained may not be directly transferable to other teaching experiments in which different programs (e.g. WebCT or FLE 3) and/or approaches are used. However,
teachers who are interested in using and implementing Internet teaching situations similar to this study might find these results useful.

11.1. Triangulation

I have endeavoured to make this study valid by applying the theory of triangulation in the research process. According to Eskola and Suoranta (1998: 69), triangulation means using several different data, theories and/or methods in the same study. Triangulation is used on the grounds that it is difficult to get a full picture of the research topic with one research method only. Eskola and Suoranta state that some researchers argue that while one research method describes the research topic from one angle only, it is possible to correct this credibility problem by using several methods in the same study. The research topic can be studied by several different data gathering and research methods using the triangulation of methods (ibid. 70). I point out that there is method triangulation: I have used quantitative, qualitative, survey and interviewing methods and thus aimed at getting a more complete picture of the processes in the study. In addition to the numerical and statistical data, I have also taken into account the students’ spontaneous feedback to the teacher. By this I wish to show that the material gathered is comprehensive, i.e. there is data triangulation by which a more complete picture was gained. I did not have preconceived attitude or bias towards either of the groups in the study.
12 DISCUSSION

12.1 Pedagogical implications of the statistical results

This was an exploratory study and as such it has several shortcomings, especially as regards the statistical component. The virtual group achieved significantly higher scores in the initial test and had somewhat higher school and matriculation grades in English. However, at the end of the course, the virtual group did not achieve significantly higher. This perhaps is because the virtual group worked on their own: they studied the terms, the grammar and affix section without the teacher. The virtual group had the text questions in TopClass but the grammar and affix booklets were self-study with the keys given afterwards. Because the control group studied and practised the affixes, the 300 terms, and grammar, with the teacher, they learned them relatively well.

The lesson learned here is that in addition to the questions on the texts, the virtual students need to do computer exercises on the terms and affixes as well. Moreover, and meet the teacher a few times during the course. Later, I have rectified this by writing exercises in TopClass on the 300 pharmaceutical terms and affixes in TopClass.(see Appendix 2 for the Term exercises) Now I meet the virtual students every second lesson in order to cover the grammar exercises in class, and to check that they have done all the Internet assignments on time. Had the virtual students had this additional support, the learning outcomes might have been considerably better.

The focus of my study was on teaching and learning outcomes; I do not claim these results show the students’ learning process. The statistical section in this study is there partly because of academic interest, and partly in order to make sure that the results are reliable.
The fact that the groups were not statistically randomised may not be relevant since language teaching groups will always be different and a researcher cannot control all the variables in teaching situations. The computerized reading comprehension test was developed as part of the teacher’s ordinary work, and so it became part of this action research. It was not undertaken under controlled conditions though, which is how standardized tests are produced.

Comparing two different courses may not be important per se. But, at this strategic stage when the University is planning to transfer more of the courses to the Internet, we need to know how teaching and learning via the Internet differ from classroom teaching and learning, e.g. are they as efficient or even more efficient than classroom work, how Internet teaching and learning changes the roles of student and teacher.

This study did not show that one group performed better than the other, although Sinko and Lehtinen (1999: 34) found that the use of carefully planned computer-assisted drill and practice programs, when combined with teaching by a teacher, was more effective than traditional teaching alone. In this study, the students only experienced one of the two teaching methods. The virtual group achieved higher scores in the initial and final tests, but more or less in the same ratio; there was not a significant difference in the learning outcomes when tested with the final test. This might lead to the conclusion that it would be useful to have a course in which there was the same amount of both virtual and classroom teaching. It would create a good balance between classroom language learning and using the resources of information and communication technology.
The results of this experiment support the view that ‘the skills required for survival in an information-based society can be achieved by the majority of the population’ (Hakkarainen 1997: 14) Nevertheless, it must be borne in mind that the subjects in this study are university students and can be regarded as the elite of the young population.

12.2 The future of TopClass

Helsinki University has adopted the Canadian Internet program, WebCT, as its official Internet teaching program. The users of TopClass 3.1 at the Language Centre will also have to consider using WebCT because WEST, the makers of TopClass, are phasing out the sale of small server programs for minor operating systems such as the Macintosh OS.

Helsinki University would profit greatly if it invested in a second program (i.e. TopClass), which has proved practical, efficient and user-friendly in language teaching. It may happen that teachers are daunted and lose their interest in virtual teaching if the program is clumsy and complicated. They perhaps cannot see how it could enhance their teaching and help learning more than what happens in face-to-face situation.

