

Regarding the development of a new standard for the education of teachers in delivering scientific training on synchronous (real-time) E-learning platforms.

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Education on the Internet through synchronous (real-time) methods is a very different and demanding task. Early on, it is easy to realize that it is far more complex for the educator to communicate like this than by traditional means such as those used in a class or auditorium. It demands a higher degree of preparation, plan of instruction and carefully prepared teaching materials.

If one is to compare it to other media, then this method of teaching has several similarities with communication of knowledge via audiovisual media such as TV. Actually, one can regard the teacher as being a “host” on a TV station.

This is the conclusion that Professor Per Moller at DTU has made after having worked with E-learning on a trial basis on different platforms through several years. Per Moller has a scientific background in corrosion and surface technology.

All the practical experience from these experiments has now been gathered and is the basis for the establishment of an efficient training program for selected university professors. These professors are known to have good evaluations of their teaching skills and an interest in reaching a wider audience with their professional and scientific education. From the outset it has been the intention that the training of web-educators should be efficient and only be offered to the university’s best and most dedicated teachers.

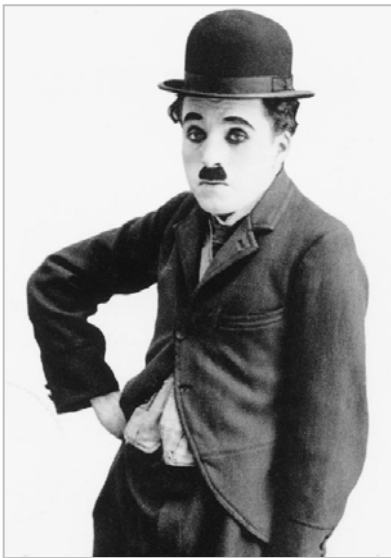


As an educator on the Internet it is important to acquire a lot of skills both technical (*how to operate the technology of the virtual classroom*) and how to communicate and talk to the students.

One might wonder why an experienced educator has to learn how to talk to the students, but the conditions are quite different when one is working with a TV- or radio- medium.

Speakers in TV and radio are routinely trained to facilitate the communication of news and other information. The underlying reasoning is obvious. In a physical encounter people unconsciously read the body language, read the facial expressions and listen simultaneously. Together this combination is regarded as a transfer of communication. When one of these disappear – be it body language or speech – the receiver has to compensate. In addition one has to make further demands in regards to the quality of the sound, since this usually do not get better by being transmitted through a medium.

Hence it is important to understand the significance of speaking clearly. If one wonders about the importance of body language with regards to communication one only has to consider the history silent movies. In the early days of cinema there was no way to co-ordinate the audio and the moving pictures in a rational way, which is clearly seen in the famous Charles Chaplin silent movies.



The silent movie actor Charles Chaplin mastered, as few others, the ability to communicate a message without the use of verbal aid. The web-educator has the opposite problem, since the message has to be communicated without the use of body language and practically only verbally.

In addition the Web-educator doesn't get any feedback from the students in the form of body language. Many teachers are consciously and unconsciously aware of the facial expressions and body language of the students. Are the students actively listening or indifferent? In the virtual auditorium/classroom this is not possible, so one has to compensate by other means.

In connection with the establishment of the formal education of web-educators at DTU it was therefore decided early on that there was a need to incorporate the knowledge and experience already acquired in TV- and radio-broadcasting.

For example, in order to be a good anchor at a news station extensive training in phonetics is required.

The virtual classroom or auditorium is a new and untested medium, which few people know the existence of and even fewer have experience in using as a teaching tool.

Another matter that demands attention is the degree of multitasking required by a web-educator. It is important that the educator is proficient in the technology, as a speaker and as a teacher.

In the course of the educational situation one also has to monitor the chat-room at the same time as giving an exiting and coherent lecture with academic value.

This is precisely the problem seen on the TV screen when the trained anchor manages to both communicate the news and simultaneously insert incoming news without any unintended disturbance for the viewer.

