

The many rooms of the virtual workplace

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ABSTRACT

Since the mid-90's the University of Karlstad has been involved in research work on the usage of so called videotelephony in therapeutical work as well as studies in common social distance interaction. Four main projects have been presented during a five-year period:

- Videotelephony and language training for people with Aphasia
- Videotelephony and language training for people with Mental Retardation
- Videotelephony as a network tool for speech pathologists
- Videotelephony as a text telephone for people with language and speech impairment

At the moment the projects have resulted concretely in some 20 videophones installed all over the country and some international tests as well.

A main ingredient in the projects has been to study the social importance of this technology as well as the educational possibilities in the technology, that is, how learning is amplified or not through the usage of videotelephony. The final aim of all the projects is five fold. First we want to establish a well founded description of the quality of the communication situation in relation to its physical counterpart. Secondly we want to study cost-effective alternatives in the professional care of people with speech and language problems. Thirdly we want to make this technology a commonly used tool among speech pathologists and therapists in the whole of Sweden since its multi-functionality seems to offer new professional possibilities. Fourthly, we want to evaluate the methodologies which might evolve. Finally, we want to see in what ways this technology can support and alleviate the social communication patterns of the specialists as well as the service users, in other words, the people with different sorts of communication disabilities. The equipments used are in almost all cases 2x64 kb/s ISDN-based and also desktop video conferencing, that is, systems integrated into personal computers.

1. BACKGROUND

The so called Information technology has given birth to a large amount of new words, concepts and tools or products described in all languages during the last three decades or so. The most common application in the IT-family is clearly the personal computer. The grandchild of the large and impersonal mainframe-systems of the 1960's has become a sort of cybernetic mental prostheses to individuals, seemingly expanding certain mental processes in a way which have given birth to ideas about the human machine or the technified human being. The PC as a tool is very hard to define or to classify as a tool. Most tools in human history of technology has been linear and uni-dimensional, meaning that you are supposed to use the tool in one or possibly a few general situations with very specific aims and that the result of using the tool can be seen directly. The typical tool then has been unifunctional, with one main function – the scissors will cut, the pen will write etc.

The typical tool has also been non-representative, that is, the tool has never symbolized anything. This doesn't mean that tools have never been used as symbols but the symbol-content has always been unintentional in relation to the intended usage of the tool. One example is the usage of a pen to symbolize literature, writing, being literate etc. The PC, however is multifunctional, rapidly changing, indirect and representative which makes it very difficult to define and generalize according to traditional terminology.

Still another fact which is less considered is the fact that the PC, due to its flexibility, is used by so many different groups of people and in so many different situations that the terminologies for the tool become as varified as there are different functions. In other words, the development of classification strategies, concepts and terminology is an ongoing work which is very difficult to grip. This "meta"- problem, surprisingly

enough, is not debated in research society as much as would be expected. The researcher Paul Mayer has presented a short and tentative argument for a new typology for describing and analyzing PC:s where he is building upon some of the work which has been done sofar (Mayer, 1998).

The concept of distance communication also is the subject of a very intense debate, all over the world at the moment. Since large areas of the world are underpopulated and since the infra structure of communication, travel and transport is insufficiently developed in many countries, the idea that distance communication would save a lot of work (and money) is widespread today. Especially education performed over a distance has become a thing which interests people all over the world at the moment and more efforts are spent in that area than in the fields of distance work, distance therapy, telemedicine etc. People have participated in many different forms of distance education for more than 150 years (Holmberg, 1996), so the idea of a distance between teacher and pupil is not a new one. Historically the solution has mainly consisted of moving either the pupil or the teacher, bringing them physically closer to each other, until the birth of reliable and common postal communication in the early 19th century.

With modern technology, however, teaching and learning can be performed without moving the participants, just transporting the messages between them, using some sort of medium. Thereby it will be easier to raise the productivity of education in the term of number of teaching hours for every pupil and it suddenly becomes possible to analyze education in terms of marketing a product, which could be negative or positive (Peters, 1967).

To make a somewhat farfetched association, one might argue from the findings of the researcher Walter Ong (1986;1990) and say that the concept of distance in the knowledge distribution between people was born when the written language was born, in fact, that written language is the first and still most general tool for distance education. At least if we define "distance" as what cannot be experienced without any intermediate tool of some sort. If we accept this idea then we could say that the letters from the early church fathers like St Paul or St Augustin could be considered as a very early form of correspondence course.

