THE ROLE OF COMMUNICATION IN LEARNING TECHNOLOGIES

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Abstract

It is a fact that human communication plays an important role in how you develop an intellectual mind and the way knowledge is transferred to the next generation. From this point of view the increasing use of Learning Technologies in Higher Education has to be critically reviewed. The main concern of this paper is: How can we create an academic learning environment for students' learning based on WWW course material with email as their only communicative tool?

Key words

Communication, Communication Disorders, Learning Technologies, Learning Theories, Multimedia, Medicine, Voice Disorders, Logopedics, Phoniatrics.

1. Introduction

The first European universities were stationary knowledge bastions visited by students on foot or horse that came to learn about new things and exchange ideas. Today you do not have to walk - on the Internet you can fulfil the same needs for cultural and scholarly exchange independent of time and space. In the future we will see a combination of real and virtual universities where you can create your own curriculum from home.

But if the whole course is delivered on the Internet – where is the students' interaction in the classroom and on the campus? In the mail list Distance Learning (distancelearning@onelist.com) there has been a debate on this issue, since the publication in July 1999 of "On-line U." by Wendy Grossman in Scientific American (1999) where she makes the following statement:

> What happens to the students' interaction, a reason people go to universities in the first place? Nowhere outside a university do you rub shoulders with such a variety of people with so many different interests. Reproducing the student experience on-line is much harder than creating courseware.
>
> (Grossman, 1999)

The arguments against her position have so far been that in many over-crowded universities there is no shoulder-rubbing, there are few contact points between teachers and students, and the Internet offers more interesting people to communicate with in the specific subject area.

It is a fact that human communication plays an important role for how we develop an intellectual mind and the way knowledge is transferred to the next generation. A basic assumption is then that human communication between students and between student and teacher is an essential component in academic studies. Communication, in oral as well as in written form, is a constituent element in higher education, e.g. in seminars

around a written essay. Why is it then so difficult or even impossible to recreate this kind of learning environment on the Internet? I think the answer is that since the days of Socrates, we also need face-to-face communication with peers and academic mentors to learn - it is not good enough to collect and tacitly swallow information. The transition from information to knowledge is most often done by interpersonal communication even if it could be argued that intrapersonal communication is the main characteristic of learning. In this learning process we need access to both communication channels (the written and spoken language), and in most cases the Internet can only provide us with acceptable quality for the written language. The dialogue is also essential and most often a dialogue has to take place in a synchronous mode, whereas learning environment on the Internet provides us mainly with asynchronous means. The fact that as a student you can access your course independent of time and space does not mean that there is anyone around willing to participate in an academic discussion with you in your time and space. This freedom of knowing that you have an audience on the Internet does not mean that this audience is willing to participate in communication with you.

From this point of view the increasing use of information and communication technologies (ICT) in higher education has to be critically reviewed. The main concern then is: How can we create an academic learning environment on the Internet for students whose own learning environment could be their childhood hometown, and when it is possible for students to complete an academic degree without ever physically entering a university campus? This paper intends to discuss how we deal with the students' communicative environment in the design of Internet-based courses or course material for higher education.

2. Learning theories related to learning technologies

Modern learning theories, such as Kolb (1984), Laurillard (1993), Papert (1991) and Jonassen et al (1995) have adopted the fact that students should *construct their own knowledge* through communication with a variety of resources.

These theories are based on some core assumptions about students' learning and how to improve that learning. They also apply to the societal needs for the organisation of future higher education. The principles are valid both in theoretical subjects and in more practice-oriented subjects, and they can be summarised in the following way:

- Self- regulated learning
- Participation in formulating learning goals
- Equal opportunities between sexes, ethnic groups and socio-economic standards
- Life-long learning
- Efficacy of time and costs

These new learning theories combined with the new learning technologies have brought about changes in the teacher and learner roles. The roles of the teachers in an information-rich world will not be to provide more information, but to guide students in the learning process. Teachers in this learning environment will primarily act as mentors. Students will be more active in their learning, sometimes even having more information on specific topics than their professors. The academic structure of

lectures etc will be replaced by other means in order to give students, especially distance learning students, information from their teachers. However ,Wendy Grossman warns us for this change by her concluding remark in Scientific American:

> Distance learning does have its place……..Even so, the fact is that like it or not, most of the time learning is something that happens between people. It is not broadcasting, however much it feels like it when your professor's lecture heads into the second hour.
>
> (Grossman,1999)

2.1 The learning process

An interesting perspective on the learning process is offered by David Kolb (1984). His model, slightly modified for the purpose of this article, is applicable to how students learn from the variety of material and experiences offered by the traditional educational system. This model could easily be used in the design of courses and course material with the learning technologies.
The following concepts are used by Kolb:

- *Concrete experience* is learning through emotional experience. Some students learn best from emotional involvement in good examples and through discussion with others. They often have difficulties with generalisation in the sense that every learning experience is perceived as unique.
- *Reflective observation* is learning through looking and listening. These students tend to prefer lectures and they are not too fond of discussions with others. This group of students generally profits from a variety of subject area settings and a variety of teachers from different disciplines.
- *Abstract conceptualisation* is learning through thinking and analysing. Students tend to be more interested in "theories" than people and prefer learning situations where theories and systematic analysing are emphasised.
- *Active experimentation* is learning through experimenting and testing. Students tend to learn best from experimental activities in a small group setting and believe lectures are too passive settings.