When a lecture is given through synchronous (real-time), E-Learning one usually uses slides, simple animations and in rare occasions small video-clips as the visual aids. In order to achieve optimal visual communication, the training of the web-educators at DTU will also spend some

time on how to pass on complex theoretical problems to the students (digital presentation-technique). A more improvisational educational aid such as the digital white-board and the combination of this and slides is also covered in this part of the training.

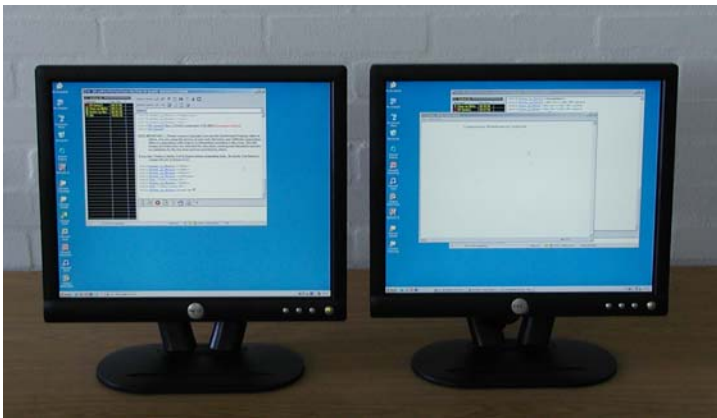
One may ask whether education in the use of a virtual classroom is really a necessity. The answer is a resounding yes – it would be highly inefficient for students as well as teachers if one just threw oneself into an educational situation in a virtual classroom. Consider the huge amount of problems of both technical and educational nature which could arise. It would require a very patient audience and would probably mean that the great potential of this form of education would have a hard time breaking through as a new method in education. This process can be facilitated and be more efficient by giving the future web-educators a thorough training before commencing the actual lectures in the virtual classroom.

The contents of the training program

The practical implementation of the program has been an interaction between the three elements of the course.

1. Training in the technical aspects of the software.
2. Training in phonetics (verbal communication technique).
3. Training in digital presentation technique.
4. Practical experience (Combination of 1,2 and 3)

1. Training in the technical aspects of the software:



The training program is initiated by an introduction to the use of the software. A small group of participants is placed in the same room so that the person who is acting as teacher and those acting as students are able to view both screens simultaneously. Many computers these days have graphics cards that enable the connection of 2 monitors at the same time – by attaching a long cable to one of the monitors it is

possible to have a bit of distance in order to give the teachers computer some distance and privacy from the students.

This is done so that the teacher can view the consequences of his/her actions and thereby learn the basic operating procedures of the software and its application in an actual dynamic educational environment. It is expected that during the course of this module, the participants become acquainted with use of the chat-system, web-camera, audio recording facilities, the digital whiteboard, shared Internet surfing and application sharing in general. The future web-educators are strongly advised to “play” with the software at home, in order to maximize their familiarity with it. Obviously the participants taking part in the training program take turns in acting as the teacher.

2. Training in phonetics (verbal communication technique):

After this the participants take part in a brief, but intensive training in phonetics (proper speech), online teaching theory, and the problems associated with teaching online. The goal of this part is to allow the web-educator to keep his/her style of teaching, but to adapt it to this new medium. The web-educator has to be trained to be secure and self-assured in the educational situation both mentally and psychologically.

The verbal communication part of the course is based in learning how to control the basic functions in voice, speech and breath in order to prevent the teacher's own verbal communication skills from becoming a hindrance for the communication in the virtual classroom.

The basic functions that we focus on, are:

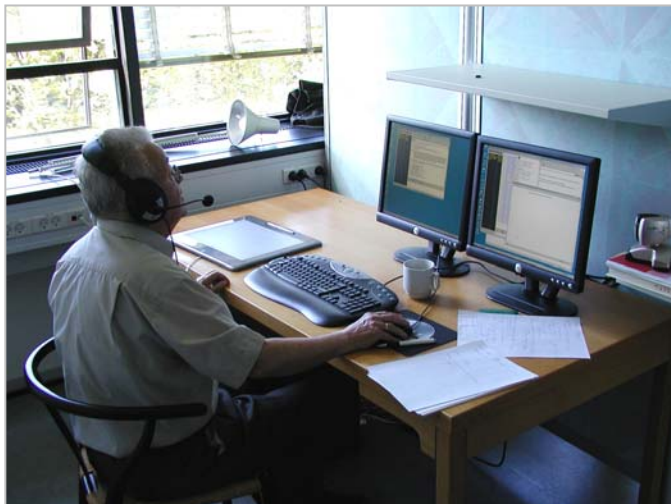
- Placement of the voice
- Tempo of the speech
- Breathing
- Diction/language
- Communication skills (modulation, phrasing)

The web-educator may find that his/her voice is inappropriately “placed” with regards to the hardware, microphone and headset. This aspect of the technology is unfortunately frequently a low priority compared to other hardware issues, and the result may be a poor sound quality. This must be addressed by the educator, because a voice with too much body-resonance or a “smoky voice” does not travel well over phone-quality sound and gives a throaty impression, and a voice with too much head-resonance will be sharp and irritating to the listener .

The first obstacle the educator encounters in the virtual classroom is that they lack ability to communicate via body language and mime. This applies both on the transmitting and receiving end.

The first “error” in overcoming this obstacle is the tendency to speak too fast – this is often an unconscious attempt to compensate for the diminished channels of communication by increasing the flow from the one(s) that are available. The immediate consequences of this should be obvious – the educator communicates even less.

Hence the goal of this part of the course is to enable the web-educator to be consciously aware of the tempo of his/her speech and adjust it to a degree that may feel drawling to the educator, but actually is better for the listener.



An essential condition for communication even if it is “only” complex academic information without any literary or artistic qualities, is that the transmitter has an idea, a thought that is sought after and communicated.

This requires time, which in turn requires a moderate tempo of the speech. A thought takes time, even more so for web-educators.

Another reason for the tendency to speak too fast is an irrelevant fear of boring the students. In practice we have experienced that if the web-educator is speaking too fast, then the students are left hanging and boredom sets in as a result.

The absolute requirement for any good and comprehensible communication is that the transmitter is at peace. The speaking voice is the most expressive part of a human being. A well-positioned voice reveals most of what is going on in the mind of the speaker and consequently the ears are capable of intercepting anything that a voice can express. The ears and the vocal chord have evolved in parallel and a trained listener can effortlessly put the audible feelings into words.

The foundation of a well-placed and expressive speaking voice is well-placed breathing - the Alpha and Omega of the entire voice function.

A well-placed breathing is the basis for an optimal functioning voice and the mental activity to match. If the breathing is not “in place” then neither voice nor thought is “in place” and interference is almost assured.

One has to make the web-educator conscious of how his/her breathing is placed correctly in the body in order for the system to remain “in balance” and the students can feel at ease and taken care of in the virtual classroom.

Obviously a big part of the verbal communication is in the language itself. The spoken language has many characteristics and the fact of the matter is that there is no recipe as to what proper speech is supposed to be. The spoken language changes according to age, origin and education. The only external characteristic which is an indisputable quality in any spoken language is the articulation and delivery. It must be the aim to clarify the web-educator's spoken language to make it organic and personal and be a natural extension to the mind at work. Hence it is of no importance whether the web-educator has a dialectical tone in his/her spoken language, as long as it does not have a restrictive influence on the students' understanding of the subject.

A tendency for the transmitter to embellish the language to clarify or lets it slide because of lack of attention might arise. Both are damaging for the organic sense in the verbal communication which causes more interference.

One of the major conditions for the emergence of thoughts in the mind of an audience and thereby learning is that the thoughts are present in the mind of the transmitter as well. A large part of communication rests on the formation of images – even academic communication. Any spoken word must have content in the form of an image, a mood or a feeling in order for it to make an impression in the audience.

The good and efficient learning depends on the teacher's surplus energy in order for him/her to convey the desired messages with words and thoughts beyond the “dry” academic information.

The goal here must be to enhance the educator’s consciousness of how this surplus energy can be established, maintained and communicated.