In general, I think it is advisable to use a commercially available system. There are several cases where self-made programs do not work after hard work that has been put into it because the computer specialists have gone somewhere else to work or the teachers have become tired of the complicated and hard work. Commercial systems such as TopClass and WebCT are guaranteed to work.
TopClass 3.1 works reliably and effectively; the students enjoy doing the tests I have written into it, and we constantly find new ways of utilizing the environment in useful ways. The ‘class announcement’ feature and internal mailing system as well as the ‘view tests’ are convenient. The program gives the test scores automatically and counts them in a logical way. It is truly astonishing how a program, which was created at a time when the Internet was in its initial stages (1995-1999), is still working powerfully. Since I find TopClass an excellent program, I would like to see virtual teaching done through the next version of the same system, TopClass Version 5, which is a greatly upgraded version.

Now that the quality of teaching is in the forefront, it is questionable whether it is possible to attain high quality teaching if we do not have programs of the best quality. TopClass Version 5 has the ‘Golden Grail’ feature, i.e. the XML Interface, which is needed for long-term and grand-scale Internet work. Professor of Mathematics, Mika Seppälä stated (at the Helsinki University Virtual University Seminar on December 4, 2001) that the weakness of WebCT is the fact that it does not have the XML Interface.

Although TopClass Version 5 is rather expensive it would be cost-effective in the long term because this program is easy for the teachers to use independently of computer assistants, and thus the courses become inexpensive to use in the future once they have been created. Teachers are used to working independently, and I argue that teachers prefer working so. And, it is not realistic to expect a language teacher to be able to put together a self-made course from the miscellaneous items that are available on the Internet. Some departments can and are willing to do it.
For language teaching, Helsinki University Language Centre and the language departments of the University, as well as perhaps the Finnish Virtual Language Centre could together buy the TopClass Version 5 licence because it is too expensive for one department to buy alone.

12.3 This study in a wider context

Sinko and Lehtinen (1999: 223) reported that in schools, the attitudes of boys toward ICT are more positive than those of girls, and that girls are significantly less interested in ICT than boys. There is general concern about girls not being sufficiently interested in using computer technology (Helsingin Sanomat, October 7, 1999). In this study, the females had no reservations about using computers for studying. Perhaps females will be more willing to use new technologies when they actually find them to be useful in practice. (Girls do not play computer games as much as boys do.) Female students may profit from the situation which prevails at the Department of Pharmacy where there are practically speaking no males to compete with in using technology. Hakkarainen (in Tella 1998: 42) noted that females need to get used to the new culture of technology; ‘top-class abilities grow with a specialist culture’; the females of this study formed the specialist culture themselves.

Most students including the three male students in the virtual group generally seem to have enjoyed the new course. Some of them had evidently worked in peer groups, which might explain the ‘good atmosphere’ the students experienced during the course. The length of the virtual course (6 weeks) seems to be appropriate, (cf. Khaili & Shashaani, 1994, in Sinko and Lehtinen 1999: 40), neither too short nor too long. Brett (2000: 276) found similar
positive attitudes toward using multimedia in learning business English. Also the fact that virtual learning was more varied and interactive may have had an influence on the attitudes.

As a result of this teaching experiment and its positive feedback, the Department of Pharmacy decided to introduce English reading comprehension courses via the Internet, starting in the autumn of 2001. Virtual learning solves the Department’s timetable coordination problems and also frees classroom space for other purposes. The Viikki campus, where the Department of Pharmacy is situated, has a brand-new media laboratory, which eases the problems students have with access to computers.

There was not a significant amount of attitudinal problems on the part of the virtual students (cf. Lindh and Matikainen, 2000: 229) in this study. Very few students responded negatively or were frustrated. I think this was because the material was of high quality, there was not too much, it was carefully selected and the exercises were tailored for students who study pharmaceutical English. The students may have found this teaching method varied and challenging.

Admittedly, the aim of higher education is to develop the student’s cognitive skills and independent construction of knowledge (Lonka & Lonka, 1993: 60). However, everything everywhere in all organizations is not possible. I feel the tasks in these pharmacy reading courses were somewhat behaviouristic, but since the course is worth only one and a half credits and there are more than 20 students in each course, the teacher cannot significantly improve the students’ higher cognitive skills. The reason simply is that certain terminology, grammar and vocabulary has to be learned and tested. Sinko and Lehtinen (above) noted that positive effects were especially visible with respect to simple cognitive tasks and basic
skills. In these pharmacy courses there are many basic skills to be learned. On longer-term courses it is natural that the teacher guides the student’s cognitive development more individually so that s/he can perceive new syntheses and constructions. Marttunen (1992) found that the argumentative skills of students can be enhanced through online studying.

In general, a web-based course demands greater autonomy and self-directedness on the part of the student, which was only partly true in this TopClass course. This experimental Internet course was rather pre-determined and it was autonomous only in the sense that the students could decide when, where and in which situation they liked to study, and they could even explore the Internet more widely than was necessary for completing the requirements of the course. In the same vein, Brett (2000: 270) found that students enjoyed using authentic materials and doing appropriate tasks autonomously.

