

ICT, Learning & Value Creation – Strategies Missing?

by

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Norwegian School of Management BI
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Abstract

What are effects of the ICT-revolution on the organising of learning within universities and corporations and on the “learning relations” between corporations and universities? The pilot study has responded to this question by reviewing a sample of existing relevant literature and by conducting policy analysis and interviews with key persons of two Norwegian organisations, The Norwegian School of Management (BI) and Telenor. The research question was specified into three sub questions:

- How does universities and corporations e-react as *organisations* to the current context of a global informational society and a global economy?
- How well are *educational rationales* understood and implemented by universities’ and corporations’ management and staff?
- To which extent has *a functional e-Learning Meeting Place* for learning partnerships between university and corporation been established?

The literature review and the empirical pilot have confirmed that the ICT-revolution has had a dramatic effect on universities’ and corporations’ policies and implementation of ICT expected to facilitate learning, and to make it more efficient. However, it was not found convincingly empirically underpinned that all ICT investments for learning purposes are goal- and cost-effective. There is a lack of overall strategies for the use of ICT based learning. And, an organisational schizophrenia has been found between policy writers and staff in terms of the need for pedagogical understanding. Such understanding is absent in the policy documents, while strongly expected by staff. The top management does not show sufficient concern for a pedagogically rational use of ICT based learning. A pedagogically sound solution needs to focus on how people actually learn and how to best facilitate for different modes of learning. This also touches on the need to balance individual and corporate needs and goals. Such considerations ought to be reflected in an articulated corporate learning strategy endorsed by the top management and implemented in such a manner that both time and space are created to facilitate for learning. E-learning meeting places between universities and corporations have not yet been developed.

The findings of and conclusions have given direction, motivation and new ideas for a follow-up comprehensive research project, including several universities and corporations in three countries.

Acknowledgements

This study was inspired by two events. A summer sabbatical at Stanford University in 2000, and the invitation from Accenture (then Andersen Consulting) to apply for research grants. The application was developed in the inspiring Stanford environment in the field of ICT, learning and economy.

Our application was successful, and our two institutions, The Norwegian School of Management BI and the University of Oslo have been most supportive, both administratively and in terms of collegial academic support. Supportive and stimulating were also our French and US colleagues, Professor Alain Tobelem at CERAM, Sophia Antipolis and Professor Albert Angehrn, INSEAD, Fontainbleu, Professor Michael Kirst, Stanford University and Dr. Eilif Trondsen at Stanford Research Institute Business Intelligence Consultants.

Key academic and administrative persons at BI and Telenor generously took time for interviews to give us their professional opinions about ICT based learning strategies in their organisations.

Four graduate students have assisted in making this report: Lena E. Bygeballe, Taran M. Thune, Liudvika Leisyte and Therese M. Uppstrøm.

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Sandvika and Oslo, December 2001

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1. Introduction

1.1 What is the study about?

ICT and learning are among the hottest buzzwords at university campuses all over the world today. At whatever institution you arrive the first issue is practically about ICT – how can I connect to my home server, and tap my e-mails? The new technology is spreading like grass fires globally. However, in practice you find it applied, at one end of the scale, as merely a symbol of being “modern” and mostly used for the staff’s personal e-mail correspondence. At the other you find fully computerised institutions, using ICT consciously for teaching, research and administration, as a crucial means for their competitiveness in the global education market and the e-learning industry. It is evidence of the latter – universities meeting corporations as partners of the e-learning industry that has brought forward the rationale of this study. The core issue of the present changes of institutions and corporations caused by the global economy as their new surrounding is *learning*. Simply put, a valid slogan for universities and corporations alike can be: *Learn or Burn*. This study is about if and how ICT can be used to improve learning in a way that significantly add to value creation of a university or a corporation.

1.2 Motivation

Primary motivation has been technological changes and challenges around us next to every day at our respective institutions, the Norwegian School of Management (BI) and the University of Oslo (UO). Moreover, the differences between our two institutions in their ICT behaviour have made us curious about what are the actual links between learning, ICT and economic effects. At a first glance a striking difference between BI and UO is that the first one is independent and has to earn ninety per cent of its revenues in the tertiary education market. The latter has a more relaxed financial situation due to its status as a public university, fully financed by the Norwegian State. This curiosity about our own institutions, and the differences between them has been reinforced through visits to and contacts with colleagues at foreign institutions, e.g. a visits to CERAM and INSEAD in France. However, the strongest motivation has come from lengthy stays at Stanford University (1997, 2000, 2001) located in the world heartland of ICT development, Silicon Valley. The university is independent, and fully financed by revenues from the tertiary education and research market. Living in the Stanford area, as researchers have been a continuous source of inspiration to ask: What is actually going on in the field of learning and ICT?

Are we witnessing a “revolution of learning”? Is the new technology really producing better learning than traditional classrooms and traditional teachers? Or, is this a repetition of the Emperor without Clothes – empty buzzwords aiming primarily at making people “believe and buy” technology for technology’s own sake? Direct concrete impressions could be seen as pointing in both directions. Hence, a basic motivation for this study is to explore the field in order to satisfy curiosity – and, hopefully to get a more valid understanding of what is actually contributing to better learning and increased value creation, and of what is merely profitable selling of technology because it is fashion.

1.3 Research questions and assumptions

This is an explorative pilot study. There is no intention of trying to explain or to formulate even preliminary reasons for what is going on in the field of learning, ICT and economy. The ambition is more modest. The present resource conditions do not allow for an extensive review of existing research. The empirical data are intended only to illustrate or exemplify policies and opinions at two real organisations. The findings of the pilot may level the ground for a later extensive study. The overall explorative research question of this study is: *What are effects of the ICT-revolution on the organising of learning within universities and corporations and on the “learning relations” between corporations and universities?*

The main confirming assumption is that the literature and the empirical pilot will show a tendency of universities and corporations having turned “IT-educational” and of having established “IT-educational learning partnerships” structured around the university’s “learning resource centre”. The negative assumption is that neither is the reviewed literature underpinned by much empirical research, nor is the empirical pilot demonstrating impressive educational use of ICT at the chosen university and corporation.

1.3.1 Specific research questions

Answers to the following specific questions are assumed to make possible a conclusion to the overall research question:

- How does universities and corporations e-react as *organisations* to the current context of a global informational society and a global economy?
- How well are *educational rationales* understood and implemented by universities’ and corporations’ management and staff?

- To which extent has a *functional e-Learning Meeting Place* for learning partnerships between university and corporation been established?

1.4 Objectives

In order to respond to the research questions the study will meet the following objectives:

- Make a review of literature about learning, ICT and economy in universities and corporations
- Make an empirical pilot into a university and a company in Norway
- Based on the review and pilot findings recommend goals and design for an international research project, comparing Norwegian corporations and universities to parallel organisations in US and France

1.5 Methodology

The literature review takes as its starting point and overall frame of reference a sociological theory about the information age (Castells 2000). Further, recent articles in journals on learning and ICT, and journals on corporate training are sampled and reviewed.

Empirical data gathering is made, firstly by an analysis of policy documents on infrastructures for e-learning at the Norwegian School of Management BI (NSM) and the Norwegian telecommunication company, Telenor – in order to identify organisational facts about a) to which extent ICT-based learning has permeated these two organisations, both directly and indirectly. While *directly* means consciously planned and implemented e-learning activities, *indirectly* means finding indications on how the learning capacity of regular e-based working activities are exploited constructively and economically. Secondly, the attitudes towards e-learning strategies and practices among key actors are identified by semi-structured interviews. The sample of key actors is chosen because of their theoretical and/or practical closeness to the field in their respective organisations.

In terms of BI, the persons interviewed represent three professional groups: a) professors/researchers, b) administrators and c) professor in an administrative position. At Telenor six persons were sampled according to their closeness to the company's ongoing implementation of ICT policies.

The empirical data will be analysed by

- Identifying the actual status of ICT based learning at the two organisations
- Identifying discrepancies between policy documents and key actors
- Comparing status and level of ICT based learning at the two organisations

1.6 Delimitations

Although the literature review is international, the study has a definite Norwegian focus. This is a conscious choice. Primary motivation for the study ran from subjective experiences at our respective institutions, BI and UO. Also the empirical pilot was consciously chosen to illuminate a Norwegian reality of ICT based learning strategies. The reasons for this was the last objective of the study: to act as a preparation for an extended research project on how major Norwegian universities and corporations apply ICT based learning compared to internationally leading universities and corporations.

1.7 Limitations

There is a research limitation in the fact that the study is a pilot, and by that not meeting the standards of a full-fledged study, particularly in terms of operationalisation, methodology, instruments and sampling. However, this is an acknowledged limitation. In hindsight, it has to be admitted that the interview guides ought to have been developed more systematically, in order to better tap the key actors as resource persons.

1.8 Report structure

The following main parts structure the report:

1. Introduction (Ch 1)
2. A sociological frame of reference (Ch 2)
3. The e-learning industry (Ch 3)
4. The changing concept of learning (Ch 4 and 5)
5. Corporate learning (Ch 6 and 7)
6. Conceptual framework/models of analysis (Ch 8)
7. Empirical data from BI (Ch 9)
8. Empirical data from Telenor (Ch 10)
9. Analysis, discussions, conclusions and recommendations (Ch 11 and 12)

2. The Informational Society – Implications for Education

During the last twenty years the world has become an informational society where the new information technology has dramatically affected economy, culture and organisational structures. What are characteristics of this new global society – and which implications for the organising of adult education can be envisaged? In the following Castells' theory of the informational society will be outlined by presenting his information technology paradigm, the effects on the informational economy and, finally some assumptions about implications for the organisation of post-secondary educational institutions will be made

2.1 Castells' theory about the Informational Society

Berkeley sociology-professor Manuel Castells' point of departure in his *The Rise of the Network Society* is the assumption that we are living through a revolution equally pervasive to society as the Industrial Revolution¹. He defines a revolution as a discontinuity in the historical development, an interval in history characterised by the transformation of the material basis of the economy, society and culture. The core of this revolution is technologies of information processing and communication; he therefore names it the Information Technology Revolution. Central to his argumentation is the distinction between the 'information society' and the 'informational society'. Defining information in its broadest sense, as the communication of knowledge, one can claim that this has been an important aspect of human societies throughout history, thus there is nothing characteristically new about it. Contrasting this, the term *informational* indicates the attribute of a specific form of social organisation in which information generation, processing, and transmission becomes the fundamental sources of productivity and power. These processes permeate all spheres of activity, starting from dominant activities of the economy and military system, spreading to objects and habits of everyday life.

This distinction parallels the common definition of an 'industry society' compared to an 'industrial society', so does also Castells' description of the Informational Technological Revolution parallel the common description of the Industrial Revolution. Societies will be informational, not because they fit into a particular model of social structure, but because they organise their

¹ This is the first of three volumes of his work *The Information Age: Economy, Society and Culture*.

production system around the principles of maximising knowledge based productivity through the development and diffusion of information technologies, and by fulfilling the prerequisites for their utilisation.

2.2 The Information Technology Paradigm

To organise the essence of the current technological transformation as it interacts with the economy and society, Castells has formulated a new paradigm, pinpointing those features that constitute its material foundation. In a particular paradigm, a “key factor” can be identified, an input or set of inputs characterised by a falling relative cost and universal availability. The contemporary change of paradigm may be seen as a shift from a technology based primarily on cheap inputs of energy, as a result of the innovations of the Industrial Revolution, to one predominantly based on cheap inputs of information, as a result of advances in microelectronic and telecommunication technology. There are five features central to the Information Technology Paradigm:

- The fact that *information* is its raw material.
- The *pervasiveness* of the effects of the new technologies. Information, being an integral part of all human activity, causes the new technological medium to directly shape all processes of our individual and collective existence.
- *The networking logic* of any system or set of relationships using these new information technologies. This networking logic is needed to structure the unstructured while preserving flexibility, since the unstructured is the driving force of innovation in human activity. The structure of the network seems to be well adapted to the increasing complexity of interaction and to unpredictable patterns of development as a result of innovative activities.
- Flexibility.
- The growing *convergence* of technologies into a highly integrated system. The multi media system is just a minor aspect of this feature. Technological convergence increasingly extends even to growing interdependence between biology and microelectronics, both materially and methodologically. Microelectronics, telecommunications, optoelectronics and computers are now integrated into information systems. Even business distinctions are becoming blurred as a result of

the growing integration of firms in strategic alliances and co-operative projects.

2.3 The Informational Economy

One of the main dominant social processes in the world is the economy. Castells describes a new economy that has emerged over the last two decades due to the infrastructure provided by the new technologies. The informational economy is distinct from the industrial economy, but does not oppose its logic. Castells' claim is that the industrial economy had to become informational, or collapse. Common for both is the element of knowledge and information processing as a determinant for economic growth, what sets the new economy apart is its features of being *global* and *informational*.

The fundamental and distinctive features of this new economy are thus:

- *Informationalism*, because the productivity and competitiveness of the units within this economy depends on their ability to generate, processes and apply knowledge-based information.
- *Globalism*, because the core activities of production, consumption and circulation and their components are organised on a global scale, directly or through a network of linkages between economic agents.
- *Informationalism and globalism*, because productivity is generated through, and competition is played out in a global network of interaction.

Firms and nations are not driven by productivity and technological innovation but by *profitability* and *competitiveness*. Thus profitability and competitiveness are the actual determinants of technological innovation and productivity growth. There are four main ways to increase *profits* in a given financial environment and with prices set by the market:

- to reduce production cost,
- to increase productivity,
- to broaden the market and
- to accelerate capital turnover.

All four strategies have been seen during the last two decades, but Castells emphasises the importance of the *broadening* of the market. This strategy ultimately has led to increased internationalisation and also the need for

effective means of communication - the evolution of IT and globalisation. The informational economy is thus shaped by the firms' search for profitability and nations aiming at increased ability to compete on the global market.