In theory all this may sound excessively complicated, but basically it is just a matter of showing the educator how their individual speaking voice sounds and feels like, when it is functioning properly and organically. This is experienced by simple practical exercises and specific work with applicable evaluation.

In addition one has to take the use of the medium into account. Communication on such a “narrow” platform is rather sensitive to interference and small disturbances can render it inefficient.

First and last is to make the web-educators feel at ease communicating in a different environment than what they are used to in the normal “analog” auditoriums and classrooms.

The web-educator also has to be trained in the interview situation as known from TV and radio. This will get increasingly important, when several educators are taking part in the same lecture. In this situation it is necessary for one of the web-educators to be a moderator and in principle be responsible for getting through the logistical part of the education and control of the virtual classroom. The moderator is also responsible for the introduction of new teachers and giving them a proper closing. It is important that the audience receives a homogeneous educational experience with continuity.

This part of the course will also deal with some of the psychological issues that may arise when teaching online. It is important that the web-educator is capable of creating a nice and pleasant atmosphere in the teaching situation. An atmosphere that enables a feeling of solidarity in the virtual classroom and thereby facilitates a verbal dialog. For some educators this is very easy, for others very hard. In online teaching it is crucial to motivate activity in the participants. This can be done by asking “intelligent” questions that has to be answered. The questions could very well be intellectually challenging and create a competitive situation. This kind of motivational dialogue and activity is known to significantly increase the efficiency in the learning process.

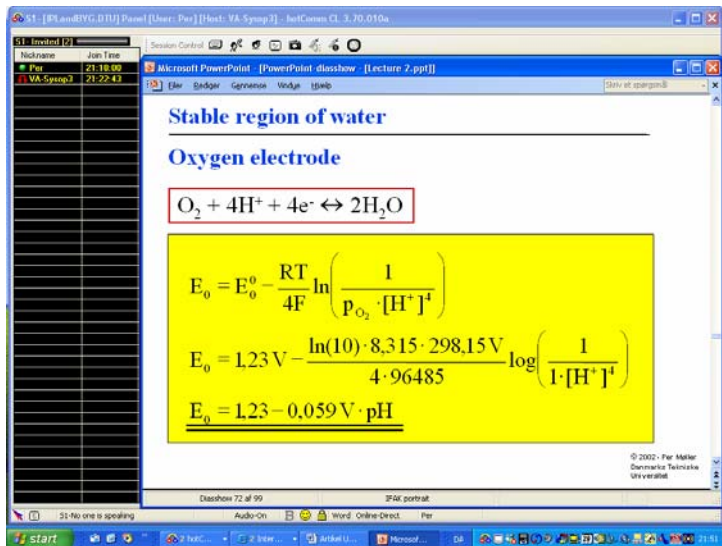
If this kind of dialogue is achieved it immediately registers in the “atmosphere” in the virtual classroom by the number of participants who wish to ask questions relevant for the subject being taught and an increased sense of comfort in the “room”. A lot of students feel that this situation is far more intense than a physical encounter, due to the diminished awareness of a physical self and the problems that has in regards to confidence.

The negative effect of this situation might be that particularly active student takes control over the educational situation. This must not happen and the web-educator has to practice a sense of the situation that enables him/her to control the activity in a reasonable manner. It is important that a set of rules has been established in the beginning of a session so that the virtual classroom is in fact guided by rules and etiquette – so called netiquette.

The web-educator also has to be able to deal with the situation, where the technology may fail (e.g. software crash or loss of connection) either at the receiving or transmitting end. For example, does one go on or repeat or schedule a later session for the ones who missed out on some of the education? The Web-educator has to be prepared for these situations and not let it influence the “flow” of the teaching although it may seem difficult.

3. Training in digital presentation technique.

This last part of the course contains directions on how to prepare the optimal digital presentation on the Internet and in the virtual classroom. A particular focal point is the design of overheads or slides.



It is important to have a solid knowledge, since presentation material is often unsuitably designed.

The method we use here is simply a demonstration of what to do and what not to do in order to make the teacher aware of some of the possible pitfalls. Many trained educators already have a firm grasp of this and only need little help, but some of the animations and effects commonly used are currently not suited for use online.

