

Lone Dirckinck-Holmfeld  
Bo Fibiger

# LEARNING IN VIRTUAL ENVIRONMENTS



Samfundslitteratur

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# Preface

Learning in Virtual Environments is the result of on-going work within the interdisciplinary and cross-national Research Network on Learning and Multimedia. The network was established in 1994 funded by the Danish Research Council for the Humanities (1994-96) and later funded by the Research Programme on Welfare Research (1998-2000). The coordinators of the network are researchers from the Department of Communication, Aalborg University; Department of Informatics at Copenhagen Business School; Department of Pedagogical Anthropology at the Danish Educational University, Department of Communication, Roskilde University and Department of Media and Informatics, Århus University. The network has 25 core members. In addition to the core group are colleagues from other universities in Denmark, from the other Nordic countries as well as from companies engaged in work related to the research area.

The network meets twice a year on research seminars. The seminars are used to present and discuss our current research, invite guests and colleagues from abroad and to make experiments and explore technical and social inventions within the research area. Besides the Network, many of us share research projects and work together in different constellations. The Network has applied the writing of anthologies as a tool to challenge the approach and findings of each participant and to build a common ground as well as a shared understanding of the problem area.

The network has been very productive and inspiring crossing many boundaries. We have had a fruitful collaboration between researchers coming from different approaches and different disciplines, between junior scientists and senior scientists, between researchers from academia and developers from companies, between male and female researchers, and not least, we have managed to mix intensive academic discussions, play and laugh. During the lifetime of the network, we have succeeded in establishing a sort of »community of practice« and a shared repertoire

for our work founded on mutual respect for each other, and the shared engagement in the problem area.

Håkon Tolsby, who is an associate professor within Computer Science at Ostfold University College, Norway and currently a PhD-student at Aalborg University expresses the experiences with the Network as follows:

»There are several things which makes the network interesting and functional. The first thing is the working method. I find it very important that we produce things together – not only talk and discussions. To produce things together is much more demanding but it helps to develop shared objectives and to align our work. Normally, you do not succeed in establishing shared goals, however, in this network, I think we have managed to do just that. The next important factor is the affective and emotional side of such a network. In order for a network to function, it is very important to spend time together, to establish mutual understanding and that people like to be together. There has to be a sense of community formation. It is a combination of committing science together and establishing a living network, which made this network function so well. Another thing, I want to stress is that it was easy to be a new-comer to the network and the network was a very good entrance to the research field. In other words, the way this network functions has been a very good example of the principles of »Legitimate Peripheral Participation«. The network contained of a core group of senior researchers. PhD-students, master students and professionals from companies (often former students) were integrated. The senior researchers were very open to and interested in the work of us newcomers, and we contributed with new theories and also with new perspectives. For me, it was a very productive way of entering the new field and also to get to know all Danish researchers within the area. However, the fundamental explanation for the success of the network was that there was this core of senior researchers, who wanted to collaborate – and that the goal was to collaborate rather than to compete against each other, which seems a tendency within academia. In addition, the network has lasted several years so we have had time to get to know each



other, time to do failures and time to build up a community. However, it took us too long to finish this series of anthologies«.

The reason why it took us so long has been that we, along with our work together on the anthologies have developed the Master »ICT and Learning« offered through IT University West ([www.hum.auc.dk/mil](http://www.hum.auc.dk/mil)). Master in ICT and Learning is a virtual education organized in cooperation between the five institutions and managed by the network. This master gives us a social and experimental laboratory for students and researchers trying out new ideas on virtual learning, interaction design, organizational learning, and didactical design. In addition, the master gives us an organizational structure to continue the work of the network on building a shared theoretical and methodological approach to learning and multimedia crossing disciplinary and institutional boundaries.

## Acknowledgement

To establish a well functioning network requires resources and help from many. I therefore want to take the opportunity to thank the Research Councils and the Programme on Welfare Research, which contributed to the network through economic support. Furthermore profound thanks to all participants for challenging and inspiring discussions. Finally, special thanks to Hanne P. Clausen who has been the key-person for supporting the network in the virtual world as well as on the physical seminars. The coordination group consisting of Oluf Danielsen, Bo Fibiger, Janni Nielsen, Birgitte Holm Sørensen and undersigned has taken the long steady pulls.