Each of Kolb's suggested components in the learning process is necessary to the proper achievement of learning. Each of the four learning styles represents an ability, which a student may possess to a greater or lesser extent. A well-organised study programme should then take into account these aspects when offering students learning opportunities. Students who tend to rely more on reflection and abstract thinking need to have more experience and experimentation opportunities, and vice versa. The Internet based learning environment should be able to offer these variety of learning activities.

2.2 The learning environment on the internet

Learning technologies (Internet, CD-ROM) offer students, as well as their teachers, new opportunities to construct knowledge that has not before been available in this easy and quick mode. We should keep in mind the fact that even if students probably

have more time to spend on their studies than their teachers do, the study period is always limited in hours and weeks according to their study programmes. However, it could then be argued that the Internet causes confusion in this aspect with its unorganised huge amount of information and communication possibilities.

One of the most important features of educational multimedia is the interactivity (feedback) between material and user, and hence the stimulation to better learning. Also, the fact that students can contribute in a new way to their own production of learning material creates a new learning paradigm. We believe that the transition from passive consumers to active producers of educational material would improve learning. In the future we can see teachers and students collaborating in producing learning material.

The Institute for Higher Education Policy (US) has recently published an extensive report on contemporary research in distance learning *"What's the Difference?"* (1999) which states that the quality of the research on evaluation of Internet-based learning material is scientifically very poor. In the report several points are made concerning the weak status of the researchers' efforts in evaluation of the learning outcome of "virtual courses". The validity of the instruments used to assess the learning outcome is often criticised. However, it could be argued that the evaluation of the learning outcome of traditional classroom teaching also has weak instruments. The fact is that it is probably not useful to evaluate on-line courseware with the same instruments as in the traditional university campus setting. It may well be that on-line learning is a different modality to university training, where the individual has a much greater choice of resources to interact with.

However, the report acts as a warning to take extra care when evaluating the introduction of new theories and technologies in flexible learning mode for higher education.

The Australian Government has also published an extensive report on the use of information technology in university teaching and learning *" An evaluation of Information Technology Projects for University Learning"* by Shirley Alexander and Jo McKenzie (1998). The aim of the report was to provide decision-makers with a cost/benefit analysis of the use of information technology in teaching and learning at university level. The results from the study are 20 practically oriented recommendations regarding the outcomes of information technology projects. Although the report does not deal specifically with the issues in this article, it is worth noting that in the enumeration of students' benefits from the projects, learning through communication plays an important role (Alexander & McKenzie, 1998 p ix). The means of communication mentioned are email and computer-based conferencing over the Internet. However in the background analysis they state:

> What is clear from the literature is that the most important factor affecting the learning outcomes of IT projects is not the kind of technology used, but the design of the learning experience which makes use of it.
>
> (Alexander & McKenzie, 1999: 6)

The design of the learning environment is of course of outmost importance, but the low technological level of synchronous communication is actually today the most

hampering factor in the development of Internet-based distance courses in higher education.

3. Communication and learning technologies

> Almost from the beginning, the Internet was conceived as a mean to allow scientists to share data and access remote computers - a bridge to cross a physical gap quickly between researchers.
>
> (Kuster& Poburka, 1998: 73).

This quotation demonstrates how the Internet developed out of the need for easy and quick global communication between researchers, and this is probably still the best application of Internet for universities. Tools for communication were then email programmes, and for the exchange of data/articles ftp programmes. To seek for information (such as you could in a library) the Internet was judged to be too incomplete and too unorganised. Very often, however, this information was stored in databases on CD-ROM, thus providing researchers with computer-based information for the text production which is so important in research reporting. The need for global communication in research is based on sharing and collaboration and not very much on learning.

In the following sections experiences from four different projects are given to illustrate the development and evaluation of the communication in learning technologies. The projects are:

- the Project for the Development of Multimedia in Logopedics and Phoniatrics, part 1 and part 2 (PUMP 1 and 2)
  URL http://www.ldc.lu.se/logopedi/pump2/,
- the European Virtual University-voice course (EVU-voice course)
  URL http://www.ldc.lu.se/logopedi/EVU-Voice/, and
- the project for ICT support in on-line distance course development in medicine and health care.