Limitations in bandwidth and other technicalities make it impractical to employ all the

features of the modern presentational software. It is important that the web-educator is aware of the limitations of the software used in the educational situation.

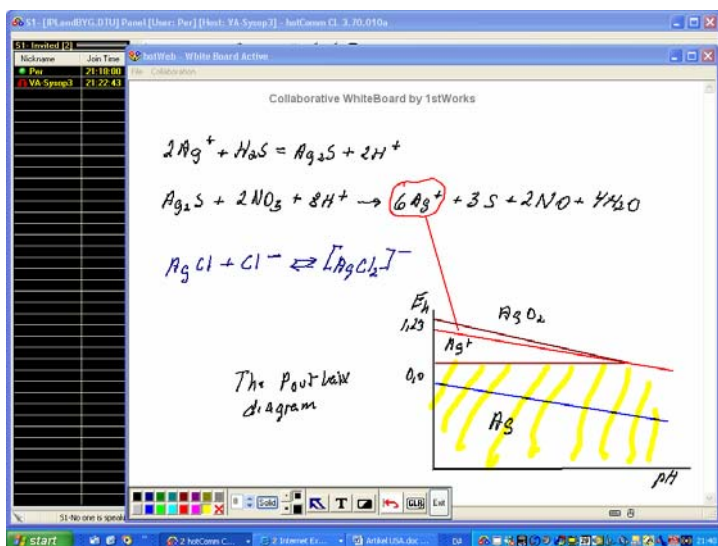
4. Practical experience (Combination of 1, 2 and 3)

In the practical experience the future web-educator has to combine all the disciplines of the previous lessons. Each of the participants has to prepare a series of lectures in his/her field. The aim is to focus on the didactic part while practicing the technology, the phonetics and the digital presentation technique.

The lectures primarily take place on the university campus, but could easily take place from other geographical locations. During the lectures several PC's are connected. The web-educator is physically separated from the other participants. More participants can follow the lecture on a projector. The participants are required to follow lectures both as a teacher and as a student since it is important that the web-educators gain insight in both roles of the educational experience. This also develops the technical skills of the web-educators and enables them to improve their online teaching skills. At this moment in time synchronous online education is still in its infancy and in the foreseeable future we are considered pioneers in the field. The teaching sessions are evaluated on a scientific, didactic and phonetic level by specialists in the relevant fields.

The possible use of a webcam is kept to a minimum, i.e., only in presentation of the web-educator or similar situations, since it interferes with the receivers' attention and thereby reduces the

learning ability. The web-educator has to demonstrate his/her ability to use the digital white-board as well as handling the chat-functions during the sessions.



The guiding principle in the practical experience is “learning by doing” under the supervision of IT-specialists, didactic and phonetic specialists and fellow science educators. Each session is reviewed and the web-educator receives instructions on how to improve the performance by the supervisors.

When the web-educator is deemed to have reached an appropriate level of expertise, the E-learning-Consortium at DTU offers a 1 hour test judged by a group of experts in speaking, education and IT –specialists.

The test is an online synchronous e-learning lecture on a subject chosen by the candidate himself. The web-educator may choose to demonstrate his/her abilities acting also as a moderator for someone else, by inviting another web-educator. The educational experience has to be arranged so that the academic judge is actively drawn into the session to demonstrate a certain degree of improvisation during the lecture, for instance, by co-operating on a task on the digital white-board.

The test should reflect that a suitable skill in operating the software has been obtained, that the phonetic and digital presentation has a quality that ensures an optimal communication of the subject and that the web-educator is able to activate the students.

If the evaluating judges decide that the test is successfully completed, the E-Learning-Consortium will issue a certificate that enables the web-educator the right to offer academic courses on the software platform made available by the E-Learning-Consortium at DTU.

The E-Learning-Consortium at DTU is an independent organization established by a number of institutes on the university campus made for the purpose of securing a solid platform for online education as well as carrying out the necessary education and training of future web-educators. This includes the supplementary training to keep pace with development of the software and the formalization of exchanging experience between the web-educators. In addition the E-Learning-Consortium is to provide research funds for new initiatives in the field of E-Learning.