2.4 The organising of higher learning in the Knowledge Society

“If knowledge is the electricity of the new informational-international economy, then the institutions of higher education are the power sources on which the new development process must rely” (Castells 1994:16). Castells does not deal specifically with the notion of higher education in *The Rise of the Network Society*, but the importance of it lies there implicitly. In a society where knowledge is the main power source, the development and spread of new knowledge becomes central. There are two ways of organising tertiary education. One is within the frames of an institution created for that specific purpose; the other is within the frames of a business with an external purpose, realising the importance of upgrading the skills of the employees. It is clear that there is an increased need for a certain competence both before entering the work force, and as a member of the work force.

Schools and universities are paradoxically the institutions least affected by the virtual logic embedded in IT, in spite of the foreseeable quasi-universal use of computers in the classrooms of advanced countries. But they will hardly vanish into the virtual space. In the case of primary and secondary schools, this is because they are as much childcare as they are learning institutions. In the case of universities, this is because the quality of education still is, and for a long time will be, associated with the intensity of face-to-face interaction. Thus, the large-scale experiences of “distant universities”, regardless of their quality, seem to show that they are second-option forms of education which could play a significant role in a future, enhanced system of adult education, but which could hardly replace current higher education institutions (Castells 1996: 397).

Thus it seems likely that the majority of learning will for the near future take place within the frames of a physical space, with face-to-face interaction between the learner and the learned. Employers might to a greater extent use the opportunities the new technologies offer in providing distant learning opportunities for their employees, but they might also believe in the value of face-to-face interaction. Drawing a parallel to the relationship between the work process and the Informational Paradigm, however, it is reasonable to assume that information technologies will have a particular affect on learning processes in addition to a “quasi-universal use”. In the Network

Society governments and enterprises will recognise the importance of education for profitability and competitiveness and will get involved either directly, in the case of enterprises, or through strategic policies in the case of governments. How this will affect institutions of higher education, which historically to a large extent have developed as autonomous institutions fed by government allocations, is an interesting research topic. Based on Castells' theories one might assume that it would both lead to diverse trajectories for institutions in different cultural, economic and political settings, at the same time as the increased globalisation of the student mass will cause a need for a common matrix. Looking at the importance of innovative milieus, and the logic of networking, we might also see an increase in co-operation and contact both between institutions of higher education, and between institutions of higher education and business life.

2.5 Summary

Looking at the world from an historical perspective we can see that the role of basic education changed dramatically as a result of the Industrial revolution. Today, as part of the informational revolution, the focus is turned towards the role of higher or tertiary education, and we might expect an equally complete change in structure, content and extent in this area. The role of the new technologies has proved to be a substantial one in the development of our society. We can assume that it will be equally important to the development of higher education and lifelong learning.

According to Castells the ICT revolution has fundamentally changed the global economy and the organisation of enterprises. By implication it is fair to assume that the new technology has created extensive needs for renewed competence in order to make production competitive and profitable – that is new needs for learning. As a spin off effect of the informational society and the global economy, and indirectly, as an indication of the empirical validity of Castells' analysis, we would expect to already find that an extensive global e-learning industry is in operation. Its volume and its driving forces are the themes of next chapter.

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3. The E-learning Industry – Volume and Driving Forces

The California's Bay Area historically came to be the first critical node of the informational world. Especially Stanford University and the Silicon Valley have become labels synonymous with the ICT revolution and the informational economy. Hence, it is natural that the area also has turned dominant in terms of the emerging e-learning industry. The following overview of volume and driving forces of the e-learning industry is mainly based on two sources affiliated strongly with the heartland of the informational economy and its relation to the e-learning industry. The first source is a presentation at Stanford University on March 31st, 2000 by Gay and McCrea, from the consultancy company, Thomas Weisel Partners². The second is the Stanford Research Institute and its director for the department of Learning on Demand, Dr. Eilif Trondsen. His book, *The Emerging E-learning Industry* and discussions with him have been most valuable for grasping this field.

3.1 The Rationale of the e-Learning Industry

According to a Stanford Research Institute (SRI) Report (Trondsen *et al.* 2000) the e-learning industry will struggle hard to prepare supply companies with e-learning strategies, products and operations for the new era. Gay and McCrea (2000) note the importance of knowledge transfer as indicated by the customers. The aim of winning organisations today is not only revenue generation, but to boost profits by the help of knowledge transfer, namely, by obtaining, distribution, speed and cost effectiveness. Gay and McCrea claim that customer interest is primarily in managing organisational competencies, distribution of latent knowledge, alignment of learning and business goals, value chain learning, reduction of costs, increase of revenues, return on investment and on demand learning (Gay and McCrea 2000:26). Thus, the future trend is the online delivery and expansion of online learning options. With the awareness of return on investment and cost reduction, e-Learning demand in industries is most likely to increase.

On the supply side, course based offerings complemented with online learning options, including materials from vendors of eCommerce products

² Also discussion with Professor Michael Kirst of Stanford University's School of Education who participated in the March 31st-meeting as been an important source of information.

and services, Usenet discussion forums and learning-community forums will see an increase. (Trondsen *et al.* 2000:6) In general, the tendency of using computer-based learning is quite apparent in the new policies of educational institutions, whether it will be universities, or innovative start-up companies linking industry and school.

3.2 Market size of the e-Learning Industry

In trying to describe the market size, different authors use different definitions of the e-Learning industry, different factors and criteria for estimation. We will refer to two examples. Gay and McCrea (2000) see the market size according to the separate segments of the industry, looking closely at the number of institutions, the number of employees and the number of customers. The geographical focus is USA.

According to them K-12 is a really huge market, encompassing 14,000 school districts, 112,000 schools, 3.1 million teachers, 53 million students and more than 50 million parents in the US today. It is estimated to be more than a USD 330 billion market. The SRI report (Trondsen *et al.* 2000) notes that the K-12 share of the market is 80% of the total industry. The services and products that could be for-profit include curriculum and content, services and training. Since education becomes a priority on a national USA agenda and given the student-friendly approach prevailing in this country, the opportunity for a K-12 portal seems to be a good solution. Both suppliers - teachers and schools, and customers - students and parents are looking for the best results, efficiency and competitiveness. Parents are seeking real time information regarding their children, teachers are increasingly utilising learning resources beyond the classroom walls, schools do not have the in-house capabilities to develop an online presence, and students are demanding real-time information and engaging content.

The Higher Education market is estimated to be a more than USD 230 billion market opportunity with 4,000 institutions, 1.7 million administrators and 1 million faculty, 15 million students and 57 million alumni (Gay and McCrea 2000:7). The development tendencies are strongly those of growth. A one million-student increase in the period 1994-2004 is expected in Higher Education enrolments. Short training courses are catching its momentum since the corporate learning market reaches USD 62.5 Billion. The B2B³ e-Learning Market has been increasing from USD 550 Millions in 1998 to projected USD 11,415 Millions in 2003 (*Ibid*: 26).

³ B2B= business to business

The SRI Report, on the other hand, does not look closely at different sizes of the segments of the e-Learning industry (Trondsen *et al.* 2000). It maintains that the differences in estimating market size account not only for the differences in the definition of the e-Learning industry, but they are also due to diverse definitions of key driving forces. Thus, the point of departure is that learning becomes learner focused, learner driven, and technology based. Work-related learning will take place in all settings, including home, work and school. The best approach for the authors, which is used in the report in order to look at the market size is that of collecting analyst estimates, clarifying their underlying assumptions and then using the estimates whose definitions and worldviews they follow. Thus, the total spending on business infrastructure solutions in the education sector will rise from USD 5.5 billion in 1999 to USD 10.6 billion in 2003 according to SRI Consulting (Trondsen *et al.* 2000:52). Given that e-Learning will extend beyond traditional venues and formats, it is presumed that the overall e-Learning market potential is likely to be much larger than many analysts assume (*Ibid.*: 51).

3.3 The Drivers of the e-Learning Industry

According to Trondsen *et al.* (2000), the major driving forces are popularity of Internet and related technologies, people's understanding of eCommerce and build-in infrastructures. Brezil (2000) sees the rising popularity of the Internet as a particular driver. But there are also other important factors, such as demanding customers and unrelenting expectations for expedited services, continuing cost constraints, and growing opportunities for new revenues. Demanding customers related to global competition as well as cost constraints in corporate downsizing are seen as the main drivers by Gay and McCrea (2000). The birth of the Knowledge Economy, global competition, rapid technological change (a computer science degree has about 2 years of relevance), increasingly short product life cycles and hangover effects of corporate downsizing are the main facilitators of B2B e-Learning. Due to the high pace of changes, corporations have been put on notice to "learn or burn" (*Ibid.*: 26).

The SRI report (Trondsen *et al.* 2000) claims that the development of the e-Learning industry is three to five years behind eCommerce in maturity and development. Generally, growth prospects depend on the overall macroeconomic environment. Trondsen *et al.* (2000) propose three phases of the e-Learning evolution, namely, the childhood, adolescence and adulthood:

The present *childhood* phase will continue facing confusion in e-Learning markets as companies try to determine what products work and to match learning systems to individual learning styles and training needs. Experimentation is prevalent in this phase and it carries great risk. On the other hand, it provides great opportunities, such as developing portal products and services, create alliances to obtain quality content, begin customising services, develop platforms and learning management systems, introduce streaming-audio and video tools and services.

The *adolescence phase* is forecasted for the period 2002 to 2005. This would be a period of growth and rising opportunities, such as e-Learning hosting and outsourcing, systems integration, testing and assessment, career management, personalization software, tools for converting learning content and tools for learning analytics.

e-Learning should grow into *adulthood* after 2005. The industry by that time will be able to take full advantage of eCommerce advances and e-Learning services, software, and content. Key opportunities will be in human and software learning agents, hosting of advanced learning systems, high-end executive education, adaptive-learning systems, granulated learning content, and personalised e-Learning environments (Trondsen *et al.* 2000:2-3).

The Stanford Research Institute analysts suggest four current dynamic shifts in the learning industry, namely, increased Webification of learning offerings, more complete learning solutions, growing interest in outsourcing and hosting services and emerging internationalisation (*Ibid.*: 25).

The concrete examples of this dynamic range from small start-up companies to large consulting firms and telecommunication companies. SmartForce initially was a content publisher with a number of IT courses and was called CBT Systems. In 1999 the company broadened its base and transformed into SmartForce. Today it provides a more complete technology training solution. It targets not only the corporate market but also the consumer market by building a premier e-Learning destination site. (*Ibid.*: 26). Click2learn.com was a premier provider of content-creation tools for years. Now it has an extensive line of products. It built strength on the service and consulting side of the learning business, helping customers to architect and implement e-Learning solutions (*Ibid.*: 27). Large consulting firms have wide-ranging capabilities in communications, strategy, and people-related consulting activities as well as the IT area in general. Thus, they have sufficient internal resources in case they wish to target e-Learning. These companies also have

high internal learning needs. IT is crucial for them in terms of an internationally distributed workforce.

Telecommunication companies are in a peculiar position since they are e-Learning users and providers at the same time. Their workforce has learning needs to keep abreast of new technology and to meet intensifying competition from the global market. Most telecom companies will have cross-border alliances that will require new forms of working, including higher levels of collaboration across organisations. Formal and informal learning will be necessary for success. Many of them have established corporate universities in order to satisfy these intense learning needs. Telecom companies stand to benefit from the spread of e-Learning as providers of infrastructure. Some companies are interested in multimedia content, others prefer to find partners that can provide content, focusing instead on providing the basic transmission infrastructure for either synchronous or asynchronous learning services as for example Sprint company in the US (*Ibid.*: 31).

3.4. Future trends

Flexibility and clear strategic direction seem to be vital for the future of the e-Learning industry. Since these also have become the main characteristics of business today, it inevitably applies to the e-Learning as well. We will look at different changes that are foreseen in terms of services and their quality, management, content and structure, according to Gay and McCrea (2000). In the K-12 sector, Internet creates the opportunity to extend the classroom into the home, linking parents, teachers and students. Teachers want access to high quality content and resources that are easy to find. Parents want a community where they can participate in their child's learning experience and find pertinent information related to parenting and their child's development. Students want personalization and benefit from content that is tied to assessment and is customised for their interests and needs. Creating Internet-based communities between parents, teachers and students will increase communication between parents and students beyond the bi-annual parent teacher conference and engage parents to become more involved in their children's learning and development.

The for profit management of K-12 schools might lead to a situation where the winner will build an Internet community that rivals the best and brightest on the web and give an added value to a child's education. Thus, the idea of K-12 portals can become a vibrant opportunity for schools to compete. So far, the best attempts in the field are both public and private. For example,

the "best bets" in public sector are National Computer Systems, Scientific Learning Corporation, Lightspan, Reverdeep, The Edison Project and Zap Me. In the private sector we find BigChalk.com, Family Education Network, EdVision.com, Chancery, Power Schools, Project Achieve, eProcurement: Epylon, Simplexis and eFundraising: SchoolPop. These are noted as the top ones. According to Gandel (2001:11) "Colleges and universities are developing asynchronous leaning environments and the associated services to support students involved in education from off the campus". They also develop a broad array of online services to meet the expectations of their students, who increasingly look to the Internet as the place to conduct business. Such online student services must be an integral part of a broader campus e-business strategy that integrates enterprise transaction systems, customised transaction systems, course management systems, portal technology, and customer relationship management (*Ibid.*:13).

"The New School" driven by Informational Economy can be characterised as student focused, learner driven, asynchronous and results-oriented with just-in-time learning and synthesis of materials. This school is the opposite of "the old school", which is faculty focused, synchronous, research driven, geography centric, just-in-case learning and based on memorisation. The opportunity that universities and colleges face today, according to Gay and McCrea (2000:14), is that of for-profit management of higher education where *.com* meets *.edu*. This includes management of online universities, as for example, University of Phoenix and the online "enablers" (the companies that help colleges to get their products on line).