3.2 Communication in a computer-based learning environment

The project for the Development of Multimedia in Logopedics and Phoniatrics (*PUMP1*), was set up in 1995 at the University of Lund through its Centre for Information Technology in Education. The aim of the project was to develop an interactive multimedia pedagogic tool to support the students, as well as the teachers, in integrating and presenting the variety of learning objectives for the graduate course in voice disorders. Our motivation was thus to promote the reflective and active learning styles, see section 2.1. The content of this experimental demo was however very limited (70Mb):

- one patient history (written records from assessment and intervention, audioclip from voice recording, videoclip from laryngeal examination and an interactive sheet for perceptual analysis of the patients voice disorder)

- a database with 5 different videoclips of laryngeal status for the most common voice disorders (and a text section with explanation of epidemiology etc)
- a database with 5 different audioclips of voice recordings for the most common voice disorders (with interactive data sheets for perceptual analysis).

This pilot version, produced as a Macromedia Director application, was presented to the students in voice pathology in September 1996. The outcome of the project has been reported by Wigforss (1996) and Wigforss et al. (1997). More extensive voice course material on CD-ROM have been developed at La Trobe University, Australia by Jennifer Oates & Allison Russel (1998) (the programme "*A Sound Judgement")* and at Lund University, Sweden by Göran Pettersson& Peter Kitzing & Leif Åkerlund (1998) the programme ("*Dysphonia").*

Communication: Many interactive multimedia programmes are used alone at the computer. A single student types, selects, points and clicks in silence. *PUMP1* was also planned to be a stand-alone product and the student should be able to use it whenever she/he wanted to during the on-campus voice course. According to Lave and Wenger (1991) the ability to speak the vocabulary and tell the stories of a culture of practice is fundamental to learning. We decided therefore to present the demo to students organised in small groups, sitting two or three at each computer. We wanted them to discuss and interact with the content (learning objectives). A computer-based learning environment should ensure that the interactive multimedia resource is used within a social context - with students working in groups, discussing the issues, reporting back, presenting findings, interviewing and debating the issues - to ensure that students have the opportunity to articulate, negotiate and defend their knowledge. Communication within this learning environment proved to be very successful, since the discussion of the PUMP1 content and the interactive data sheet with perceptual analysis was highly evaluated by the student in this group session.

3.3 Communication in an Internet based learning environment

The pedagogical demands from teachers and students to use, reorganise, select and learn from the material/program forced us to leave the educational multimedia environment that was offered by CD-ROMs. We thus changed over to a hypermedia-multimedia approach, which is a much more flexible solution. The project PUMP2 and the programme *PUMP2-röst* is funded by the Swedish Council for the Renewal of Undergraduate Education 1997-2000. The dominant pedagogical method in the educational programmes for speech pathologists and audiologists is Problem Based Learning (PBL). The project group considered it important, and natural, to keep that view on learning when creating the *PUMP2-röst* Web-based programme. The aim was to create a genuinely dynamic teacher and student learning environment, where both students and teachers could contribute with their own findings.

The programme *PUMP2-röst* is stored on a fast university network and is very easily accessed from home through modems. Course material is constantly added (or removed). Teachers and students in the voice course module can provide the programme with new patients, literature references, articles, valuable www-links to voice pathology sites etc. Since we now are working with streaming multimedia for our video and audioclips the compression of those files makes the program very easy

to store on a reusable CD-ROM. To use the Internet links you have to have an Internet connection, otherwise students can use the program via CD-ROM or on-line via the server. The programme contains at the moment about 1,000 webpages. The programme is password protected due to our ambition to protect our participating patients. The programme which is already fairly extensive, contains:

- 20 complete authentic patient records (assessment, intervention, surgery, video- and audioclips, perceptual analysis etc)
- a database with about 40 examples of laryngeal status for voice patients
- a database with 25 pathological voice recordings (acoustic and perceptual analysis)
- a library (with material produced at the department)
- a link library (with external links to other Internet sites in voice pathology)
- a communication corner (email list and addresses to all students and teachers involved in the course)
- a quiz area (with problem based and an interactive list of simple questions of facts in voice pathology)
- two information corners of how a logopedist (speech pathologist) and a phoniatrician assess and intervene with patients.

The programme has been in operation now for a year and can be accessed by students, supervisors and teachers in voice pathology. The first step in the evaluation process was a student evaluation after using the programme for half a year (Lyberg et al, 1999). Through this evaluation it has been possible to continuously improve the programme.

