



# Effective Online Learning: A Matter of Making Sound Models Work

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## ABSTRACT

*The authors have used modeling techniques to gain understanding of causes and relationships in online learning environments. The cases that the modeling relates to, origin in the large Norwegian research project NettLær, which runs online courses for more than 2000 participants on various topics and levels. The modeling work seem to indicate that good learning models from earlier learning research may be the methods to be chosen also in online learning, but the conditions to make them work are more limited and more critical than before.*

## BACKGROUND

Industry today does not use the possibilities within the traditional formal education system. This is mainly due to a lack of knowledge of the possibilities offered, and skepticism regarding the formal system not able to deliver according to industry need regarding content, time and place. At the same time new information and communication technologies (ICT) provides new possibilities for flexible deliveries of courses and communication. But how can a content deliverer like the education system or a company buying courses make sure that learning takes place as wanted?

In Norwegian industry we have seen many examples of employees using much time attending courses with small results regarding the learning that was intended. These courses are either standard education courses or tailor-made courses for a company. There seems to be little connection in many cases regarding effective learning to where and when the courses take place, as in their own company, at a hotel, or while attending ordinary or tailor-made courses at a College. At the same time, the industry emphasis the need for more effective learning, both regarding the need for the knowledge and a need to keep the cost for courses low. [1-7]

After doing some minor experiments with online distance courses during a few years, we set out in 1999 with a larger research project, NettLær, to investigate relations between an effective learning process and various online learning methods. Knowing the vast complexity of the issues involved we have no intentions to research every possible topic, but rather identify some guidelines that seem to have a major impact. And as a "proof of the pudding" establish a set of available courses during the work.

### About NettLær

NettLær (an acronym in Norwegian for learning by use of Internet in Rogaland) is a research project in Norway supported by the Norwegian Research Council (NFR) that was established in 1998-99. [8] [<http://www.nettlaer.com>] It will run for 4 years with a budget of 2,7 M Euro not including the running of courses. It is based on 5 existing industrial collaboration networks with more than 80 companies as members, and with Rogaland Training and Education Center, (in Norwegian Rogaland Kurs og Kompetansesenter, RKK) and Stavanger University College (in Norwegian Høgskolen i Stavanger, HiS) as the main educational vendors. [9]

The main focus for the project is to accumulate knowledge in how to provide and run vocational training as efficient as possible with the ICT tools available. The courses all have a reference to the formal education system from 10<sup>th</sup> grade to Master level.

The project is divided into four parts:

- Arena, studying the ICT and the course delivery infrastructure and specified/ developed a new course administration tool, Coursekeeper™

(patent pending). Coursekeeper™ focuses on the participant in the course. [10, 11]

- Pilot courses, 7 courses developed for the project in order to provide a variation in pedagogical method, ICT tools, content level and type, and background of participants [12]
- Empirical data collection and analysis, the collection of what happened both in the pilot courses and other related courses available for data gathering. [13]
- Optimal Models, this is where we try to utilize different modeling techniques in order to test and eventually provide guidelines in how to deliver effective learning to industry. [14-16]

The related courses delivered by various combinations of Internet include as of October 2001 more than 1900 post education participants on different vocational topics such as full technical college for employees in mechanical industry, healthcare, offshore maintenance, economics for employees in a hotel chain, project management, fish farming, petroleum processing technology, congregation administration etc. It is on levels from first year in secondary school to PhD course. The PhD course runs with participants from all the five Nordic countries.

At the moment, we use two parallel administrative infrastructure systems, Coursekeeper™ and WebOffice™. Its two vendors will as a result of NettLær experience develop both tools further. We find the WebOffice™ system useful in lower level classes where the teacher works in a traditional way and benefits from being able to control the participants and the progress, in other words a class management system. Coursekeeper™ have another structure as it is made to be a learning management system where the individual participant chooses his/her own pace and use the teacher as a coach and sparring partner. We have found this useful on the college level both for ordinary students and for vocational training for industry.

Rogaland Training and Education Center, RKK, have during the last decade established a profitable system for vocational education in the Rogaland area. It is now a virtual vendor of vocational training with only 4 permanent employees in RKK itself, but based on a network of 32 local schools employing ca 1000 teachers that generated an income of 4 mill Euro in 2000. Collaborating with Stavanger University College, HiS, RKK offers vocational training on levels from secondary school to Master degree. [<http://www.rkk.no>]. NettLær enhances the RKK system in several ways with the ICT. First, it increases the flexibility for industrial participants, as a portion of a course will be done wherever they are when they have the opportunity to study. Second, it increases the market for the institutions as they deliver their specialties to companies outside of their local area. Third, it improves the follow-up of participants as the systematic use of chat and news groups together with email improves the possibility for personal adjustment and dialogue. This reduces the number of dropouts from the courses.

From spring 2001 all RKK courses will use Internet tools in various settings, and combine these with the administrative software that is WebOffice at the moment. [9]

### Research Method

In the NettLær project, we somehow try to sit on both sides of the table regarding research method. In the Arena and Pilot sub projects, we generate the courses and their environment as we work. This work will typical be an action research type of work. [17-19] As with the Coursekeeper™, we have specified it, developed it, put it to real life usage with online courses and participants from companies, and we test the results from the usage.

But, in the data collection and analysis sub project and in the modeling sub project, we sit more on the side, viewing the process and the results as they emerge.

By doing it this way, we hope to get the best of both the action research and the more traditional research methodology. One of the benefits is that we get insight in the processes and the conditions that are better than we could have expected standing on the sideline. The same way, one of the main problems is that we to some degree mix people by using some of the people on both types of sub projects. This reduces the objectivity for some of the staff.