To conclude, do we want distance communication to be a form of "virtual room" system where the meeting between people, more or less directly, is important or do we want more or less automatic systems "virtual libraries" where one person at a time is actively looking for knowledge and navigating through systems where information is stored? Or do we want both?

2. COMMUNICATION, TECHNOLOGY, EDUCATION & SPECIAL NEEDS

2.1 The Concept Of Communication

A very trendy word today is the word communication. Most definitions agree on the fact that communication consists of (meaningful) interaction between two or more participants. More detailed definitions also add that the most common tool for human communication would be language and that communication has a temporal dimension as well as a spatial, that it connects users over time and distance. To be able to create distance communication you have to communicate and also to use (some sort of) language. The means of communication today are mostly related to telematics and to computer technology. However, it is important to remember that the old-fashioned technology of yesterday, still is very much in use today. For instance, the combination of correspondence and radio-transmitted courses and exams are very common in Asian countries and radio-based education has been in use in Australia and Canada for a very large part of this century (Fleming, Toutant, 1995). The lesson to be learned from this fact simply is that new technology does not always kill the old technology, just because it is new. The price, literally and figuratively, might be to high.

The most general and optimal situation for communication would probably be the situation where the participants can use as many of their sensory organs as possible, without intermediate tools of any sort, in other words a situation where you can see, hear, touch, smell etc the one you are communicating with, in other words sharing the same experienced space or "room", at the same time. This could be described as synchronous communication or interaction as opposed to asynchronous communication of which the most extreme example probably would be reading a book.

2.2 The Concept Of Technology

The question about integrated technology vs technology with specific and limited functions – so called dedicated technology - leads us into very complicated problems. A comb or a spoon are examples of very specialized tools with highly specialized functions. The computer, however, is an example of a non-specific tool which can be used in many different ways and where even combinations of seemingly separate functions give way to new functions which makes the computer more of a mental tool, that is, the tool becomes something very close to the human mind. Finally, when the trust in the technology is strong enough, the

computer might become a tool for your personality directly, a sort of symbiosis between the animate and the inanimate (Treviranus, 1993). Some authors of fiction for instance Arthur Koestler or Karel Capek and Isaac Asimov have also speculated on the fact that the ultimate tool of human beings, seems to be another human being. Would that mean that our technological motivation, deep down in our collective Jungian subconscious mind, would be to create something in our own image, in other words to play God? Or just to create a child?

One of the big discussions of educational technology today concerns the question of the relation between form and content. The philosopher MacLuhan stated that “the medium is the message” in his classical book *The Gutenberg Galaxy*, stating that the mass fabrication of the written word forever has changed the thoughts of people. In other words, our thoughts become dependent and variable according to the medium whereby we express them. MacLuhan’s statement could be considered as a simplification of Whorf’s theories on human language and its cultural dependency. Ong expresses several authors’ ideas (Ong, 1990) when he says that the same idea can be expressed in many different ways, not dependant of the medium, that is the form. In other words, according to Ong, it is possible to express the same ideas in any medium. Ong and MacLuhan represent, or are interpreted as representing opposite ideas.

Technology has become an integrated part of human behavior today. It is very difficult to imagine a society of humans where some sort of technology would not be integrated into that society and the American philosopher Don Ihde (1990) even speculates if there ever in the history of Man has been a sort of Garden of Eden situation where Man used no technology whatsoever. The PC has become a part of telematics technology and seems to be at the core of distance communication today.

2.3 The Concept Of Education

This concept includes a situation or a specific environment, an activity or several activities and some participants. In this situation there is a meeting between the participants where they act jointly. This activity is goal oriented towards a problem to solve, an item of information to remember or a question to answer. Those three goals are different parts of the general concept of learning which is the main goal of education, according to all educational models. However, the three goals are very disparate which means that the idea of learning is a complicated one where there is no direct consensus in different cognitive theories. That sort of discussion has no place in this paper, suffice it to say that learning is no “watertight” idea or concept, but that memory and performance are central parts of that concept.

If we tie modern ideas and definitions on education together, there seems to be a need of a technology where participants can interact and use as many sensory channels as possible and where it is possible to interact with many in the same way as with few, and where language knowledge is important. Furthermore, it is important to realize that communication can be both synchronous as well as asynchronous (Zirkin, Sumler, 1995).