Communication: The *PUMP2-röst* programme was planned to be accessed solely from home and the communication between students and between students and teachers was to be accomplished through email. The programme has an in-built mailing list, and also information on individual email addresses to students and teachers/clinical supervisors. However, *PUMP2-röst* was intended to be an interactive support to the campus-based voice course, and was not intended to replace but to add modules in the ongoing course. The fact that the students met each other almost every day made the email communication superficial and even email communication with teachers did not appeal at all to the students. All students had email accounts and most of them used the account quite often. Since the dominant pedagogical method in the study program is problem-based learning, we tried to stimulate their communication through PBL cases. We encouraged them to form small email groups and discuss the cases presented and we even offered to give our point of view for their collaborative efforts. But we had no success with the PBL cases. Our conclusion then was that for students on campus the synchronous speech-based real-life communication is so much better than the asynchronous text-based virtual communication. We then discussed the introduction of some known chat-options with our students (ICQ and IRC). However it turned out that there was only a very limited number of students that could manage (or had previous knowledge of) chat programmes. The quality of direct communication is so much better than communication through learning technology tools – this is at least the case with students in communication disorders!

3.4 Communication in the European Virtual University

The Socrates ODL-project *The European Virtual University-voice course - EVU-voice*, is an international (multilingual and multicultural) development of the *PUMP2-röst.* The project's objectives are primarily to promote education and training in collaboration between universities, hospitals and schools. The main activities are to develop, implement and evaluate an interactive web-based voice course (basically *PUMP2-röst*) in the partner university departments.

Communication: The project was planned to have as its corner stone collaborative learning between the educational programmes in the five European countries (Ireland, Spain, Finland, UK and Sweden). Communication would take place mainly through a specific email list, but also a newsgroup was created for enhancing the involved teachers' communication. Common language between all students (10 from each department) would be English, and then students could communicate in their native language (Spanish, Finnish, Swedish and English) when addressing their peer group. The outcome of the first effort in May-June 1999 indicates that students were not "using" the programme in the same period, and thus rather communicating directly their opinions on the course content with peers on campus. No one really managed the newsgroup. In the next phase of this project 1999-2000 we will put more efforts in making the students participate in the voice course at almost the same period, so that we can stimulate both mail and chat between them.

3.5 Communication in internet based open and distance learning

Almost all undergraduate/graduate study programmes at the Faculty of Medicine (for doctors, physiotherapists, nurses, logopedists, audiologists etc) have as their dominant pedagogical method problem-based learning (PBL), and as their dominant learning theory to enable students to construct there own knowledge from a variety of resources (experience, lectures etc). The Faculty has also together with the regional health care authorities a specific obligation for lifelong education of specialists in the health care system. In order to develop distance courses on the Internet a specific project was set up 1998-2000 "*ICT support in on-line distance course development in medicine and health care"*. At the moment about 25 courses in all subspecialities are under preparation. The issue of how much of the learning environment should be campus-based and how much should be Internet-based is at hand in each course design at the moment.

Communication: In almost all of the courses information is posted on the course web pages, and the predominant communication tool between students and teachers is email. However, some of the distance courses will be given through the *Lund University Interactive Virtual Tool* (LUVIT), a tool that also includes chat and Netmeeting. It is too early to evaluate the outcome of these efforts, but for some of the courses the problems with communication seem to repeat themselves. It is hard to get students in lifelong learning courses to communicate. The following statement was made in an evaluation sheet from a school-teacher participating in a distance course in Dyslexia:

> I don't want to write and I don't want to read emails since it takes too much time. I rather pick up the phone and talk (for hours) with my course peers. It costs much more and I can only reach one at a time, but I feel the freedom of talking. The written language is so stiff and you have to think about what you want to put down. I posted one mail some weeks ago and no-one has yet answered it.
>
> (Student evaluation 1998 - translated from Swedish.)

Is the informal style in the spoken language too difficult to translate into the text-based style of email? To understand more of what goes on in email-based communication, the author has for several months subscribed to a variety of mail lists in order to see how communication in the lists takes place. The overall impression is that the mail list is supported by a few active people, and probably many passive people. There are mail lists where just one person is active, sending out a stream of letters about his/her favourite topic, e.g. distance education. The ambition is high and there is probably an audience willing to receive this amount of email messages. However, there are also mail lists on very specific topics such as Dragon Dictate Applications where both professionals, programme developers and handicapped people take part in the communication. It would be interesting to see some research on the quality of email list communication.

Conclusion

For the majority of students and teachers the need for face-to-face interaction is overwhelming. A learning environment for academic studies must therefore at some point in the distance course or course material offer this interaction. To have students as well as teachers use only text-based communication for academic purposes seems to be very dangerous for the quality outcome of courses in higher education. The examples of the development of courses and course material given in this paper illustrate the need for better communication tools in Internet-based courses. This is a case where the pedagogical intentions of designing a good learning environment on Internet demands further technological development in the area of Internet communication tools.

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