The examples of best bets in Higher Education are e-college, Unext, Blackboard, Embark, Campus Pipeline, Student Advantage, College Club, VarsityBooks.com, Zuniversity (*Ibid.*:15). If we look at these e-Learning enablers, their success might highly lie in the understanding of the value of human capital and delivery of high quality services.

Unext is one of the most successful Internet education companies. It has formed alliances with the University Consortium comprised of such universities as Stanford University, Columbia University, University of Chicago, Carnegie Mellon University and London School of Economics and Political Science. Unext's belief is that those countries, companies, and individuals that do not invest in knowledge are destined to fall behind. Their mission statement "Through the power of the Internet, we are delivering world-class knowledge to people everywhere" indicates their ambition to be a quality provider to their customers everywhere. The selection of the

alliances provided above indicates this company really to have a competitive edge (Gay and McCrea 2000).

The e-Learning industry's *structural changes* are highlighted by Trondsen *et al.* (2000):

Universities and colleges recognise opportunities and threats posed by the Internet and eCommerce. As a result, they become more entrepreneurial.

Corporations create their own corporate universities. These universities can become key players in restructuring corporate learning activities and processes with the use of a variety of technology tools for formal and informal learning activities.

Growing university-industry co-operation is visible both in providing content and technology expertise and in providing mentors and coaches for students. This is a good opportunity for project-based learning activities. An opportunity for alliances appears since vendors know that they should provide a full set of products and services.

Innovative Web sites and portals provide new learning options. They target learners by different criteria. The authors notice that the characteristics, business models, and operations of most of these Web sites do not fit into the traditional structure of the learning industry.

Outsourcing options are appearing. The division of labour seems to manifest itself in this segment. The scenario provided by the report says that many companies will be outsourcing a large share of their learning activities to external specialist firms. These specialists will host management services and learning content.

Return on investment considerations is becoming important for top management, thus, the new status for corporate learning function appears (Trondsen *et al.* 2000:11-12).

Possible changes in the content of services are also emphasised and there is expected the building of e-Learning alliances. A solution for being flexible is to co-operate with the firms with complementary strengths that are likely to become important in the future. Learning-portal players are looking forward to sign up top content providers. But there is a possibility of repetition of content since most deals are nonexclusive. The appropriate content goes beyond courses. The authors claim that in the future, the variety of informal

learning activities will spread out, as well as learning-community activities that use targeted and personalised content from thousands of sources on the Web (*Ibid.*: 38).

3.5 Challenges

There are quite a few challenges that higher education institutions have to face due to advanced networking. First of all, the crucial step is understanding and taking hold of the opportunities made possible by the technology, both in enhancing and widening educational offerings, streamlining institutional offerings and in *streamlining institutional infrastructure* (Brezil 2000: 49). New applications, such as Internet2, according to Gandel (2000: 14) will require end-to-end network connectivity, which will lead to major upgrades in campus networks. Voice, video, and data are merging into a common digital infrastructure, and connectivity will increase between wired and wireless networking. The challenge is to choose the right application at the right price and time. Some vendors and applications listed in Table 1 provide colleges and universities with off-the-shelf solutions; others are potential competitors or strategic partners.

Table 1. E-Business and Vendor Applications

Process Area	Sample of E-Business Vendors
Online admission applications	Embark, CollegeNet, XAP
Online student services	Campus Pipeline, YouthStream's, MyBytes.com, Jenzabar.com
Online textbooks	VarsityBooks.com, Textbooks.com, exampus.com, efollet.com
Online procurement	CommerceOne, Ariba
Online alumni communities, contributions, and merchandising	Harris Publications' Alumniconnections.com
Tools and systems for online delivery and management	Blackboard Inc., Centra, Convene, eCollege.com, WebCT, Eduprise.com
Online content distributors	Caliber, Unext.com, Pensare
Learning portals	Asymetrix's click2learn.com, Hungry Minds, Ziff-Davis' SmartPlanet.com, Blackboard Inc.'s Blackboards.com

Source: *Educause Quarterly*, No.2, 2000, p.23

A main challenge of the future will be to simply keep updated on the options and possibilities: "Researching this ever-changing list of vendors and applications, comparing solutions, selecting the right approach, implementing solutions, managing these relationships, and maintaining

institution-wide technology standards and architectures requires time and attention to ensure colleges and universities are identifying the right solution” (Kidwell 2000:22).

3.6 Summary

Already the present extent of the e-learning industry has firmly confirmed Castells’ analyses of effects of the ICT revolution. It is neither surprising that this industry for the time being is very much a US American phenomenon. Since the start of the ICT industry itself was an effect of the synthesis between Stanford University professors and technological and economical entrepreneurs (e.g. Hewlett and Packard) it is natural to find that the spin off industry on e-Learning to a considerable degree is also found in this area. Also the fact that US have a large private education sector, especially in higher or tertiary education, has contributed to the rapid development in this country.

While the present e-learning industry is a distinct indication of a new learning reality in economic and practical terms, it is also relevant to ask for theoretical implications of the recent development. What has happened to understanding of learning as process? Has the technological development just merged with traditional understandings – or has the new technology implied changes in the concept of learning? These issues are reviewed in the next chapter.

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4. Understanding Learning in the Knowledge Society

New information- and communication technologies provide flexibility, and though there have been earlier technological changes, influencing information, knowledge and learning, there has never before been a more rapid and sustained period of changes with such broad social applications (Castells 1999, De Weert 1999). The emphasis on “lifelong learning” and “continuous learning” involve an increasing need for and emphasis on flexible learning methods. Computers and telecommunications have sparked a revolution in human communications, removing the constraints of time and space, and enable a formidable possibility for teaching programmes to become more flexible (Farrington 1999). The dynamic changes in technology, communication and theories of learning are representing a shift towards flexible learning methods aimed at meeting the need for just in time competence needs.

It is fair to assume that the changed technological reality has had an impact on how the concept of learning is understood. In this chapter main traditions within learning theory will be highlighted in terms of how they have been influenced by the new technology.

4.1 A knowledge-based society and the need for flexible learning

A common assumption about the economy and culture of today’s society is that they are knowledge-based and informational, determined by information technologies, globalisation and competition. New and more flexible information- and communication technologies enable information itself to become the material basis of all production. According to Farrington (1999), the new technologies make it possible to disseminate information faster than before, and they allow each user to be a publisher of information as well as a consumer and to interact with people around the world. ICT is rapidly changing the ways in which information is distributed in society. Information sources are available across the world, and the new technologies and telecommunications make it easy to collaborate across physical distances, and thus provide new ways of teaching and learning (Bates 1997, Farrington 1999, Light & Light 1999, Säljö 1999).

The symbol-processing operations following from the technological revolution are highly linked to the education and skills of people (Castells 1999). Hence, all societies’ culture and institutions will have to change.

Technological, economic and social developments have resulted in more sophisticated work processes that require a broad range of skills of a technical as well as interpersonal nature. The explosion of electronic commerce (e-Commerce) creates a particular need for new learning. Producers and customers will have to learn about the possibilities of new technologies, new capabilities, new contents, and new delivery mechanisms. Continuous new learning is necessary in order to improve all types of production and processes. The emerging e-learning industry, which implies the use of networks and digital content to enable learning, is a result of this (Trondsen 2000). Trondsen (*Ibid.*) argues that the new technologies, globalisation, the highly competitive markets and the new labour force, all contribute to the increasing demand for learning. Jobs in the information age require learning to learn and life-long collaborative learning and problem solving skills (Silverman 1995).

The new technological and economic conditions will have profound effects on the character of distance education in itself, as well as bringing distance and conventional teaching organising closer.

4.2 Open and distance learning

The market's need for "lifelong learning" and "continuous learning" forces the suppliers of education to provide flexible learning methods. These are often based on the use of electronic technologies, which bring new ways of creating learning content and delivering it to learners, at any place and at any time (Trondsen 2000). Bates (1997) notes that because of the changing nature of work itself and the possibilities offered by the new technologies, a greater need for *cost-efficiency ways* of training and learning is emerging. Focus is especially set upon the opportunities made possible by open and distance learning strategies. Open learning centres offer employees to "drop in" for training at any time, while distance learning offers employees to learn at any place that they want (Bates 1997). Due to the great developments within web-based systems and computer-mediated communication, the possibilities for open and distance learning and thus for flexible ways of delivering education services are increasing rapidly.

Bates (1997) argues that while the concepts of open and distant learning are often used synonymously, there are differences. While "open learning" refers to a particular learning goal or a learning strategy emphasising flexibility, distance learning is a means to that end. It is a strategy where learners may study at their own time, place and without interaction with other students or tutors (Bates 1997). However, what these two concepts

have in common is that they both attempt to provide alternative ways of high quality education and training for those who cannot attend conventional, on-campus institutions. Open and distance learning, originally concentrated on the post-secondary level, are now also appearing within education in general and in the private as well as the public sector.

There are several reasons for the current increase of open and distant learning. They provide the flexibility needed for adults to adapt to the concepts of lifelong learning and continuous learning. These concepts are both recognised as highly connected to economic productivity and competitiveness. They remove the barriers of access to higher education. They enable the possibility to offer education and training to large numbers at lower unit costs, and thus represent cost effectiveness, and they enable education services to be delivered to geographically sparsely populated areas (Bates 1997).

4.2.1 The convergence of distance and conventional learning

Due to the recent developments in computer-mediated communication and web-based learning, such as CD-ROM, e-mail and electronic conferencing, web-based enquiry and topic-based investigative learning strategies, the distinction between conventional and distance learning is becoming blurred (Bates 1997, Johnston 1999, Kirkpatrick & Jakupec 1999 Tait & Mills 1999, Thompson 1999). Wilson (1997) notes that the old paradigm of on-site versus distant learning is rapidly decreasing as network resources and collaborative software are becoming available. Technology-based approaches, which have facilitated and influenced teaching and learning for off-campus students, are now influencing approaches to on-campus teaching (Thompson 1999).

The recent development implies a more student-centred approach to learning and teaching (Kirkpatrick & Jakupec 1999) – which will also imply a change in how we understand the concept of learning.

4.3 The definition of relevant learning

Time is an important dimension of the concept of learning. Although many different definitions of learning exist, a common attribute of learning is that it results in a relatively stable change of behaviour, or potential for change of behaviour if realisation conditions were present (Lai 1997, p.141)⁴. The key

⁴ The process learning itself is a cognitive process that cannot be observed, and learning is hence usually defined by estimates of behaviour that can be observed.

aspect relates to the expression “relatively stable”, indicating a medium or long-term perspective. This means that for something to be indicated as learnt, it must have more than an immediate impact. If a person is taught a given procedure or reads a teaching manual and then performs the procedure successfully, this will not be considered as a valid estimate of learning. If he can repeat the performance after time has lapsed, that could be taken as an indication that he has actually learnt the procedure.

This distinction also relates to the distinction between knowledge and information. A learning process without retention resulting in no lasting change of behaviour might be called information processing. Learning requires active processing of information by the individual in such a manner that the person can recall and reuse that knowledge or skill in different settings.

Is the definition of learning itself changing due to the demands of today’s society and the new information- and communication technologies? According to Twigg (1994) the definition is changing in a number of ways. First of all many stakeholders’ expectations to *what* ought to be learnt is changing. Critical thinking and effective communication are being upgraded along with the ability to detect needed information and to collaborate well with others. Twigg (1994) claims that this represents a shift of educational focus - from teaching a given content to enabling students to develop lifelong learning skills, motivated by their own needs at given times. Another dramatic change is the composition of the learner group. The emergence of a non-traditional market, including part-time and non-residential students seeking flexible ways of learning makes it a challenge for the providers of educational services to respond to these new customers in an adequate way. There is also a change in terms of *when* students learn. Some claim that the average work life in the future will consist of several different careers, each demanding for retraining in new skills, new attitudes and new values. Lifelong learning is becoming a necessity, both including the retraining of adult learners as well as preparing traditional students for continuous learning (*Ibid.*).

Moreover, there is a change in *where* students learn. Learning is no longer bound to the traditional classroom, and the information technologies allow learning to extend beyond the single campus to distant sites across the world. New technologies provide creative tools to assist learning, including visualisation- and electronic communication tools which allow us to communicate in several different ways (*Ibid.*). Finally a change in our understanding about *how* people learn is emerging, leading to a more

individualised learning and to the development of learning environments that accommodate different learning styles. Twigg (1994) argues that the existence of affordable information technologies with the capability of offering teaching anytime, anywhere and to anyone has given a new impetus to the above-mentioned changes in where, when and who is learning. The knowledge of different learning styles and how we learn is converging with new multimedia capabilities (*Ibid.*).

4.4 From a teaching-based to a constructivist learning perspective

The referred changes in the understanding of learning are claimed to reflect an overall shift in which learning theories are now dominating. The changed understanding is seen as a shift from a teaching-based to a constructivist approach to learning. In terms of learning theories this is claimed to be a principal shift from behaviourism first to cognitive theories – and then to socio-cultural and constructivist theories. *Behaviourists* view learning as a matter of registering and remembering sense impressions that come from the outside. The underlying epistemology here is realism, which implies that knowledge has an independent status vis-a-vis different human beings. Learning is linked to physical behaviours and performance of new behaviours is seen as the true sign of learning having taken place (Säljö 1999). Bates (1997) claims that behaviourism ignores conscious strategies and self-will in learning. Learning is merely a consequence of a person's seeking of reward and avoidance of punishment. *Cognitive theorists* seek to explain learning as specific intellectual activities. Knowledge is within this tradition viewed as the unfolding of capacities that exists in latent form in the cognitive structures of human beings. Our capacity for learning is given to us as members of the human species and the environment provides us with the experiences and psychological stimulation that allows for our capacities to surface. The underlying epistemology here is idealism or rationalism, which implies that knowledge is held to be non-material, and the physical doing of something is seen as an application of knowledge in practical settings. Modern cognitive psychology of recent decades emphasis on how people process and store information (Säljö 1999), and there is also a growing tendency among many cognitive psychologists to emphasise learning of conscious intellectual strategies, where learning is viewed as an active process (Bates 1997).