2.4 The Concept Of Special Needs

Not so many years ago we tended to talk about “handicap” and “handicapped people”, meaning anything and anybody with some sort of (physical, mostly) deviation. Since the 1960’s and WHO’s definition of the concepts of impairment, disability and handicap the debate about human rights and society’s responsibility and the role of the individual etc has been much clearer. In the 80’s, however, the ever-ongoing debate was coloured by the fact that the rapid technological development would interfere with the lives of many more people than expected from the categorization made by WHO. For instance, elderly and people living in desolate areas and other groups would be very much marked by societies willingness to adapt to and adopt new technology. The general ICIDH-concepts used today are based upon social and functional as well as biological considerations

This problem of words and concepts is important on another level. Groups of people with disabilities, within or without their organizations have rightly commented on the fact that when we talk about disabilities and when we create new concepts and words, then it is very rare to find people with disabilities involved (Seale, 1988; Johnson, Moxon, 1988).

3. DISTANCE LEARNING & DISTANCE THERAPY

3.1 The Telematics Or Distance Learning Situation

The first real studies in the educational situation in electronical distance education were made in the 1960’s and 70’s. The most wellknown studies were made by the American sociologist Roxanne Hiltz Starr (Starr, 1995). She used the concept the “virtual classroom”. If we accept the ideas mentioned above that education should include interaction, then a main part of distance education would be to stress the sense of

being interactive, for the teacher as well as for the pupil. From the experiences of earlier trials with distance technology, it is clear that a tool that uses only limited channels of communication has been enough to create interaction and contact, both between individuals with special needs (Cerf, 1996) and anyone who is using a distance tool.

If we accept a basic idea that a human being has the optimum chance to interaction and common understanding and contact, in a situation when you feel close through as many channels as possible, then it is highly probable that the usage of a technological tool which offers as many channels as possible will result in the experience of high quality (and quantity) communication. A concrete example of this is the many trials all over the world, investigating videotelephony as a communication tool (Brodin, Magnusson, 1993). A recent study in Sweden at the University of Karlstad estimates that there are at least 500 large video-conferencing studios available in Sweden today and that the number of desktop systems using either analogue communication or ISDN can be counted in thousands. It is very difficult to find solid studies on the longitudinal usage of videotelephony. Since Norway is one of the "videophone-densest" countries in the world we have to mention one of the few available books on collected experiences of videotelephony (Kristiansen, Ed, 1991).

3.2 Distance Education And Special Needs

The first systematic trials, using telematics were started in the 1960's and 1970's. If we mention a few examples, for instance in delivering medical and pedagogical support regarding disabled children in rural areas in the US, including direct training to the children themselves (Aeschleman, 1979). Another example was a very concrete projet in the US where Stroke patients had specific training to handle the telephone (Leff, 1976). A third example was a system to give consultations to communication impaired people over the telephone, also in the US (Vaughn, 1976). Some of the earliest trials with graphic phones for deaf people came already in the mid 70's (Pearson, 1981). The earliest trials used the telephone or radio, later on TV. In the 1980's the concept of telemedicine was created and most applications directed towards experts in the distance communication field and special needs are defined as being part of telemedicine today. An immense number of experiments are conducted all over the world with the main goal to teach experts how to use and benefit from the technology. Today, the main technology in use in telemedicine seems to be videotelephony. One of the early pioneers in seeing the possibilities of telematics for a specific group of users was the American speech pathologist Robert T Wertz who studied potentials of telematics for consulting in the Stroke and Aphasia fields in rural and remote settings in the 1980's (Wertz, 1992). Another example with telematical consulting included tests with a specialist available over the phone for talk and text (Dean, 1991; Goldberg, 1997). In Sweden the Swedish Handicap Institute and the Telecom company had a joint project on telematics and disability. Within this project a lot of research was produced and also reports of great principal importance, for instance inventories on ongoing activities and needs for the future (Lindström, 1989). The examples from the 1980's and the 1990's have developed into two main directions, as mentioned above, the "virtual classroom" or the "virtual clinique" direction and the "virtual library" direction. The technology representing the virtual classroom would be videotelephony and the other direction could be represented by Internet. However, the technologies and directions tend to mix between them so for instance, you can use simple videophones over Internet and it is also possible to simulate some sort of virtual classroom over Internet.

There have also been trials for people with special needs to give distance education, for instance to people with Aphasia (Lifvergren, Lundell, Magnusson, 1997, Holand 1991, Magnusson, 1995, Johansson, Magnusson, Wallin, 1997). The last example also gives descriptions on how to teach or train adults with mental retardation. The tool in this case is the videophone or Internet and the results are preliminary very good. However, there are also projects which have resulted in more skepticism.. At the Microelectronic Institute at the University of Dundee, under the leadership of professor Alan Newell, there are always ongoing investigations into the use of different sorts of technologies. In 1994 they looked into the use of desktop videotelephony and found that technology was not transparent (Beattie et al, 1994).