Conclusion:

In the year 2000 a report ⁽¹⁾ was composed by the American Senate headed by Senator Bob Kerrey. At the same time, the first ideas for synchronous E-learning were underway and being tested at DTU.

Three major problems —

- 1.** Not enough money is spent on educational research
- 2.** Educational research often does not support enhanced learning performance
- 3.** Educational research often is not accessible to teachers or easily translated into practice

Senator Bob Kerrey

Indirectly this report had a major influence on the development of online education at The Technical University of Denmark (DTU). Especially, Bob Kerrey's statements regarding the quality of research results from the many research activities in didactics emerging through the years without having any positive impact on the proliferation of E-Learning made an impression. This inspired an institute specializing in materials technology to make its own

experiences. Bob Kerrey's realization was not only an American one but soon became Danish as well.

It soon became apparent that a lot of the experiments in synchronous E-Learning outside DTU were based on random platforms, lack of technical insight, lack of understanding of the weak points of the software and poor abilities to work out academically competent educational material for use on the software platforms.

The reason for the limited benefit was more a problem based on a lack of understanding of the multidisciplinary technique in didactics, phonetics and academic competence required rather than the educational potential of the medium.

The training of web-educators at DTU was also influenced by the online gaming industry, which already employed application sharing and messenger type programs as the basis for competition and group cooperation.

The present training of web-educators at DTU is primarily offered to persons with acknowledged teaching experience. They have to have demonstrated teaching potential in the form of good student evaluations as well as a commitment to teaching. A new group of partners from the hi-tech industry has already agreed on participating in the training of web-educators, realizing the unique possibility of employing this technology in the technical training of staff in far-away destinations.

After extensive research of various platforms the E-Learning-Consortium at DTU has chosen the American hotComm system based in Boston as the educational platform. Reasons were numerous, but among the most important was that the dialogue and support were extremely good in spite of the distance. In addition the cost of establishing a server based in Denmark wasn't in any way prohibitive in order for the Consortium to have the necessary capacity to explore the potential and interest at DTU.

It is obvious that a project this size and with this many partners isn't without problems. Experiences so far can be summed up like this:

The educators are very committed and expect to establish proper web-courses. The industry and the industrial organizations in Denmark among which is the Danish engineering association wholly support the idea. Several leaders in Danish industry have stated that the university has shown initiative in giving everybody the opportunity to gain knowledge of this technology. This to avoid having simple software problems being an obstacle and the primary message being the communication of high quality academic education with the following intentions.

- real time
- on line
- on demand

Off course there have been technical problems in the establishment of the platform – problems have been solved in cooperation with the software developer. In the foreseeable future new problems will emerge, while the technology is new. This is a law of nature when one is a pioneer in a field. It is important that the problems is tackled professionally in order to distinguish between software development and actual application problems so that they can be solved in dialogue between the developer and the user. As of now the software is sufficiently advanced for the newly trained web-educators to enable them to offer quality education in complex theoretical academic courses on the Internet.

The relative success of this project at DTU has been made without government subsidies and started out as a private enterprise, which has grown from insignificant one-person activity into a large number of partners both inside and outside the University. The activity has survived due to the commitment of dedicated people who from the onset has been able to see the ideas in the project. This has fostered a teamwork that has been able to unite the technology, the phonetics and the didactics. An essential part of the success has to be attributed to the software supplier, which has contributed with technical advice throughout the process.

Interested students and colleagues surrounding the core of the E-Learning group have also contributed to the unique knowledge gathered about synchronous E-Learning. It has only been by the constant experiments in the academic environment and with the educators as principle actors and constructive critics, that it has been possible to create useable results. Quality E-Learning probably cannot be created outside of environments where education is a central activity.

Literature:

1. ***"REPORT OF THE WEB-BASED EDUCATION COMMISSION" MOVING FROM PROMISE TO PRACTICE.*** (Published by the American Senate in the year 2000)