The *socio-cultural perspective* is based on the assumption that learning is primarily determined by how people master tools for thinking and acting that exist in a given culture or society. Focus is set on the mediated nature of

human knowledge and action, and the mastery of mediational means is viewed as an essential aspect of the learning process (Säljö 1999). According to Säljö (1999) learning is always learning to do something with cultural tools. Learning is not only inside the person, but also in his or her ability to use a particular set of tools in productive ways and for particular purposes within a certain environment. A socio-cultural perspective is highly connected to situated learning and constructivism. Situated learning implies that the cognitive processes are integrated in the possibilities created by the situation and the context. This claimed shift of focus to have taken place - from behavioural to cognitive to socio-cultural learning perspectives represents *a shift from primarily a teaching-oriented to primarily a student-centred/constructivist perspective on learning*. A constructivist approach is focusing on the learner's active problem solving and his co-construction of knowledge. Several authors claim that co-construction implies an emphasis on co-operation and co-ordination in learning as knowledge construction (Herrington & Standen 1999, Solheim 2000).

Constructivist understanding plays an important role in the today's debate of lifelong learning and the concept of "learning to learn". Constructivism views knowledge as constructed within the cognitive structures of the individual, and is thus completely personal, but dependent on the individual experiences in the learning context and on the interaction with others (De Weert 1999). These experiences lead to the acquisition of learning skills, which make the students capable of handling knowledge in an independent way, and to the acquisition of a self-confident and creative learning attitude, which is increasingly important in the context of lifelong learning (*Ibid.*).

Silverman (1995) has summarised main characteristics of a student-centred learning model:

- i. The professor must change from traditional teacher and instructor to facilitator and coach, promoting mental scaffolding and cognitive apprenticeship.
- ii. Students in today's informational age must develop life-long learning skills, rather than acquiring a fixed body of knowledge. The most important here are metacognitive skills, including learning to learn and collaborative problem solving.
- iii. Student learning is enhanced by constructivism, collaboration and teaching one another and student motivation is enhanced by situated cognition in real world tasks.

- iv. Providing an authoring environment that permits the students to express what they have learnt, in a medium that emphasises their strengths.
- v. Providing real-world contexts, and where this is not possible a simulator, which enables experimentation in microworlds, should be developed.
- vi. Providing distance communication between group members, both asynchronous (e-mail) and synchronous (computer conferences).

These goals for student-centred learning may be seen as reflecting a convergence between co-construction, and computer-mediated learning.

4.5 A constructivist ideology?

The review of literature on learning theories related to the use of new information technologies present a clear strain of arguments in favour of the socio-cultural/constructivist way of understanding the learning process. It is unanimously claimed as a panacea of principal understanding for organising of learning by the new technologies. Without doubt this way of understanding learning may be relevant for many learners and for many types of content. But not universally. And, there is not brought forward any impressive amount of empirical underpinning for these hypotheses.

In certain content areas, for certain purposes and for certain learners a behaviourist understanding of learning may still be valid. Moreover, basic competencies may still be best acquired by structured and well-prepared teacher-centred learning. Not all learning purposes can be based on the student's particular motivation for learning at a particular moment. The student-centred and problem-oriented learning strategies obviously are important when they are the best solutions within a larger overall scheme. They are probably most useful as options for certain tasks and certain learners under certain conditions (Welle-Strand 1990). However, to make them a panacea for goal- and cost-effective learning would be identical to making them an ideology of learning.

4.6 Summary

Researchers broadly agree upon the necessity of flexible organising of learning in the network society and the global economy. Flexibility,

effectiveness and efficiency in delivery of learning products and processes are paramount for public and private businesses to stay competitive in their respective markets. In terms of theoretical understanding of learning under the new technological conditions, a rather one-dimensional line of analysis and arguments is observed. The student-centred and socio-cultural/constructivist approach to learning is not only claimed to be the best approach for certain students and contents under certain conditions, but is seen as the best strategy for all individuals and all purposes. There is not found much of empirical underpinnings for these assumptions. To a fair degree these assumptions come close to wishful thinking about how all people ideally ought to behave; always be individually motivated for learning by solving problems in creative co-operation with others. What the review has indirectly proved important to be done – is to carry out systematic empirical research of what actually works, and what does not – of learning strategies being applied with the new technology.

Hence, the next chapter will make an attempt at mapping what has been the brief empirical history of computer and web-based learning

5. Computer and Web-Based Learning

5.1 Introduction

Due to the continuing developments within web-based systems, computer-mediated communication, opportunities for flexible learning emphasising interaction and collaboration have emerged. These technologies have the potential of reducing the traditional distinction between distant learning and on-site education. Three main developments within computer-based education are found (Bates 1997).

Firstly there is the move to multimedia, implying a wider application of computer-based education, secondly the use of computer networks for communication purposes and finally a change from computers as teaching machines, to computers empowering learners and teachers. ICT as a medium includes CD-ROM, electronic mail and other communication applications. In addition the World Wide Web makes databases and online applications available. Two different forms of learning and teaching with computers are found: pre-programmed computer-based learning (CBL) and computer-mediated communication (CMC). The key distinction between them is that while CBL is primarily a one-way communication, the CMC is two-way, allowing for inter-personal communication.

After presenting pre-programmed learning models, changing “paradigms” of teaching technologies will be reviewed.

5.1.1 Pre-programmed computer-based learning (CBL)

Common to all pre-programmed computer-based learning systems is that the learners are supposed to work with pre-designed materials, interacting by answering questions that are embedded within the materials and choosing options from the learning materials. There is a built-in control of the routes of the programme as well as in-built feedback to the learner's responses. A key feature of CBL is that it provides interaction between the learners and the computer only, and not any direct contact with tutors or other students. The recent developments within multimedia, e.g. video, audio and animated graphics, have increased the options for presenting specific features of pre-programmed computer-based learning, and hence widened the range of possible applications. New generations of computer software allow the users to create and modify the learning materials. Since CBL is based on behaviourist approaches to learning, it is viewed as preferable in areas where repetition, mastery and practice are important conditions for achieving the stated goals of competence.

5.1.2 Computer-mediated communication (CMC)

The main difference between pre-programmed computer-based learning and computer-mediated communication is that the latter is based on the integration of a desktop computer with the public telephone network (Bates 1997). This technology makes access to remote data-bases through electronic networks possible. Information can then be extracted from a data-base and down-loaded into the learners' or tutors' own computers. Hence, access to a computer connected to a telephone line makes it possible for learners and tutors to communicate to any other similarly connected person.

5.2 Changing paradigms of teaching technologies

Koschman (1996) claims CMC to be the most recent paradigm shift in the history of teaching technologies, and he also holds that the shifts in teaching technologies are driven by changed psychological theories of learning and teaching. Koschman have identified four paradigm-shifts: Computer-Assisted Instruction (CAI) or pre-programmed computer-based learning, Intelligent Tutoring Systems (ITS), Logo-as-Latin, and Computer-Supported Collaborative Learning (CSCL), also termed computer-mediated communication.

5.2.1 Computer-Assisted Instruction (CAI)

Computer-Assisted Teaching (CAI) is related to the terms Computer-Based Teaching and Computer-Aided Learning. In the early literature CAI was used generically as a blanket term for all computer-based education (Koschman 1996). Koschman argues that this term refers to a particular paradigm in the design and evaluation of teaching technologies. The starting point was IBM's release of Coursewriter I in 1960, the first CAI authoring tool (*Ibid.*). With the emergence of courseware building tools, individuals without formal training in programming or computer science could develop their own computer-based teaching aids.

Within the CAI-paradigm, learning is seen as the direct acquisition of an established and known body of information. CAI is influenced by work in programmed teaching and teaching design, identifying a specific set of learning goals, decomposing these goals into simpler components and finally developing a sequence of activities which are supposed to lead to the achievement of the stated learning objectives (Koschman 1996). According to CAI researchers, learning is a measurable difference in displayed proficiency.

The emphasis within CAI research is put on teaching effectiveness. The recent research is technology-driven and is focusing on the emergence of certain forms of technology, hypertext and CD-ROM. The research tries to evaluate effects on learning outcomes. Applications designed under this paradigm range from early drill-and practice programmes to more recent network-based World Wide Web documents. Today, CAI research especially aims at evaluating the learning effects of teaching software (*Ibid.*).

5.2.2. Intelligent Tutoring Systems (ITS)

The second paradigm, ITS, evolved as a result of an entry of workers from the field of Artificial Intelligence (AI) into the educational arena in the early 1970s (*Ibid.*). ITS is based on Information Processing Theory, which views problem solving as a process of defining a representation of a problem space. This problem space consists of an initial state, a goal state, and a set of operations for moving from one state to another. According to the ITS paradigm, a learning process has occurred when the problem solver acquires a proper representation of a problem space. Teaching is here viewed as the activities designed to facilitate the learner's acquisition of this representation (*Ibid.*).

Both the CAI and the ITS have a view of teaching that can be identified under a *transmission model of teaching* (*Ibid.*). Both in CAI and ITS the designed application serves teaching by posing problems and by providing feedback to the learner. There are however some differences in that ITS provides a more interactive fashion with respect to a more complex set of skills. While the ITS applies an approach influenced by research in Artificial Intelligence (AI), which is aimed at providing an account of various aspects of human cognition, the CAI paradigm applies evaluation methods which reflects the standards and methods of the general educational research community.

5.2.3 Logo-as-Latin

A third teaching paradigm is labelled the Logo-as-Latin. This model is based upon an epistemological perspective that holds knowledge to be acquired through the subjective construction of an experiencing individual rather than this individual's discovery of an ontological reality. This view of learning is relativistic and fallibilist, and thus referred to as constructivism (*Ibid.*). It is based upon Piaget's (1985) theory of assimilation and accommodation and has had a great impact on many teaching methods, e.g. learning by discovery, open classroom learning, experimental learning and inquiry learning (*Ibid.*). In Logo-as-Latin, the computer becomes "tutee", allowing the learner to assume the role of the teacher. The learner engage in activities

of programming-designing-building and debugging programmes, and acquires thereby cognitive benefits that extend beyond simply learning to code in a particular language. The research within this paradigm is mainly focused on what kind of cognitive benefits these are and on the issues of teaching transfer. Several studies have aimed at investigating the effects of learning to programme on planning, metacognition and other aspects of cognitive performance (*Ibid.*).

5.2.4 Computer-Supported Collaborative Learning (CSCL)

The growing interest in the question of how technology might serve to support collaborative methods of teaching is claimed to be a new paradigm within teaching technologies (*Ibid.*). This model is founded in disciplines like anthropology, sociology, linguistics, and communication science. Common to these traditions is that they are devoted to interpreting and understanding language, culture and other aspects of the social setting, thus emphasising social and cultural issues. Koschmann (1996) has identified three movements within the socially oriented sciences that have influenced CSCL:

- i. Socially oriented constructivist viewpoints:* Constructivism is primarily based on Piaget's theory in developmental psychology. The recent focus within this perspective is set on the social context in which learning occurs, inspired by the neo-piagetians emphasis on the importance of peer interaction for cognitive development. A tradition of social constructivism is now emerging, promoting a non-absolutist view of knowledge as constructed through an essentially social process.
- ii. Soviet socio-cultural theories:* Another important influence on CSCL was research in the cultural basis for human intellect. This work was led by Soviet psychologists, especially Vygotsky and his theory of cultural genetic law of cultural development. Vygotsky claimed that learning always occurs on two levels, first on the inter-psychological level and secondly on the intra-psychological level. He promoted the concept of *The Zone of Proximal Development*, which represents learning on the inter-psychological level, where an individual's capabilities are enhanced through the interaction with a more skilled co-worker.
- iii. Theories of situated cognition:* Situated cognition is primarily based upon the aim of re-conceptualising educational practice. Within these theories, learning is viewed as a process of entry into a

community of practice, where the individual learns to use tools as the practitioner uses them by entering the same community and its culture. Here focus is set on the context in which learning occurs and the agent, the activity and the world are viewed as mutually constituting each other.

Research in CSCL is concerned with questions like: How is learning reflected in the language of the learners? How is technology actually used in collaborative settings? Within this research tradition, focus is set on teaching as enacted practice, and on processes rather than outcomes (*Ibid.*).

Herrington & Standen (1999) have identified nine critical criteria from the literature of situated learning, which have guided the design and development of interactive multimedia programmes. These have comprised the constructivist shell for the learning of research methodology: authentic context, multiple perspectives, expert opinion, collaboration, articulation, reflection, coaching and scaffolding and authentic assessment. This is reflecting a shift towards a constructivist style (Herrington and Standen 1999).

CSCL applications display several forms, where the majority is designed for student use. These applications have been designed both for use in classrooms, across classrooms, and to create virtual classrooms. The CSCL applications can be used in a number of ways, including the possibility to present or simulate a problem of study, and thereby helping to situate it in a real-world context. They can also mediate communication within as well as across classrooms, and support knowledge building by providing archival storage for the products of group work. Another important application is that they can support the creation of representational formalism that enables learners to model their shared understanding of new concepts. Expeditionary Learning, Group Investigation, Problem-based Learning and Project-based Learning, are all models within this paradigm (Koschmann 1996).