*Lone Dirckinck-Holmfeld  
October 2001*



# Introduction

*Lone Dirckinck-Holmfeld & Bo Fibiger*

»Learning in Virtual Environments« is the result of a mutual engagement in the Danish Research Network on Learning and Multimedia. The volume presents our ongoing research to a broader audience – practioners within the field, students and the international research community. Seen in an international context, the experiences from Danish research may at one hand be special due to the historical tradition and culture within the educational system, on the other hand most of the research problems are general and go beyond national borders.

We start the introduction by setting the context for our research. This is followed by a brief presentation of the themes of the volume with references to the relevant chapters. Finally, we introduce the different contributions and chapters.

The volume presents a coherent whole, however the chapters may be read independently. In order to establish the relations between the contributions, footnotes are used extensively throughout the volume. Furthermore, we have attempted to minimize the repetition of information about context and presentations of theories. The volume is organized in four sections: 1. Pedagogical Framework, 2. ICT and Learning, 3. Didactic Design and 4. Research Methodology.

## The context of the volume

Most of the articles reflect experiences and research within university educations. In order to set the context, we therefore shortly introduce to the roots of the Danish university tradition. Afterwards, we situate the volume within an international research context, namely that of Computer Supported Collaborative Learning (CSCL), and finally we introduce the Danish area of information and communication technology (ICT) and learning.

### Educational university traditions

The Danish educational tradition within higher education has been closely linked to a general European tradition. Especially, the romantic, humboldtian university ideal model, which dates back to the years 1809 to 1810, when Wilhelm von Humboldt was Prussian minister has influenced the Danish university tradition. The universities were free institutions independent of the state and characterized by a close community between researchers and students. The universities were free in terms of spirit and research, yet committed to »higher« political and intellectual goals, truth and nation (Jensen, 2001). These ideas are still important in the overall understanding of the roles of the universities in Denmark and especially obeyed within the more traditional universities, such as University of Copenhagen and Aarhus University. However, in the beginning of the seventies, two reform universities were established. These two universities – Roskilde University and Aalborg University were, from the beginning, founded on ideas reflecting post modernism and pragmatism, and the new social conditions for the universities, including the changing role of the university from being an institution for the elite towards a mass-educational institution. As a consequence, the overall pedagogical methods were also changed dramatically towards a »workplace« metaphor, namely »Problem Oriented Project Pedagogy« (POPP) as dealt with more deeply in part two, Pedagogical Framework.

The different university traditions are reflected in this volume, and as a reader you will meet different pedagogical approaches to the design of virtual learning environments, which mirror the fundamental differences within the university culture in Denmark.

## The International Dimension: Computer Supported Collaborative Learning

During the 90ies, an international community within Computer Supported Collaborative Learning (CSCL) developed as described in the articles by Dirckinck-Holmfeld and by Sorensen. This community is very much in line with the approaches behind Problem Oriented Project Pedagogy. It is therefore obvious that several authors in this volume are oriented towards this community, developing the dimension on how to integrate computers for collaborative learning. As described in the article by Dirckinck-Holmfeld, the community of CSCL has its roots in two main approaches – that of distance education and that of information and communication technology (ICT) within institution-based collaborative learning situations.

### ICT and Learning

As a small country, Denmark has a limited tradition for *distance education*. This is not only due to short distances but more to the Danish tradition of bringing culture and enlightenment to adults through the so-called folk high schools and local adult education associations and through the tradition of the »spoken word and story telling«. Very few correspondence colleges have existed with a very limited contribution to education, both quantitatively and qualitatively.

Not until the middle of the 80ies, the universities began to take up the challenge of open distance learning. This was at the same time as computers and networks were transformed to media for communication. This may explain why we, from the very beginning of the open distance learning experiments, started to integrate ICT for learning – especially Computer Mediated Communication (CMC). So even though we did not have a very long and strong tradition for distance learning, we soon integrated CMC within a collaborative learning paradigm. Some projects were supported from the national Research Council, some from the European Union and others from the national Ministry of Education. The Government focus was on involvement of new target groups and cost benefit. During the nineties and the beginning of the new Millennium, this focus has changed towards a much more offen-

sive and radical position focussing on the potential within ICT for developing new ways of teaching and learning, and new ways of organizing distributed and virtual learning.