In the same way as we have a duplicity in method, we also have a duplicity in goals. NettLær have as an overall goal to provide knowledge in models, guidelines etc that can enhance the efficiency when making later online courses. At the same time it is a clear stated goal that the project shall significant increase the amount of running online courses from the related providers, and if possible come up with new methods or tools regarding how to run such courses with an effective learning process for the participants.

### Modeling

What is a Model in this setting

- *A idealized simplified description of real life phenomena, often viewed as a picture or flowchart with some syntax guidelines*

We try to use modeling techniques known [14-16, 20] and recognized. Due to former experience we have used System Dynamics with the iThink-modeling-tool as a primary method, but also other methods have been used. Our models of the learning process are focused towards the learning outcome. They have been altered many times due to discussion on "what is learning" and "how do we measure learning in this kind of context". The models include all parameters that we have found that may have significance. These parameters are generated from the pilot courses in the NettLær project. They are extracted both from dialogue with teachers and participants in the pilot courses and the more general empirical data collection such as questionnaire.

We regard the learning coming out of the modeling process as the most important results, not the models created and used during the process. But, we tend to refer to this process-learning as an integrated part of the resulting group of models even if the final models not always represent all learning gathered during the process.

What identifies sound Models

- *Recognizable relations or phenomena usually regarded as good practice*
- *Concrete common identifiable input and output situations*
- *A one problem-one solution type of situation that means that the model treats a well defined limited situation, not the whole world.*

We have tried to identify what goes on in our online course learning processes, and to limit the scope of the models and the number of parameters involved according to recognizable situations. We thus have used a kind of filter saying that observations in at least some part of one course should have something similar for a parameter to be included. As a model in our setting shall represent some important parameter use or relation for further interpretation, we have to be able to identify relations between the model and the real life situation/ observation.

Examples of facts stated in our models for e-learning or online learning

- *Company need as a major motivation factor*
- *Frequent coaching by tutor towards the individual learner*
- *Groups as a social network, make everyone belong*

We have found many relations that give a meaning for the learning process. Some of these are obvious special cases coming from certain not-so-common conditions. Other has a more general usability. We thus try to extract understanding from our modeling work, and we would like to get this as general as possible. But, as quality of results is an issue here, we have to say that this understanding does not come from modeling single courses alone. Rather, it is a evolutionary process going back and forth between modeling work and dialogue with practitioners and data from their courses.

Many of our models state that old terms on how to achieve learning comes to a bearing also for online learning. But, it seems that in most cases, the requirements to the setup, the teacher/ tutor, the structure of the content, the exercises etc are much more restricted than it is for ordinary classroom or lecture hall teaching.

A major difference seems to be a shift in focus from the teacher being the center of the activities to placing the learner in the center. This has several implications both for the pedagogic and the technology to be used, and it sets clear demands for the infrastructure needed both in the ICT and regarding the content deliverer/ coach. It also provides the learning process with possibilities to increased use of the learner's context, which again may benefit both the company/ learner organization involved and the learning process.

Motivation plays a major role in online courses, even more than in ordinary courses, and for company employees attending, the relation to the need of their company is important.

Other factors that have a major role are the frequency of coaching towards the learner and the creation of an infrastructure to include the learner in some kind of society.

Other examples that may not be similar general, but seem to have impact in many cases are:

- *When someone the learner regard as an authority shows interest for his/hers individual progress such as the company manager or professor/ teacher*
- *Content and progress schedule adjusted for the learner's capabilities and background*
- *Groups when learner needs a social network as discussion partners for learning tasks.*

Motivation is a frequently returning issue but with many variations regarding both learner background and course level and characteristics. [21] One easy way to promote motivation is to make the learner feel that it matters what he/she does. This can be achieved by attention from the learners superior in the company setting, but is also possible with frequent personal coaching from superior people in the course setting.

Similar effect can be derived from possibilities to have content and schedule adjusted for personal background and capabilities. Using group members as discussion partners is another way of extending the learners capabilities. Both these have close relations to motivation.

But, as mentioned earlier, much of these guidelines gathered from course and treated in models do something to our technical need and usage. We are used to having technological people providing us with possibilities about future use in online learning and related administration and communication. It has become a way of technological push.

Our work with models does not only suggest how to arrange courses to achieve effective learning, but it also suggests demands to the technology. These demands are both easy and hard to implement. Technical solutions talk often about flexibility but seem to prefer many kinds of standardization on technology's terms. Such standardization may and may not be an advantage when we talk of a need for flexibility on the learner's terms.

If we want freely functioning discussion in learners groups, individual adjusted content, or frequent personal coaching etc with learn-

ers spread out in different towns and courses run in a wide span of time, then we need to implement a technological infrastructure and tools that supports these kind of guidelines.

We have so far described what we have “found” during the modeling process. With all such work we have a need to validate both the process and the results. In our case this has been done over some time. We started out years ago with test cases in online teaching that we tried to model. Then this was taken into the NettLær project and previous ideas and guidelines was discussed with practitioners from different companies, and the emerging ideas were taken into new courses and then again information was gathered for both models and discussion. This has been done in several cycles.

## CONCLUSION

We have found that the use of modeling is a profitable way to accumulate knowledge when working in a complex research project setting. As for the online learning, we have seen little new in how people learn. But, new tools and new context sets constraints on old methods and provides new possibilities when we combine old methods and new tools. These possibilities relates to many parameters in a complex learning environment, but much is close connected to a shift in focus from teacher/ teaching to the learner and his/ her learning process and objectives.

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