The four paradigms, CAI, ITS, Logo-as-Latin and CSCL, and their underlying learning- and teaching perspectives are summarised in the following table:

Table 2. Four paradigms of Teaching Technology

Year	Paradigm	Theory of learning	Model of Learning/Teaching
1960	CAI	Behaviourism	Programmed teaching
1970	ITS	Information Processing/ Cognitive	One-to-one tutorial
1980	Logo-as-Latin	Discovery-based/ Experimental	Teaching transfer
1990	CSCL	Socio-cultural	Collaborative learning

Source: Koschman 1996

5.3 Asynchronous and synchronous applications

Users of CMC and of CSCL in learning and teaching activities can coordinate their interaction synchronously or asynchronously. Synchronous learning implies that the students and the instructors interact at the same time, working together with a collaborative software package. This allows for a certain control over the learning processes by the instructor, ensuring that the students are keeping up with the course content provided. A synchronised environment, provided by video connection, allows the instructor to be seen and heard while sending electronic demands to all the other participants' PCs. This is often supplied with the students opportunity to "raise their hand" by clicking on an icon, sending a signal to the instructor. The instructor may give one of the students the mission of leading the other students or to make comments. Then it is this student's video and audio which is distributed instead of the instructor's (Wilson 1997). Asynchronous learning activities on the other hand are done at the students' own time and pace, and thus imply that there is not only a distinction in space between the learner and the instructor, but also a distinction in time. The students may view the content at any time, which makes it possible for the instructors to create courses with a mixture of synchronous and asynchronous learning (*Ibid.*).

5.4 Web-based learning and teaching

The developments within computer-mediated communication, and the great possibilities offered by the web, allow both synchronous as well as asynchronous communication to increase rapidly. Web-based learning is assumed to constitute the most promising development within educational

theory and practice today. By way of summing up recent developments a brief description of different web-based teaching and learning programmes is given.

Driscoll (1998) has identified four kinds of web-based training:

- i. *Web/Computer-Based Training (W/CBT)*, which is very similar to traditional multimedia computer-based training (CBT). W/CBT enables learners to work individually at their own pace, where the goal is to master different skills. The main difference between CBT and W/CBT is that the latter draws on the resources of the World Wide Web and information found in different databases. In CBT programmes the resources are limited to the content of the available CD-ROM. Another difference is that W/CBT offers tools, such as e-mail, that enables communication between the learner and the instructor, or link to an on-line bulletin board.
- ii. *Web/Electronic Performance Support Systems (W/EPSS)*, which provide problem-solving skills in a just-in-time format. The learners determine how, when and at what level they will use the system, thus avoiding information they do not need. W/EPSS provide problems that require analysis, synthesis and evaluation, and thus enables problem-solving skills to be developed.
- iii. *Web/Virtual Asynchronous Classrooms*. Unlike the two above-mentioned programmes, which are designed for individual learners, Web/virtual asynchronous classroom programmes are designed for groups. Learners work together, by brainstorming ideas, analyse case studies and solve problems, but they do not necessarily participate online at the same time. The different learners contribute to the group in any time they can or want to.
- iv. *Web/Virtual Synchronous Classrooms*, where instructors and class are online synchronously working with projects, case studies and exercises. Synchronous classrooms consist of whiteboards, shared applications, video- and audio conferencing and chat rooms.

In accordance with Driscoll's (1998) categorisation, Solheim (2000) identifies four different communication forms enabled by the developments within computer-mediated communication:

- Net-to-one, characterised by information retrieval
- One-to-one communication, organised by e-mail
- One-to-many, enabled by the World Wide Web and bulleting boards
- Many-to-many, enabled by computer conferencing and bulletin boards.

Solheim (2000) argues that web-based teaching consists of teaching methods, teaching techniques and teaching media. Solheim's framework for Web-based teaching and learning programmes is summed up in the table below.

Table 3. Web-based teaching: Methods, Techniques and Media

Teaching methods	Teaching techniques	Teaching media
One-to-net	Data-bases Journals Application programmes Software library Subject groups Interview	Information retrieval
One-to-one	Learning contracts Apprenticeships Internships Correspondence tutoring	E-mail
One-to-many	Lectures	Bulletin boards
Many-to-many	Debates Simulations Role play Case Brainstorming Forums Projects	Computer conferencing

Source: Solheim (2000)

5.4 Assumed benefits and constraints of ICT-based learning

A general trend in the reviewed literature of the field is a normative, belief-oriented optimism, often lacking empirical underpinning. However, there are found attempts at a more critical attitude to the blessings of the ICT in the domain of learning. Following, a summing up of assumed benefits and constraints is made.

5.4.1 Benefits

Massey & Zemsky (1995) make some general assumptions about ICT's contribution to increased learning productivity. Firstly, ICT offers economies of scale, because access to very large amounts of information can be offered at low costs. Secondly, ICT eases the traditional limits of time and space for education activities. Finally ICT enables mass customisation and self-paced learning, as it allows accommodation to individual differences and different learning style.

According to Säljö (1999) there are several potential features of ICT that may make them relevant tools for understanding and acquisition of conceptual knowledge, and thus for learning. ICT provide opportunities for simulation of events and processes by means of computer models, e.g. micro-worlds, which are a representation of a phenomenon or process that can be explored by students. Moreover, computers allow for visualisation of all kinds of complex phenomena, and abstract concepts that can never be observed in any direct sense can be made visible and manipulated in different simulations. ICT simplifies the production of multiple representations that potentially support student understanding, and allows for new forms of interactivity between learner and what is to be learned (*Ibid.*). Light & Light (1999) notes as a particular advantage that e-communication makes the information accessible to others than those present at the time.

Computer-mediated communication comprises use of e-mail and computer conferencing. Computer conferencing can be applied to develop skills in analysis, construction and defence of arguments and critiquing the work of other learners as well as scholars (Bates 1997). This method allows for academic discourse at a distance, because participants can ask questions, argue and debate with tutors and other learners independent of time and location. At the same time this method includes a greater control by the learner, because students can participate and contribute as much or as little as they want, and when they want. Computer conferencing also has a great opportunity for collaborative learning. It allows for the learners to engage actively in their knowledge building, through idea generation, idea linking and idea structuring. These processes are connected to scaffolding, reflection, exploration and peer and mentor collaboration. In addition to this, feedback and direct student contact with the central academic team as well as with other students are made possible (*Ibid.*).

5.4.2 Constraints

One disadvantage regarding computer-based learning is the possibility of information overload. This implies that the information and messages

arriving are so overwhelming that important messages are lost. This overload has even in some cases lead to a serious psychiatric disorder, known as attention deficit disorder (ADD). The arrival of new information diverts the person away from the task at hand, so that few tasks are completed (Bates 1997).

Evaluations of computer conferences have shown that they are regarded less helpful than other available alternatives for communication, because of a lack of organisational responsibility, of participation and of immediacy. In particular, less verbal students have come out less favourably.

CMC has primarily been a textual medium, and thus has suffered from the same disadvantages associated with that medium in general. There is a great need to have good key-board skills as well as a high level of literacy that ensures unambiguous communication (Bates 1997, Light & Light 1999). Anderson and Jackson (2000) note another disadvantage in that the nature of some materials as courseware proves difficulties when they are transmitted through a solely text-based medium such as e-mail. The facilities offered by the World Wide Web can be used to overcome this, but according to Anderson and Jackson (2000) the use of the Web is often confined solely to provide access to electronic versions of course notes.

According to Koschmann (1996) work with ideas has two phases, idea generation and group deliberation. Electronic polling can support the idea generation because it forces the students to confront an issue and commit themselves as individuals. The result of the polling can then be presented to the whole group as basis for initiating discussion. However, it has been found that these group deliberations are best conducted in traditional learning environments, which imply face-to face interaction and spoken discourse. Typed communication has been found frustratingly slow (Koschmann et al. 1996:113).

The identified constraints warrant a careful and critical attitude to the potentials of the ICT in learning strategies. There are still learning goals, and learning preconditions that make traditional learning methods the preferred ones.

5.5 Summary

A dynamic and challenging development in the field of improved learning by using ICT is going on. It is likely that the speed will increase, not least, because of its importance for the e-learning industry. The developments

within computer-mediated communication allow for an improved availability and productivity of certain education services. Certain constraints of ICT as a resource for learning and teaching have also been identified. Contrary to the blunt optimism of many writers a note of caution ought to be made.. The “right” method of learning will always be a function of the particularity of the learning goal, the preconditions of the student and the particular environment. Hence, an awareness is needed for making professional analysis of which means will really work for goal effectiveness and efficiency.

Next a visit will be made to the corporate world. How are the advances of the e-learning industry and the recent theoretical developments played out in real life? – In a worklife, where the ultimate criteria of learning technology relevance is the difference it makes to the company’s competitiveness and profitmaking.

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6. Dynamic Markets, Innovation and Learning at Work

The informational society has had great implications for production, markets and economy. The “new” economy has been labelled amongst other as the informational economy, the post-fordist economy, the service economy and the knowledge economy. The informational society implies such changes in the production system that a premium is put on knowledge. This has in turn lead to changes in the system of wealth accumulation, from emphasis on the traditional industries towards the service sector as a main producer of wealth, which again has meant a new employment structure. In this chapter the effects of the informational society on production cycles, markets and the need for continuous innovation based in effective learning are elaborated.

6.1 Dynamic markets and the knowledge economy

The emergence of thinking relating developments in production to changes in wider society emerged in the late 1960s and early 1970s, but as a permeated way of thinking in business and public policy, the thesis of the knowledge economy belongs to the 1990s. According to Gibbons *et al.* (1994:125) the information technology paradigm is the present techno-economic paradigm, and marks a shift from the paradigm of mass production and consumption. They outline the content of the information technology paradigm in terms of four profiles: the technological profile, the knowledge production profile, and the skill and capital equipment profiles (*Ibid.*:126). The *technological profile* is marked by the ability to make swift changes, integration of innovation and production, as well as a shift to economics of scope. The *knowledge production profile* is marked by the rapid growth of all types of producer services, ranging from software to all types of consultancy. The *skill profile* relates to a general shift from an emphasis on “craft and supervisory skills” to broader basic skills for information handling and technology maintenance. The key feature in the *capital equipment profile* is the rise in computer-based capital equipment, accounting for 50 percent of all investments (*Ibid.*).

As indicated in these dimensions, developments in technology and economy are interrelated. The focus of this report is the first dimension, technologies’ impact on production. Technology makes markets dynamic, in terms of an accelerated pace of change and instability in customer relations. Today’s’ business landscape is marked by an enormous product variety and unstable

customer relations. In this situation, an important business strategy has been to target market niches (Løwendahl & Revang 1999), and tailoring of products. Two other tendencies characterising the post-industrial economy are “intelligent solutions” and “complexification” (*Ibid.*). By intelligent solutions is referred to the growth of “white collar” jobs as industrial production to a larger extent is replaced by machines. Pared with the strategy of targeting markets, corporations need to market and sell comprehensive and tailor made solutions to customers. This means that the most labour intensive operations in corporations relates to brokering client specific solutions. By complexification, Løwendahl and Revang points to a development adjacent to the two previous mentioned aspects (*Ibid.*). The post-industrial economy with intelligent solutions to the bespoke needs of customers, client relationships are marked by their complexity and multidimensionality as to cater for all the needs of the clients. This need for flexibility has in turn put pressure on the hierarchical organisation of corporations. What is called for is *the versatile organisation*, which can change fast according to requirements of clients and changes in markets and technology (Turner & Keegan 1999). Flexibility and fast learning are prime prerequisites for organisations that want to stay competitive in the knowledge society.

6.2 Innovation, knowledge and learning

In an unstable environment, increasing emphasis is put on innovation as a competitive strategy. This is for instance seen in the striking growth of *marketing* of new products. According to estimates, as much as 50 percent of corporations’ revenues from sales can be attributed to products introduced to the market within the last five years (Cooper, Edgett & Kleinschmidt 1999). This in turn puts pressure on cutting the development cycles of new products, as to shorten the time from development to market, as well as continuous innovation.

What is innovation, and what is the relation between innovation and competitiveness? Johannessen, Olaisen and Olsen (1999) have reviewed different theories of competitiveness, and claim that evolutionary theories see competitiveness as a result of innovation. The firm’s potential for sustaining its competitive advantage is dependent upon how easy it is for competitors and newcomers to imitate that advantage, and the firm’s ability to continuously develop its competitive advantages through innovation (*Ibid.*:38). This challenge is related to the resources the firm has to its advantage, and to what extent those resources can be imitated by competitors. Traditional resources for competitive advantage, such as natural

resources and technology, are to a larger extent prone to imitation than innovative human resources. In a highly competitive and dynamic market, corporations need to build their competitive advantage on resources that are “invisible” and hence impossible to imitate. That is the company’s internal and external relations, its knowledge and its ability to learn (Johannessen, Olaisen and Olsen 1999).

Nonaka’s (1994) theory of the knowledge creating company has as a starting point innovation related to the ability to create knowledge to solve problems, not merely process information. His argument is based on analysis of forms of knowledge, and claims that knowledge creation is a social process, focusing on the relation and dynamic between tacit and explicit forms of knowledge. Tacit knowledge has two sides, the individuals’ belief-systems and the know-how in action. Explicit knowledge is knowledge that can be represented symbolically, through language and other symbol systems. Firms create knowledge through combining the two forms of knowledge, in such a manner that tacit knowledge become explicit (and can be shared), and explicit knowledge can become tacit (and can be used in action). To create knowledge the corporation has to facilitate social processes for knowledge exchange and learning. To facilitate for innovation, the corporation has to put emphasis on knowledge creation, which again means facilitating for organisational learning. Organisational learning is not the same as corporate learning or learning at work, as will be discussed below. Organisational learning is rather a theory on organisational development, focusing on individual and collective potential for development through fostering a learning environment based on collaboration and reflection.