These few examples clearly show that the area is very heterogenous and that distance education can be defined as multimodal, which could mean several things but I choose to interpret this information as a recommendation that designers of courseware must be open to combinations of methods or integration of technologies and an awareness that technology should never be an end to itself.

3.3 Distance Therapy

The concept of therapy is very close to the concept of education. In both cases you use certain methods to make a person or a group of persons change. In education you expect more of a development but in therapy or treatment you often expect a more radical and definite change from one state of being into another. The main difference, however, is the fact that when you need therapy or in other words treatment, you are

presumed to lack some necessary part in your body or personality which you have lost from illness or accident.

Before you receive the treatment you are diagnosed by an expert who then suggests a plan of action or treatment, the diagnosis, which then could be perceived as a part of the therapy, which in general is performed by members of the medical profession in much the same way that education is performed by professional educators, mostly teachers. In distance education, then, people talk a lot about one main type of activity, that is the situation where the teacher teaches and the learner learns, that is the classroom-situation. In distance therapy or rather telemedicine which has become the main concept, we rather look at a situation of many different activities which together form the concept of telemedicine (Akselsen, Eidsvik, Folkow, 1994, Olsson, 1997). The main parts of medical activities then, would be three: diagnostics/ analysis; therapy or treatment; and prescription.

In all of these subareas, certain telemedical activities have been developed and evaluated. The main efforts have been spent in the diagnostics field where methods for fine diagnostics over a distance have been developed in most of the major clinical fields. X-ray pictures of broken legs at ski-resorts are transmitted over ISDN-lines from local hospitals to central expert hospitals which can make a diagnosis and suggest the treatment without having to travel to the patient or vice versa. Gastroscopy can be performed over the same network and also otolaryngological investigations (Goldberg, 1996). Making a good diagnosis is dependant on deep and highly specialized knowledge in certain areas and some medical developers are trying to create AI-based expert-systems to support clinicians when they make their diagnostic work (Olsson, 1996).

Telemedical treatment or therapy is much rarer. Some work has been done in the psychiatry field with therapeutical discussions over videophone-lines (von Tetzchner, Holand, Steindal, 1991), more on the line of giving support to the local staff. Long-time trials have been made with language training for people with Aphasia (Magnusson, 1996) and also short-time trials (Peters, 1996, Holand, 1991). Most of the results indicate that the technology has its faults and that it is difficult to experience that the intermediate technology is totally transparent, for the patient as well as for the therapist. A very special telematics treatment work has been done in several places in the world, using computer transmitted messages to portable pocket telemessengers, used by people with memory problems, both from senility and traumatical brain injury (Hersh, 1994).

3.4 Distance Therapy For People With Aphasia

In Sweden there was a longitudinal project with people with Aphasia for 20 months and 31 persons participated. The participants spent a total of 20 sessions together with me over the videophone, receiving language training according to individual training plans. They had different types of Aphasia and were categorized according to the three main groups Broca, Wernicke and Global Aphasia. The results were analyzed mainly from the perspective of the participant, that is, whether they found the sessions and the medium satisfactory.

The main result shows that no participant found the medium totally dissatisfactory, that most participants found no major differences in quality between the medium and so called physical real life interaction. Some of the participants also experience that their language ability is becoming better through the sessions and some also would like to use similar technology to alleviate their private communication. Most of the participants describe the main results of their experience with the technology as "a situation where they learnt something". Some of the main results indicate that users tend to oversee with the quality problems after a few times usage and that the basic comments on the technology have to do with the correlation between the visual and the auditive channels. Users very quickly learn different strategies for communication and experience a higher quality of interaction after some time of usage. However, initial comments often express a mixture of disappointment for the quality and if there are any expectations at all, they are very much coloured by experience of TV systems,

4. PROFESSIONAL NETWORKS: VIDEOPHONE COURSE, TELELOG 1-3, REGLOG

Speech pathology in the general sense is a vast professional field, where many projects have been developed during the years, including technological applications. The field of AAC (Alternative and Augmentative Communication) has inspired a large number of technology projects all over the world and in latter years these have focused on telematics projects, but projects involving videotelephony are fairly new in the speech pathology field.