This development is reflected in the National Centre for Technology Based Education which was established in 1994. Reading their reports, it becomes clear that, in Denmark, introduction of new educational technology has been very closely connected to support of flexibility and a qualitative approach to education: how may information and communication technology qualify students learning. Therefore, the Danish discourse as presented in this volume has been closely connected to learning theories, didactics and organizational issues.

Still, the use of information and communication technology has been primarily related to lifelong learning and open distance learning. But in these years, the experiences from »distance« learning are implemented in the curricula in general educations as well as in on-campus learning at universities. Shared platforms, resources and facilities for graduate studies and life long learning have been developed, changing the role of the seminar room and lecture hall.

## The themes in the volume

We have called this volume »Learning in virtual environments«. The subject of learning and technology involves several notions and concepts – each of them using a specific optic related to the educational context. Our ambition is not to comprise all the concepts, but we will try to give a short introduction to the different concepts and how they are used in the chapters of this volume.

### Learning and pedagogy

The volume discusses different learning theories and strategies, but the chapters are based on a common theoretical understanding of learning as an active process creating knowledge. Theoretically, this approach is related to constructivism as developed in cognitive psychology (e.g. Vygotsky, Piaget, Kolb) and in systems theory (e.g. Luhmann). The approach from constructivism is opposed to cognitivism, and the concept that the teacher is the sole source of knowledge and skills and that the

learner is a passive recipient of information. The theoretical framework related to learning theory is presented in section two in the chapters on *The Conditions of Communication in Computer-Mediated Net-Dissiminated Educational Settings* and *IT: A Challenge for the Educational System..*

Most of the chapters are also rooted in collaborative learning as known in CSCL stressing collaboration as a condition for creating knowledge. Furthermore, the concept of learning is influenced by theories on »situated learning« from Lave and Wenger. Collaboration and situation are integrated in the concept of »communities of practice« as presented by Wenger. The pedagogical strategies in virtual learning environments are further developed in the chapters *Designing Virtual Learning Environments Based on Problem Oriented Project Pedagogy* and *The Implementation of Information and Communication Technology in Project Organized Studies* in Section one of the volume.

Systems, communities, cognition, and communication are key issues. The primary goals for using educational technology are the possibilities for supporting communication. The focal point in all chapters is on how information and communication technology (ICT) can support communication between the students, between teachers and students, and between the teachers. Communication is a main issue in the chapter *Integrated Networked Technology into the Classroom – A Heuristic for Affecting Interactions* in Section two.

## Distance education and distributed flexible learning

Learning in virtual environments is rooted in the traditions of distance education or distributed flexible learning.

The concept of distance education focuses on the mediated communication processes between distance learners and between distance learners and teachers. Historically, the concept of distance education is closely related to democratic ideals about the rights to participate in higher and continued education and how to create new opportunities for groups of disadvantaged people in continued education, independent of geographic conditions.

The concept of distributed flexible learning is connected to the growing need for lifelong learning. The use of information and communication technology (ICT) offers organizational flexibility for both learning and instruction to benefit from a freedom related to where and

when. It provides the individual learners a freedom of choice, control, and of planning their own curriculum. Furthermore, distributed flexible learning is connected to the concept of distributed organizations and thus focus on the possibility of collaboration between student-instructor, student-student, group-group, etc.

From a technological point of view, distance education and distributed learning can be described from the perspectives of succeeding generations. As presented in the chapter *Understanding Communication in Text-Based Systems*, the main focus in the first and second-generation distance education was on the production and distribution of learning materials to the students. Communication between the students and the teachers was rather limited and communication between students was almost non-existent. Third generation distance education technology allows for more interaction and two-way communication among all the participants. In *Designing Virtual Learning Environments Based on Problem Oriented Project Pedagogy*, a fourth generation is added: the integration of »virtual reality techniques«.