According to Johannessen, Olaisen and Olsen (1999: 44), the three perspectives of innovation, knowledge creation and organisational learning are integrated. Knowledge is the most important resource, learning the most important process, and interaction between different agents and systems that contribute to the innovation process, the most important prerequisite for innovation. The integration of these three elements (resource, process and interaction) produces continuous competitive advantage (*Ibid.*).

These perspectives on organisational development focus on the humans’ contribution to innovation and competitiveness. The theoretical focus on knowledge creation and learning as continuous unstructured processes can be seen as an organisational focus or mentality. The next section will highlight approaches to and characteristics of *learning* in corporations or learning at work.

6.3 Learning at work

Learning in corporations and work settings in general is seen from many theoretical viewpoints, that have various interpretations of what learning is and how to facilitate for learning; as for instance psychology, anthropology, organisational studies, sociology, pedagogic/educational studies, and strategic management (Lai 1997:139; Sundstrøm Olsen 2000:11). In practice activities under the heading “learning” also include a variety of initiatives in corporations. This is of course attributable to learning itself being a common activity that all experience through action, interaction, or reflection. To cope with such a complexity, different authors make efforts to systematise learning in corporations, putting emphasis on various parameters often related to particular theoretical perspectives. As for instance emphasis is put on different learning theories from a psychological perspective (Lai 1997:143), didactical models from an educational perspective (Lahn 2000), types of industries from a work-sociology perspective (Lahn 2000) or according to learning contexts or culture are often emphasised in organisational studies (Saunders 1998). As such, there is no common or standardised concept of what learning in corporations is, or how to best facilitate for learning.

6.4 Characteristics of learning in work settings

6.4.1 Individual and corporate goals of learning

With the complexity in mind, to characterise learning in organisations one might start out by emphasising an important difference of learning in corporations from other learning arenas, especially educational institutions. Corporations as learning arenas are different from educational institutions like schools, because they do not have learning as a primary objective. Learning is to serve corporate goals and needs, and in a general sense increase efficiency, competitiveness and profit. However, learning is an individual endeavour, a cognitive process in the minds of individuals. As such, learning is related to both individuals’ learning experiences, while at the same time aim at serving the larger organisations’ learning needs (Lai 1997). A vital issue concerns how the corporation can benefit from the individuals’ learning, and how learning by individuals is constituted in the organisation as a whole.

6.4.2 Knowledge disciplines and work tasks

The second dimension relates to the content of learning. In educational institutions, particularly higher education institutions, learning is based on scientific disciplines or defined knowledge areas. Learning at work on the

other hand is interdisciplinary in its nature (Sangster, MacLaran & Marshall 2000), because learning in corporations is built upon work tasks or work situations, and how to master or solve specific tasks. Moreover, since learning is based upon tasks and situations and has an action oriented perspective, learning in corporations is related to the concept of competence. The content of learning in corporations is usually defined competencies, and not knowledge areas and disciplines (Sundstrøm Olsen 200: 18).

The concept of competence is seen as a composite of three main components – knowledge, skills and attitudes – and is commonly seen in an action-oriented perspective (Lai 1997; Sundstrøm Olsen 2000). What is the relation between the concepts of learning and competence development? Competence development is a growth in the competence of an individual between two points in time. For this development to happen, a learning process is required. As such, competence can be said to be both the foundation for, and aim of, learning in corporations.

6.4.3 Just-in-case and just-in-time learning

The time dimension is interesting especially related to learning strategies in corporations often being geared towards just-in-time learning. Just-in-time learning denotes learning at the time of use, or learning a competency or acquiring knowledge at the exact time when a person needs to master that competency to carry out a given action. Just-in-case learning on the other hand, is learning knowledge and competencies in advance of its potential use. This is the time perspective of educational institutions, where students enrolled in a programme learn a range of competencies for potential use in the future, or just in case s/he might need to use them in the future.

6.4.4 Formal and informal learning

Another important dimension relates to the degree of planning and structuring of learning activities. This again relates to the distinction between formal and informal learning. Educational institutions emphasise formal learning, which is course based and where emphasis is put on validation of acquired knowledge through testing/evaluation. This is not the primary focus of learning in corporations, where learning is a mix of formal course based and informal learning, and where the true test of knowledge lies in its application. According to Trondsen (2000:4) informal learning accounts for 90 percent or more of all learning in corporations.

Informal learning is a broad category, including all forms of social interaction and communication. According to Sundstrøm Olsen (2000:16) informal learning can be divided in (into) three main categories: passive or

unconscious learning, active unplanned learning, and planned informal learning. Notwithstanding, that learning takes place in everyday situations and social interaction, learning with a strategic focus in corporations requires some degree of management, planning and a focus on active learning.

6.4.5 External, internal and embedded learning

Building on the above-mentioned dichotomy between formal and informal learning and relating it to the time dimension, the issue of *learning arenas* illustrates this point further. A learning arena relates to where learning takes place, and hence it is a spatial dimension. An external learning arena refers to learning taking place outside the corporation, in courses or seminars, which are offered by an external provider. The external provider is often a higher education institution, but might also be professional societies or consult firms. External learning is often formal learning, planned and course-based, and operates more on an in-case basis. Internal learning refers to planned formal and informal learning and training activities carried out by the organisation itself often under the auspices of the human resource or training department or corporate universities. This can be training of new employees or competence updating. It can be carried out through classroom teaching or e.g. e-learning. In addition learning might be a mix between internal and external arenas and providers, where for instance higher education institutions tailor programmes for corporations. According to several authors (Nimtz, Coscarelli & Blair 1995; Trondsen 2000; Urda & Weggen 2000) partnerships between corporations and universities, as well as between corporations and consortia of providers are of increasing importance, as outsourcing of training activities is a general trend.

In all of these cases, learning is carried out outside the normal operations of the corporations. However, in the information economy, knowledge is quickly outdated, there is a constant pressure for innovation, and the time set aside for learning is diminishing as product life cycles are becoming shorter (Caudron 1996). In this environment learning is to an increasing extent carried out as a part of work. According to Tapscott (1996:198) work and learning are increasingly becoming the same thing. There is a trend towards convergence of work and learning activities, in the sense that learning is part of or embedded in work. This arena might be referred to as embedded learning, and which can be described as “learning-centred work” rather than “work-centred learning” (Meister 1998: 57).

6.5 Contexts of learning in corporations

What are main features of contexts of learning in corporations? Saunders (1995; 1998) describes four main contexts of learning, which he claims cover the situations in which learning at work takes place. The first category is labelled the *immediate context of learning*, where “learning is required to address urgent, immediate problems for which quick solutions are sought” (Saunders 1995:232). This situation is focused, in the meaning that the learning object is clearly identified. The immediate context of learning is based on the just-in-time principle and as such has a short time frame. The immediate context can be described as informal, and is embedded in work/normal operations.

The second category is referred to as the *project context of learning* (*Ibid.*). The goal of this learning situation is to acquire new knowledge to solve a new or unique problem. Learning is still on demand and focused, but the time perspective is longer than in the immediate context. Learning is still mostly informal, but requires more formal procedures of management and planning. Learning in a project context can be embedded in work, but also taking place outside normal operations.

The *validated context of learning* is formal and often takes place externally or at least outside normal operations (*Ibid.*). Validated learning is based on formal assessment or certification of acquired knowledge or competence, which gives the learner a formal qualification. This might be through attending a course at a higher education institution or completing an internal training programme. Validated learning has a long-term perspective, and can be just-in-case based.

The fourth category is labelled as the *organic context of learning*, which has a long-term or even continuous perspective. In this context “the learning needs are diffuse, changing and defined by the community of practice which characterises the work domain” (Saunders 1998:173). Learning is informal, and is carried out through communication and interaction between colleagues. Organic learning is usually found within professional groups meeting at e.g. seminars, but also carried out through electronic communication such as e-mail. However, the organic context of learning with its emphasis on communication and continuous learning bears similarity to the perspective of the learning organisation described above.

6.6 Corporate and strategic learning

So far the analysis has been focused mainly on employees' learning and competence development. However, a *corporation* as an organisation has its own learning needs. Learning as a corporate development strategy relates to the differences between human resource management and learning management.

According to Galagan (2000) one can discern corporate learning from strategic learning. This distinction has several implications. Corporate learning refers to what has usually been denoted as *training*. It is preoccupied with training of new employees or retraining of employees for new positions. This has been the domain of human resource managers or corporate training departments.

Strategic learning is, as implied, an emphasis in the corporation on learning for strategic purposes. Learning is considered an instrument for implementing strategic decisions, to change or reinforce direction, to swiftly change to meet new market opportunities. Strategic learning is a corporate responsibility, "usually owned at a level just below the CEO" (Galagan 2000). This development can be seen in the creation of new corporate executive positions, such as chief learning officer (CLO), chief knowledge officer (CKO), or director of intellectual capital (DIC) (Bassi, Cheney & Lewis 1998: 53). In addition to training of the company's employees for strategic purposes, strategic learning is concerned with incorporating learning in the whole value chain. Training is thus not only offered internally, but also for investors, partners, suppliers, vendors, customers and potential customers, the latter often being referred to as customer focused learning (Galagan 2000).

Customer focused learning or end user training sees learning as a revenue producer and a marketing tool (Aldrich 2000; Barron 2000). The business idea is that learning, or more specifically e-Learning, is a value added service that increases the competitiveness of the company by educating its customers. The trend started in the IT industry, as they, according to (Barron 2000:31), "were all but forced to move into customer training to help customers use their products". According to market analyses, customer focused learning is one of the fastest growing segments of the e-learning industry, and this development is intrinsically linked to the growth of e-commerce. With increasingly sophisticated technology and decreasing

product lifecycles, many companies find it an absolute necessity to educate its customers in the use of their products.

6.7 Corporate universities

As learning is seen with increasingly strategic importance, many companies have moved from an ad hoc and individually focused approach to learning to a more systematic and structured, organisation-focused, approach (Roesner & Walesh 1998). This can be seen in the development of corporate universities.

A corporate university is according to Hildre (1998), “an organisation for the development and education of employees, customers, and suppliers. It is an instrument using learning as a means to achieve business goals.” Companies that establish corporate universities thus emphasise the strategic impact of learning, and therefore require a systematic approach to learning. “It [corporate university] functions as the strategic umbrella for a firm’s total education requirements for all employees and the entire value chain, including customers and suppliers” (Meister 1998:52). Many corporate universities are developed in the ICT industries, as for instance Motorola University, Sun University, Oracle University and Dell University (for more examples see Roesner & Walesh 1998). These high tech companies use e-Learning extensively for learning purposes. What are the specific characteristics of a corporate university as opposed to training departments? Meister (1998: 58) compares them in the following manner:

Table 4. Training department and corporate universities compared

A SHIFT TO PERFORMANCE-BASED LEARNING		
Training Department	→	Corporate University
Reactive	Focus	Proactive
Fragmented and decentralized	Organization	Cohesive and centralized
Tactical	Scope	Strategic
Little or none	Buy-in	Management and employee
Instructor-led	Delivery	Experiments with various technologies
Training director	Owner	Business unit managers
Wide audience, limited depth	Audience	Customized curriculums for job families
Open enrollment	Enrollment	Just-in-time learning
Increase in job skills	Outcome	Increased performance on-the-job
Operates as a staff function	Operation	Operates as a business unit
"Go get trained."	Image	"University as a metaphor for learning"
Trainer-dictated	Marketing	Consultative selling

Source: Corporate University Xchange, Inc.

As seen in this comparison, a number of features discern traditional training departments from corporate universities. In the table above, the parameters – organisation, owner and operation - are of particular interest. Corporate universities often function as business units, with a corporate executive and often full- or part-time administrative staff (Meister 1998). As referred to above, customer training is of increasing importance. Such activities also imply revenues to corporate universities, which function as independent business units. Corporate universities have a cohesive approach to learning, in line with strategic consideration. Learning as a strategic emphasis also

implies a corporate approach to learning, with central planning and decision making.

According to Meister (1998) the concept “university” is used as a metaphor for learning. However, Rosner & Walesh (1998:57) claim that firms use that concept because various functions in the corporate university are similar to regular universities. They claim that aspects of traditional universities, like curriculum, faculty, course catalogues, administration, accreditation, classrooms, laboratories and grade transcripts, are also found in corporate universities. This might be due to the fact that both of these organisations have in common that learning and education are their main functions, and that organisational aspects like the ones mentioned relate to that goal.

6.8 Summary

The dynamic and unstable market has led to an emphasis on development and marketing of new products, more flexible organisation structures and focus on innovation as a competitive strategy. Theories on innovation focus on the resources that the company has to its advantages and to what extent it is possible to imitate that advantage. Concepts such as the knowledge creating company and the learning organisation focus on humans’ contribution to innovation through fostering a culture for learning and knowledge exchange.

Learning in corporations or work setting in general comprises dimensions like goals, content, structures and situations. The latter was seen in four categories – immediate, project, validated and organic contexts of learning. As learning takes place in various situations that are qualitatively different, technologies for enabling learning in corporations are also manifold.

Learning is to fill both individual and corporate goals, and the two are seen as related. To a larger extent than before learning is seen as a strategic instrument, encompassing not only training of employees, but also learning in the whole value chain. Of increasing importance is so called customer or end user learning. Learning is based on competence and work tasks, and content is regarded as interdisciplinary. Just-in-time learning is increasingly emphasised, and there is a trend towards convergence of work and learning activities. Learning in corporations is dominantly informal, however through the development of corporate universities strategic learning initiatives are becoming more planned and systematic, rather than ad hoc. Learning in corporations is carried out on external and internal arenas. There is a variety of learning situations in corporations. Technology can be used to enable learning in most learning contexts.