In Sweden there are approximately eight hundred speech pathologists out of a population of 8 million. Forty individuals or 0.5% of them are male so the group could be considered as mainly female. Most of them

are working in the big city districts which means that the more unpopulated areas of Sweden, which would correspond to about two-thirds of the country's geographical area are understaffed. For instance this effects about twenty per cent of the population in the northern part of the country, or seven of the 24 counties of Sweden. Speech pathology is a (para)medical profession and the medical services are mainly the business of the county councils while higher education and research is the business of the State and managed centrally. This means that undertaking research activities in the medical or care field can be difficult to organise. However, most local counties support research in co-operation with their closest university or university college. There are also a few university hospitals in Sweden, situated close to the original five old universities of Sweden. There are four schools for speech pathologists in the country, including the one at the Karolinska Institute.

In 1997 Värmland County Council (where Karlstad University is situated) started the TELELOG project, partly with financial support from the EG. The aim has been to teach all speech pathologists within the County to use videophone equipment as a natural part of their intra-professional relations. The results of this project will decide on the future use of the technology as a more integrated part of the therapeutic part of the work of speech pathologists.

During most of that time, the Karolinska Institute has managed a course for speech pathologists on computer technology which one of the authors of this paper led. The course has given over twenty per cent of all Swedish speech pathologists a basic knowledge of information or computer technology. During the TELELOG 1 period the same institute, the college of speech therapists in Stockholm has managed a post-graduate course on the subject of telematics and distance communication for speech therapists. The course covers 5 Swedish academic credits and provides basic knowledge on the theory and practice of telematics and different methods of distance education. Forty per cent of the lectures have been transmitted over ISDN using videophones.

TELELOG 2 studies the interaction between a few people with severe communication problems and their spouses and rehabilitators. One of the users has traumatic brain damage and another has a global Aphasia. The third participant user has CP and uses AAC-communication. A local Aphasia chapter is also involved and a folk high school with a rehabilitation course for people with Aphasia. The reaction of the users so has been overwhelmingly positive and two of the participants have decided to keep the equipment at their own cost..

Another project which is in its initial stage is called REGLOG. The northernmost college for speech pathologists is situated in the city of Umeå, not far from the Polar Circle. During the basic training of speech pathologists, videotelephony shall be used as a tool. The person responsible for the speech pathology school in Umeå is ass. Professor Ms Elisabeth Sederholm. The project is planned to develop a network over three years, including all speech pathologists in that part of the country. So far, four systems are installed and another five systems have been installed in the northernmost county of Sweden in the autumn of 1999, within the framework of a third TELELOG-project.

There is a common technology and methodology in all of the projects. First of all the common user group is speech pathologists, specialists in communication and problems with speech and language. Secondly, the aim is to develop professional networks, that is, the communication will be very goal-oriented. Thirdly, the technology is desktop-videotelephony meaning that the videophone function is integrated in a standard PC and can be combined with any other of the functions of the PC. Fourthly, the network used is ISDN which is an open network. In other words, a standardised technology is used in a natural environment.

Within TELELOG 3 there will also be a comparative trial of Aphasia therapy with and without videotelephony. This trial will run until December 2000.

About 40 speech pathologists and 20 students are or will be involved in these projects. So far, 25 professionals have been involved and the response has been very positive. The participants rapidly develop user patterns where they interact on a regular basis with their colleagues instead of using the phone or meeting physically. Some interactive work has also been done, mostly writing texts together, sharing word processing software between two users. People have also attempted to share therapeutic software, thereby simulating a session with a patient. The next step will be to try and practice therapy through the videophone. The main problem has to do with the experienced conflict of priorities between having to choose between the computer and the patients. However, all participating speech pathologists have also been allowed by their employers to take time to participate in these experimental projects.

Among the negative comments have been reflections on the necessity to integrate the usage into a meaningful everyday situation and also the need to have extra service personnel available, especially for group calls. However, the negative comments are rather few.

4.1 Tentative User Comments On Analogue Technology

A few experiences with analogue systems using narrow band have been made, both with dedicated equipment as well as with PC:s using Internet software. In the few cases performed the main reaction could be condensed into the comment "It's nice to see someone like this but compared to ISDN or TV, what's the use?".

5. CONCLUSION

Most users still are in a stage of fascination with the possibilities with the technology. Few of them have however gone on to the stage where they develop routines and where the technology is safely integrated into the workday. Most users talk about the future when it will be established. Some of them can see less travels and more fun and also more usage of their PC:s. This is just the beginning and data has to be collected for years to come at the same time as the technology will have to be spread to more and more users. The vision of the virtual room is not a reality so far but people can easily understand it and some are fascinated by it, others are worried but there is no fear among the users.

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