Although writing materials for computer use (Bickerton 1999) is a demanding and time-consuming task, writing exercises into TopClass is well within the abilities of an ordinary language teacher with an interest in CALL. When using TopClass the teacher only needs rarely a technical assistant. Clearly, the questions that could be written for the computer are different from those that could be asked in class, although the texts and other materials were the same for both groups.

Researchers (Professor Seppo Tella, personal communication) have reported programs failing to work when a course had begun. In this study the computer system worked relatively well. In spite of minor technical problems all the students were able to complete the course and the final test. Tella (2001: 242) states that it is important for the students to be able to follow his/her course through.
Sinko and Lehtinen (1999) and Brett (2000) found that students enjoyed their multimedia courses. In this study, the student satisfaction on the virtual course was slightly greater than that in the control group. This may be because of the novelty effect or the feelings of freedom from the restrictions of time and place, whether or not this effect is a myth (cf. Nevgi 2000). The feeling of freedom is understandable since many virtual students reported having done the required exercises in the pharmacies they were working as trainees, with other students, or at home. Perhaps that is why none of the TopClass students felt lonely or isolated when studying. Nevgi (2000: 183) has found that virtual students often feel lonely or isolated when studying on-line. Some thought must be given to the fact that the virtual students would perhaps have needed more guidance since 48% of them did not know whether the teacher was activating them. (Statement 6) This can be corrected in the future when I am more experienced in managing the program and know more about virtual teaching. In addition, I will be able to reuse parts of this virtual course in the future.

Pharmacy students make an ideal experimental group since in their second year of study they already have good group cohesion, know each other because they work in the same groups in the drug preparation laboratory, and are used to working according to set rules. They form a learning community. Kiviniemi (2000: 116) points out that the students’ experience of social interaction may have significant influence on the learning outcomes. Many of these pharmacy students expressed the view that they felt socially satisfied, and they said that they felt ‘the teacher’s presence and person’ to be there for them.

Furthermore, a system such as TopClass is ideal for teaching reading comprehension because students who work with it are required to read and write in English and Finnish. It
comes naturally for a Finnish teacher to communicate with her Finnish students in written English when the Finnish language is also needed.

The students claimed that apart from learning English, they also learned to use computers for their own professional purposes. Therefore this kind of learning is meaningful in their wider study context, i.e. the students were doing tasks via the Internet which were relevant to their own subject matter: the students were a) solving real-world tasks, b) solving meaningful, complex problems and c) interacting with problem space (Tella, 1997:41; Jonassen 1995:63). The meaningfulness of using of the Internet depends totally on the specific teaching/learning situation in question; and here the teacher’s innovative and didactic skills play a central role. The new situation forces the teacher to think how best combine his/her pedagogical theories, practices and ICT.

This virtual pharmacy English course is in line with the wishes of the Department of Pharmacy, and the Development Programme of Teaching and Studies of Helsinki University for 2001-2003. In the latter, a requirement for information and communication skills has been included for the first time in the students’ curriculum.

Similarly, this virtual pharmacy reading comprehension course is in line with the objectives of the Language Centre because in the Language Centre Strategy 2001-2003, it is stated that more web teaching will be offered and teachers will be given training in ITC in the future. It is also in accordance with the Finnish National Information Strategy for 2000-2004, which emphasizes the importance of including females in the information society as well as introducing students to life-long learning.
The Finnish Virtual University was officially founded on the 18th of January, 2001. It includes 20 Finnish universities and it is planned to be in full operation by the end of 2004, so that the universities and polytechnics would then have permanent Internet-based courses to offer each other. In connection with the Finnish Virtual University, there will be the Virtual Language Centre, in which this pharmacy course can be an element. A sound technical base for the Finnish Virtual University will be established by FUNET, a mutual data net of the universities. The idea of a national virtual university came from Professor Paavo Uronen, the Rector of the Helsinki University of Technology (Acatiimi, 2/2001: 27).

Finland distinguishes herself worldwide in striving to unite technological-economic success with social justice and socially valuable applications of information and communication technology (Castells and Himanen, 2001). In Finland, as in the whole of Scandinavia, the Internet is in the service of democracy; the Finnish strategy of information and communication technology is based on equality. (Kimmo Grönlund, in Helsingin Sanomat, January 24, 2002).
12.4 New research themes:

1. There might be good reason for experimenting on pharmacy students for a second time. The virtual and control groups could be made equally strong from the beginning and have larger groups. Since there are roughly one hundred new pharmacy students each year, they could be put into two groups instead of four and pair or organize them so that in both groups, there would be an equal number of L-students, M-students etc. If the groups were equally strong, the measuring of the learning outcomes would be more exact.

2. In future, teachers might experiment on WebCT and find ways of utilizing it in language teaching. There might be studies in which the qualitative learning outcomes are researched in detail, e.g. the student’s individual increased awareness of his or her own thought process and skills, as well as changes in his or her learning skills. There might be a wider look at environments where critical thinking, creativity, collaboration, information acquisition and interaction take place. The focus could be on the learning process.
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