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7. Managing E-learning in Corporations

How is technology applied to enable learning in work settings? As described in the previous chapter technology enabled learning can be used for a variety of situations, and with a variety of technologies. E-learning is used as an overarching term, synonymous with technology-based learning in a broad sense: “E-learning covers a wide set of applications and processes such as Web-based learning, computer-based learning, virtual classrooms, and digital collaboration. It includes the delivery of content via Internet, intranet/extranet (LAN/WAN), audio/video tape, satellite broadcast, interactive TV, and CD-ROM” (Urđan & Weggen 2000:88). While this definition focuses solely on the technologies of e-learning, related to delivery of content and collaboration, emphasis will also be put on technologies related to learning situations and competencies, as different technologies are used for different purposes.

E-Learning is regarded with intense optimism, both in terms of cost efficiency, effectiveness and quality, and is frequently seen as something that will revolutionise training and education, both within corporations and in educational institutions. However, is e-learning in reality a passing fad, or has it as much potential as its proponents claim? So, in addition to describing e-learning generally, focus is put on the actual use of e-Learning in corporations. The empirical evidence is drawn from a study of Norwegian corporations’ use of e-Learning carried out by Telenor R&D in 1999. Based on the presentation, variety in the use of technology to enable learning is discussed, related to differences between industries and organisations.

7.1 Assumed benefits of e-learning

7.1.1 Cost-efficiency

The primary argument for e-Learning in corporations relates to the cost-efficiency as compared to traditional classroom teaching. This is partly due to the fact that a lot of corporate training has been carried out outside the company, and as such, the largest proportion of costs (approximately two-thirds) allocated for training has been for transportation and accommodation (Urđan & Weggen 2000:4). Interrelated, for an employee to take a course has meant that that employee has had to be away from work for long periods, which for the firm means loss in production. E-Learning can be undertaken in smaller chunks, and the employee does not need to be away from work for more than a few hours or training can be embedded in the normal work. Related, e-Learning can be delivered at the time of need, whereas classroom teaching operates of a just-in-case basis.

The second efficiency argument relates to the development of new corporate structures towards the network firm – where production is spread over geographically dispersed sites. In large multinational corporations, this is a particular challenge for training. Development of virtual training organisations has been seen as a solution to training a geographically dispersed workforce (Urda & Weggen 2000). This argument is hence related to accessibility, which is often claimed to be the most significant benefit of e-Learning (Galagan 2000). Although the development of e-learning programmes is costly, and few off-the-shelf products exist, corporations claim that over time, development of e-learning solutions is more cost-efficient than traditional training carried out outside the local units.

7.1.2 Effectiveness

The second assumed benefit relates to the effectiveness of e-Learning compared to traditional training, and more specifically classroom teaching. Although, the evidence for the effectiveness of e-learning can not be said to be conclusive, there have been studies that show that in terms of consistency of learning goals and content, retention of content, and speed of learning curve, e-learning is more effective than classroom teaching (Urda & Weggen 2000:6; Zschau 2001).

Research has focused on the effect on retention, and Urda & Weggen claim that e-Learning is between 25 – 60 percent more effective than classroom teaching on retention. However, this research only measures immediate effects on retention of material. According to Slaven et al. (1996), there has not been established a clear positive relationship between e-learning and long-term effects. As such, a long-term impact as well as the actual use of acquired knowledge can not be inferred from the effects of immediate retention. Researchers have claimed that the immediate effect is not even necessarily attributable to the qualitative impact of the medium, but rather that “the immediate retention of learning material is due to the novelty of using a new form of teaching” (Clark 1983 in Slaven et al 1996:220).

7.1.3 Quality of the learning experience

Arguments for the improved effect of e-Learning are related to the quality of the learning experience. There are a number of features of e-Learning that can enhance the quality of the learning experience, as compared to classroom teaching. However, these are not *per se* features of e-Learning, but can be designed into e-learning programmes.

The most important assumed benefit is the ability to individualise the learning process and content as to cater for individual differences in learning styles and needs. This means that employees can learn at their own pace, in their own way, and review material as often as needed. An emerging technology that can foster tailor made solutions is the development of so-called object-based learning, which is a way of granulating content into independent reusable software objects, which can be matched according to individual learning needs or job profiles (Bassi, Cheney & Lewis 1998:51).

The ability to practice, or learning by doing, is another potential advantage. This is especially relevant for learning tasks that are too dangerous or costly to train on in reality. By the use of computer simulation, training can take place in a safe environment, while at the same time getting a hands-on experience.

Interactivity and a learner-centred approach are other features of e-Learning that can enhance the learning experience. Student activity is considered generally beneficial for learning. Student interaction with each other and with tutors is considered to be of importance, as learning to a large extent is considered to be a social process (Slaven et al 1996, p. 219). Online learning and conferencing systems can accommodate real-time collaboration between students and tutors.

The ability to present information in various forms and media is considered as one of the greatest advantages of e-Learning. Teaching is dominated by the spoken word, where as e-learning can combine auditory, visual and kinaesthetic presentations, mixing text, graphic presentation, video, animations, sound and simulations, to accommodate variances in learning styles as well as for illustration and repetition.

7.2 E-learning solutions

As seen in the presentation of learning situations in corporations, technology can be used to enable learning in a variety of learning situations, identified as the immediate, project, validated and organic contexts. Here emphasis will be put on discussing different e-learning solutions as they relate to these situations.

Learning support in the immediate context is, according to Saunders (1995), communication with co-workers or electronically with a system that has “face-to-face” attributes, for instance an built-in help function of a computer programme or access to a data base. Learning support in the project context

can be offered through various media, and the emphasis is put on knowledge-based resources (Saunders 1998:173). In the validated context, learning support in this context is traditionally classroom teaching, but e-learning programmes with built-in testing/assessment is another way of facilitating for validated learning. In the organic learning context learning can be facilitated through electronic communication such as e-mail or conferencing systems. In these contexts, there seems to be three general solutions for technology enabled learning:

- E-learning programmes
- Database technology, or technology for access and sharing of information, knowledge and experience
- Communication and conference technologies

Below certain attributes of the technologies will be described. The technologies are often used in conjecture with each other.

7.2.1 E-learning programmes/software

The first category of solutions refers to programmes or software, which is especially designed for learning purposes. Such programmes can be part of another software (embedded), but also be an independent programme, and can be delivered through web technology and CD-ROM. E-learning programmes can range from computer simulations to electronic teaching manuals, from an embedded help function to full-fledged courses. These programmes can have designed pre- and post-test functions, thus enabling validated learning, and a varying degree of interactivity and ability to customise to individual needs. Emerging developments relate to object-based learning and intelligent tutoring systems that can profile and support according to individual needs.

The degree of multimedia use poses challenges for the delivery of the programmes. Multimedia rich programmes, especially use of video and animation, cannot usually be delivered over the web, and is hence delivered via CD-ROM. However with increasing bandwidth and streaming technology, this problem should be delimited.

An especially interactive and multimedia rich type of e-learning software is computer simulations, which are computer programmes that recreate or model a real-life situation, and enable the learner to learn through action in a safe environment. Simulations have been used to train people in situations that are too dangerous or costly in real environments, such as pilots and train conductors, but are now increasingly used for other purposes, especially so-

called soft skills training and in situations where interpersonal skills are required (Salopek 1998, p. 30). According to Salopek (1998:28), simulations have the following characteristics:

1. a defined key event or task
2. defined participant roles
3. an underlying model of effective performance
4. complicating factors and unexpected events
5. realistic interaction context
6. outcomes that reinforce the desired performance

Computer simulations are interactive in the sense that the actions of the learner are the essentials of the programme, and as such, simulations have a lot in common with computer games.

7.2.2 Database technology

Access to knowledge bases is an important part of corporate learning. However, such databases need not be specifically designed for learning purposes. But timely access to relevant information is an important part of both learning and working. Corporate knowledge bases can consist of different types of information, of products, clients, environmental/industry information, as well as of best practices and experience based information on various topics.

A comprehensive knowledge base might be relevant for all learning situations, individually or as part of other learning solutions. In terms of immediate or embedded learning, database technology has been linked to so-called electronic performance support (Caudron 1996). Electronic performance support systems are applications that provide access to information, assistance or guidance, either as part of company software, on the Intranet or even by mobile technology, to provide support on a just-in-time basis. Delivery through network technology enables that information can be updated quickly to all connected to the network. According to Caudron, such applications are vital for companies or industries where information changes rapidly, as shown in the example of commercial airlines (Caudron 1996:34), and particularly within the service industries. However, she claims that also in industries where this is not the case, performance support is increasingly emphasised as it makes traditional training obsolete, and enables employees to learn whilst doing their job.

7.2.3 Communication and conferencing technologies

Communication with other learners and with teachers is an essential part of learning. And as such, technologies for communication and conferencing are important e-learning solutions. Electronic forms of communication both delayed and in real time use both IT and telecom networks. E-mail is a common form of delayed or asynchronous electronic communication. However, for learning purposes one would often want synchronous or real-time communication, which can be facilitated through tele or video conferences, or on the internet through chat rooms (see below). A two way sound and picture video conference is about the closest electronic solution to classroom interaction between a teacher and students.

7.2.4 Online learning

Today, online learning and particularly Internet solutions only accounts for a small proportion of e-Learning. However, growth in Internet learning solutions is unanimously acknowledged (Bassi, Scott & Cheney 1998, Caudron 1996, Kristiansen et al 2000, Urdan & Weggen 2000, Wulf 1996). The most favourable aspect of Internet for delivery of e-Learning relates to its accessibility. Secondly, the potential for real time communication and collaboration is enhanced.

Internet delivery of e-Learning can comprise of almost all forms of learning, however, internet today still has problems with delivering multimedia rich programmes. According to Wulf (1996:50), there are five primary modes of Internet delivery of learning, that can be used individually or in combination with other teaching methods:

- *E-mail*: Where information, course materials, discussions, questions and answers can be sent to participants individually or to a group by listserves.
- *Bulletin boards*: Information, questions, comments and discussions are posted directly on an electronic bulletin board, and where the students must go to the host server to access the materials.
- *Downloading*: Information, course materials or software is downloaded from a bulleting board or from any website to the students' computers. According to Wulf, "this is the least interactive, but probably the most commonly available type of training on the Internet" (*Ibid.*:51).

- *Interactive tutorial*: The students go to an Internet site and take a tutorial while online. The tutorial can consist of various elements, for instance testing.
- *Real-time conferencing*: Synchronous real-time communication between students or between student and tutor facilitated through a MOO (Multi-user Object Oriented) environment which is an interactive system accessible to many users at the same time, or real-time conferencing systems such as IRC (Internet Relay Chat).

Where as the three first modes resemble a correspondence mode of teaching, the potential for online learning lies in the ability for synchronous communication, through which e-Learning comes close to real interaction and potentially collaboration.

7.2.5 Hard skills and soft skills

Traditionally e-learning has been carried out in the domain of hard skills training, particularly IT training, which comprises “application development tools, application software, and system infrastructure software” (Urda & Weggen 2000:13). According to Urda & Weggen, in the market for e-Learning, IT training accounts for three times more than soft skills training. Soft skills or business skills account for approximately 50 percent of training budgets, but soft skills training is largely delivered by classroom teaching. However, the market for soft skills e-learning is estimated to grow dramatically over the next years (*Ibid.*:17).

7.3 Use of e-learning in Norwegian corporations

E-learning in the corporate settings includes a number of applications and learning situations. However, to what extent and how is e-Learning used in Norwegian corporations? The following data are from a study carried out in Norway in autumn 1999 (Kristiansen *et al.* 2000) of one thousand companies from the following industries: oil and offshore, machine industry, construction, banking and insurance, chemical industry, electronic industry and graphic industry.⁵

Of the one thousand Norwegian companies investigated, 76 percent have used ICT for learning purposes, only 24 percent have never used any form of technology for learning. 63 percent of the users have used solutions based on

⁵ Information and analysis of the Norwegian corporate setting is also influenced by informal interviews with consultants in Norway’ e-learning business.

network technology. However, the development towards use of e-Learning is recent. 60 percent of the companies that use e-learning have introduced it within the last three years (*Ibid.*:9-10). In terms of the e-learning solutions, the following distribution represents the use of different technologies.

Table 5. Use of different technologies for learning in Norwegian companies

Type of ICT for learning	Percent	Type of training
CD-ROM on non-networked PC	61	Hard skills (IT training, especially software, but also gen. IT), product learning
Internet	55	Hard skills (IT training, both general and software specific)
Intranet	27	Hard skills (IT training, both general and software specific), and product learning
Teleconference	18	Hard skills (IT training and product learning)
Electronic whiteboard	9	Hard skills (IT training general and specific)
Videoconference	7	Hard and soft skills (product learning and leadership training)
Satellite TV	2	Hard skills (product learning)
Picture/TV phone	1	Hard skills (industry specific)
None	24	

Source: Kristiansen *et al.* 2000:10, and Jakobsen & Kristiansen 2000

In this survey, database technology/knowledge management systems and performance support were not emphasised. As seen in the table, the e-learning solutions fall in mainly two categories: Telecommunication/web technologies and CD-ROM, and the latter is in most use. According to Kristiansen *et al.* (2000:13), information and communication technologies are also used for different types of learning or for different competencies. CD-ROM and Internet are used predominantly for IT training, where as telecommunication is used for soft skills training, where personal communication and interaction often are needed. However, as the table indicates, closer scrutiny of the data (*cf.* Jakobsen & Kristiansen 2000:14-

25) revealed that even telecommunication is mostly used for hard skills, and particularly for learning about new products. E-learning in general is mostly used within IT training and product learning, and the least within soft skills such as project management.

Most e-learning solutions are used for individual learning, accounting for 84 percent. Only a few companies have tried solutions for collaborative or group learning, and there is little use of real-time applications. Multimedia rich solutions are common, distributed mainly on CD-ROM, but most companies expect to use web solutions if band-width and streaming technology can accommodate it. In general, most companies anticipate rapid growth in online learning.