### The social context

The authors of the chapters in this volume are primarily researchers engaged in open distance learning. One of the central experiences for teachers and students in ICT based learning has been the problems related to the context.

As discussed in the chapter *CSCL: Structuring the Past, Present and Future through Virtual Portfolios*, teaching in open university studies is normally planned as so-called mix-mode courses, i.e. a combination of presence at the educational institution and ICT-based periods where the students work individually or in groups with the learning material, tasks or projects. A precondition, for the students' discussions of themes and their collaboration in projects in the ICT-based periods is face-to-face experience.

The establishment of a context for learning is theoretically reflected and discussed on the basis of Bateson's communication theory in the chapter *Understanding Communication in Text-Based Systems* and on systems theory in the chapter *The Conditions of Communication in Computer-Mediated Net-Disseminated Educational Settings*. In the chapter *Distributed CSCL – a Situated, Collaborative Tapestry*, the complexity of con-



textualization is discussed with reference to narration of the past, the present and the future.

### Didactic design

The concept of didactic design is not an established discipline in studies of pedagogy and learning. In Denmark, we have a long tradition of didactic discourses related to teaching in primary and secondary schools.

From the point of view of didactic design of virtual learning environments, technology and organization as well as interface design must be regarded as a means to realize certain didactic goals. The introduction of the concepts can be regarded as an attempt to avoid two tendencies in ICT and learning in the 90ies. In the beginning of the 90ies, there was a tendency to prioritize technology over pedagogy in the development of ICT-based learning systems. Today, educational technology must be evaluated and integrated according to the potentials for supporting learning.

Towards the end of the 90ies, there was a tendency to give priority to organizational problems. This volume is part of this discourse but, at the same time, the chapters reflect the current discussion on different learning strategies as a means to realize didactic goals.

The concept of didactic design is elaborated in the chapter *Didactic Design of Virtual Learning Environments*. As the titles suggest, the concept is used as a thinking tool in the two chapters discussing the use of digital portfolios: *CSSL: Structuring the Past, Present and Future through Virtual Portfolios* and *Digital Portfolios: A tool for Learning, Self-Reflection, Sharing and Collaboration*.

According to didactic design, the implementation of learning environments must reflect the specific learning context. The ways of embedding a learning context in the design of a learning environment in a multinational company is discussed in the chapter *Implementing a Distance Learning Facility in a Large Company*.

### The research methodology

The study of a virtual environment requires the development of new research methods in order to understand the nature of interaction and col-

laboration in a virtual context and in order to assist the design of work and learning situations and software to support them. The virtual context raises questions on how to get access to the practice and the experiences of the participants – on one hand it is more difficult because the researchers do not have direct access to the physical learning environment of the participants, who are dispersed in time and space. However, on the other hand, the virtual environment gives direct access to a very rich supply of data material, because all interactions are maintained in the virtual learning environment. Video analysis combined with studies of virtual interactions have been one answer to overcome the difficulties. The chapter *What is Local Practice in Technology Mediated Environments? Video Analysis of Situated Interaction and Learning* uses video analysis as a tool to gain insight into the complex relations between the technology, and the local and the shared practice of the participants. Video analysis may be conducted in various ways, which is reflected in the chapter *Learning Happens – Rethinking Video Analysis*. The volume also challenges the practice of the researchers through the chapter on *Building Communities of Practice in Research on New Media and Learning Activities*, in which a frame for a potential »thinking tool« for coordinated attention and action among researchers within the area is presented.

## The chapters in the volume

### 1. Pedagogical Framework

The chapters in the first section of this volume discuss *the relation between ICT and the pedagogical framework*, particularly the use of ICT for problem oriented learning at Aalborg University and Roskilde University. Both universities were established in the beginning of the seventies and based on new pedagogical ideas as opposed to traditional university studies.

In *Designing Virtual Learning Environments Based on Problem Oriented Project Pedagogy*, Lone Dirckinck-Holmfeld from Aalborg University presents and discusses the design and practice of virtual learning environments based on the pedagogical approach called Problem Oriented Project Pedagogy (POPP). The collaborative learning principles for Problem Oriented Project Pedagogy are labelled *genuine collaboration*