In general, 75 percent of the companies assume that focus on training, further education and learning will increase in the future. Both the importance put on learning in general and the percentage of companies using e-Learning today, are high. This reflects the importance put on lifelong learning in the Norwegian society, a focus that also is reflected in national policies. The focus on e-Learning can be seen as related to the extended access to technology in Norway, seen for instance in percentage of homes with personal computers. Internet and mobile technology are also widespread. Kristiansen *et al.* (2000:3) also point to the long tradition for distance education in Norway as an explanatory factor.

However, the sample industries for this survey was selected based on their experience or maturity in the field of e-learning. The sample was also skewed towards big companies (in the Norwegian context). However, most Norwegian companies are small. 99 percent of Norwegian companies have less than 100 employees. Small companies do not to the same extent put a strategic focus on learning. Both size and type of industry are factors that explain differences regarding the use of e-learning solutions.

7.4 Variances in use of e-Learning

Size and industry are regarded as key factors to explain whether or not corporations use technology for learning. In terms of size of the company, measured in number of employees, larger corporations are more frequent users of e-Learning than smaller companies (Jakobsen & Kristiansen 2000). However, size also affects what type of technologies companies use. Smaller companies use predominantly Internet (*Ibid.*: 22). Larger companies frequently use a mix of technologies, such as CD-ROMs, Internet, and much more frequently than smaller companies, the company Intranet (*Ibid.*:23).

Larger companies, which use e-Learning extensively, also have more positive attitudes towards e-Learning and expect growth in the use of e-learning. Larger companies also more frequently have strategies and plans for e-Learning than smaller companies, where learning happens more ad hoc and unstructured.

In the Norwegian study described above, the industries that are regarded as the most frequent users of e-Learning were not included – the IT and telecom industries. However, for the industries that were included in the study, type of industry was a significant variable determining whether or not companies used e-Learning. In their study, industry was a more significant variable than size. Overall, the most frequent users of e-learning were oil and offshore and banking and insurance (*Ibid.*: 9). Construction is the industry with the smallest number of users (*Ibid.*). Oil and offshore and banking and insurance industries also use the greatest number of different technologies. However, they use Internet the least of all industries, but Intranets the most (*Ibid.*: 22). This might indicate that these industries develop a lot of learning material internally or buy custom-made solutions. The report does not attempt to explain or speculate on why these two industries use e-learning the most. In the oil and offshore industry, training has always been important, since they for example certify their employees for different duties as well as for safety issues etc. In addition, quite a few operations are dangerous, and training is done by computer simulation.

According to Saunders, the notion of organisational culture might also shed light on the use of e-Learning in corporations. Saunders outline various characteristics of organisations that contribute to an emphasis on learning in general and e-learning specifically. He bases his discussion on four types of organisational cultures, “each of which might have different impact on the learning culture and in turn on the use of electronic support” (Saunders 1998:173):

- Role cultures – hierarchic organisations, in which formal roles and jobs predominate.
- Achievement cultures – flat organisations, in which informal task oriented teams are put together on the basis of expertise to achieve specific outcomes.
- Power cultures – an organisational environment in which factions deal and strategic liaisons take place within a hierarchy.

- Support cultures – flat organisations which are participative and humanistic.

Although learning and specifically e-learning might be emphasised in all of these cultures, Saunders claim that ICT based learning is “most likely to yield widespread possibilities for learning in *achievement* or *support* organisational cultures” (Saunders 1998:181). However, as seen e-Learning is often an individual venture in corporations and e-learning is often tied to job competence. As such, e-Learning might just as well be emphasised in a role culture. Asides from these cultural dimensions, other characteristics of corporations that focus on e-Learning are that they are already networked and employees are habitual users of ICT. In addition, organisations must be learning oriented. According to the studies by Kristiansen *et al.* (2000:23) of Norwegian corporations, companies that extensively use ICT for learning have an expressed corporate learning strategy and a systematic approach to facilitating for and management of learning.

7.5 Managing e-learning in corporations

As seen, learning in corporations is a complex phenomenon. But if learning is to have a strategic impact in corporations this will require a systematic approach to *learning management*. This is all the more relevant in terms of e-learning, due to the fact that emphasis is often put exclusively on the *e*. Corporations, as well as educational institutions, which spend billions on buying and developing infrastructure and software for e-learning. But without a corporate strategy and a systematic approach to implementation and management, e-learning infrastructure and software might not be used. According to Kristiansen *et al.*, the challenge to e-Learning in corporations is to facilitate for learning in such a manner that “technology, pedagogy and organisation are related and create a coherent, manageable and logical system for the corporation’s learning activities” (Kristiansen *et al.* 2000:23). Fjuk (1999:14) discusses the same ‘triangle of considerations’ in identifying common problems in the development and implementation of ICT-mediated learning. Based on previous findings and discussions, one might identify a framework for learning management, with regards to e-Learning.

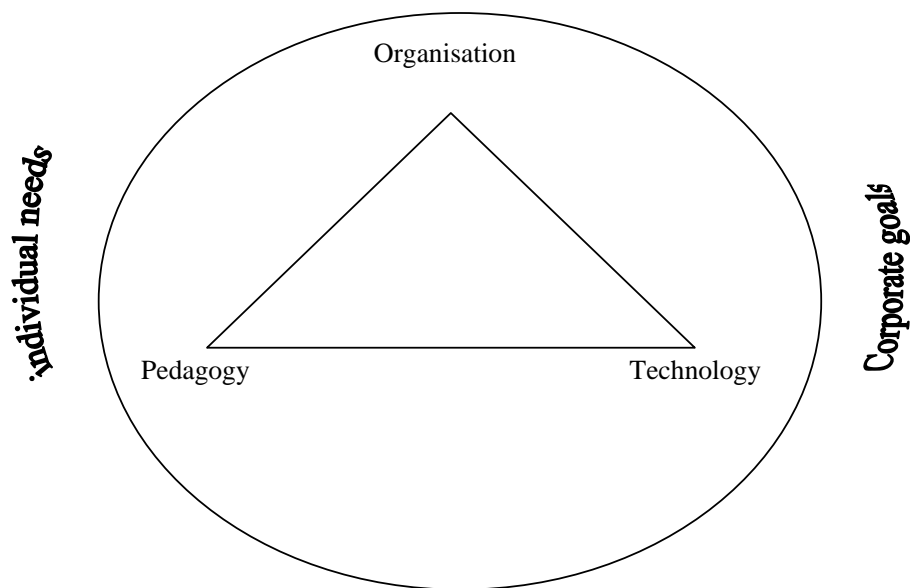


Figure 1: A framework for e-learning management (based on Fjuk 1999:14)

The idea inherent is that an optimal balance between these factors is necessary for successful e-Learning in corporations. This means that a variety of considerations should be taken into account when developing and implementing e-Learning. Organisational considerations can be aims and strategy for the company, current practices, structures and work arrangements, target audience for learning, corporate culture and traditions, time and facilities set aside for learning activities, resources set aside for learning, and monitoring. Pedagogical considerations concern issues such as didactical models and principles, content and competencies, individual and collaborative learning, role of instructors/tutors, testing and assessment. Technological considerations relate characteristics of different applications and available solutions (Fjuk 1999:14). In addition, as the circle of the figure indicates, a balance between individual needs and abilities, and corporate goals, should be taken into account (cf. the double goal of corporate learning).

How can corporations become successful in developing and implementing e-Learning? Kristiansen *et al.* (2000) carried out as part of their study of Norwegian corporations' use of e-Learning, a best practice study of ten large corporations that were regarded as mature users of ICT-enabled learning.

Their first finding is that for e-Learning to be successful there is a need for a comprehensive corporate strategy for how to facilitate for learning. This strategy must be official and supported by the top leadership, which is pivotal for the allocation of resources (*Ibid.*: 23). Corporate learning must as such be anchored at the corporate level, but must also be reflected in the individual career-plans of employees.

Frequently, it is also held that corporations need to create incentives for learning. Secondly, corporations need to structurally enable learning, by creating room and time for learning, either at the work place, at home, or at other arenas, for instance specifically designed learning zones. Thirdly, best practice corporations have systems for mapping and monitoring the learning activities of employees. Fourthly, they use a wide variety of technologies, as well as combined with other learning modes, for instance lectures and seminars. According to Kristiansen *et al.* (2000:30), *a combination of traditional forms with e-Learning seems to be the best solution*. Fifth, they put emphasis on the pedagogic quality of their solutions, for instance to design solutions that emphasise activity, interaction and ability to tailor to individual needs or learning styles (*Ibid.*: 30). Finally, best practice cases tend to focus on continuous learning and competence development, and continuous development of their e-learning solutions (*Ibid.*: 31).

7.6 Summary

There is a variety of e-learning solutions, that can be grouped in three main categories: Technologies for communication, solutions for information access, retrieval and sharing, and e-learning programmes delivered via web technologies or CD-ROM. Traditionally, the latter type of e-learning solution has been delivered via CD-ROM due to the use of multimedia components like video and animations. However, with increasing bandwidth, the Internet is becoming the most important way of delivering learning in corporations. Online learning however encompasses different solutions such as e-mail, bulletin boards, tutorials and real-time conferencing.

In Norwegian corporations, use of e-Learning is quite common. 76 percent of a thousand companies surveyed use e-learning solutions. Though, companies use a variety of technologies, CD-ROM and Internet are the most common solutions. E-learning in general is mostly used for IT training and learning about new products. In terms of variances, size and type of industry are relevant variables to explain differences in use. Corporate culture is another factor that might have impact on the use of learning solutions,

especially in terms of individual and collaborative learning and learning for different purposes.

For e-learning to be a successful strategy a systematic approach to learning is considered vital. As a general framework for e-learning management, three equally important considerations should be conceptualised and balanced: Organisational considerations, pedagogic considerations and technological considerations. It is assumed that a lot of corporations in implementing e-learning focus almost exclusively on the latter category, paying little or no regard to what the organisation needs and what it already has to offer, resources, space and time, and interrelated – the work structure.

Chapters 2-7 have shed light on relations between learning, information technology and economy by observing them from a sociological frame of reference – Castells' theory of the Information Age (Castells 1997, 1998, 2000). The main finding being that a distinct effect of the informational society is that ICT applied for learning is claimed to be paramount for corporations' competitiveness and it has become an industry in itself – the e-learning industry. While the latter is to a fair degree documented by market statistics, the claim about practical usefulness is more blurred. A lot of optimism and spectacular assumptions about the potentials of ICT-based learning are found. Empirical underpinnings are scarce and uncertain. The motivation for the present study was to empirically pilot the ICT-learning situation before launching an extensive comparative/international study of what is actually working or not working – and, hopefully also identify the preconditions necessary to make ICT-based learning economically effective. The empirical foci chosen was a higher education institution and a telecom company, both situated in the Norwegian capital area, and supposed to have been co-operating in learning projects. The research idea being to make a first grasp of how ICT was actually used within these two organisations, and, to see if ICT was used in any sort of learning partnership between them.

Before making “the empirical dip” this study's conceptual frame ought to be made clear, by presenting assumed structural and relational impacts on a higher education institution, in terms of how an institution ought to apply ICT for its own learning purposes as well as for its effective learning-business relations with corporate life

8. Conceptualising Structural and Relational Implications

Castells' theory of the *informational* society has been empirically supported by the identified extent and character of the emerging e-Learning industry. Moreover, the logic and flexibility of the network, and the convergence of technologies into highly integrated systems have also been manifested in a changed concept of *learning* in general, and of organising of "learning just in time" in higher education institutions and corporations in particular.

Having this review of the state of the art as backdrop, certain assumptions will be made about structural and relational impacts on institution and context in general and institution and corporation partnership in particular. These assumptions constitute the conceptual frame for conducting the empirical pilot.

- A model of the "service university" of the informational society
- A general rationale for organising of goal-effective e-Learning
- The Teaching/Learning Resource Centre (LRC) as an e-Learning Meeting Place of university/corporation partnership

8.1 E-restructuring the "service university" of the informational society

The informational society (and the global economy) as surrounding context of universities push the institutions towards becoming cost-effective "service universities" (Tjeldvoll 2000). A key feature of universities developing in this direction is their *organisational restructuring and use of information technology*, as a means of staying competitive in the life long education market.

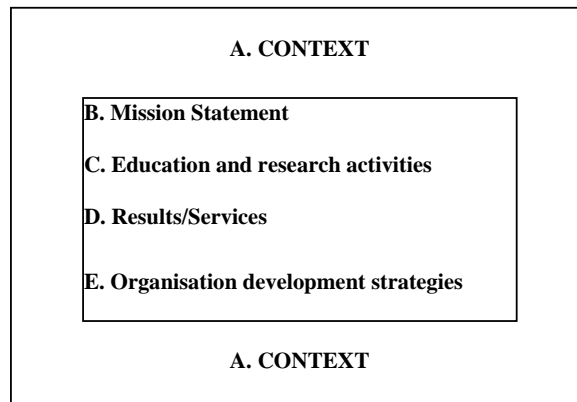


Figure 2. Context, Production and Organisation of the Service University (Tjeldvoll 2000)

The tendency towards multiplication of tasks, enlargement of functions, and diversification of outputs (increasing complexity) is a main feature of the universities' current service orientation. It entails the need for a better management of multiplicity, both in the factory and product market, and at the same time an adequate ability to manage increasingly varied internal processes. In this framework, as for many other organisations confronted with a growing complexity, a wide extension in the use of information technology is the key option. The analysis and characterisation of the different dimensions of the relation organisation-use of information technology, is therefore essential to interpret the conflicts, results and dynamics of different actors and to see realities and trends of 'service universities'.

The university's actual use of ICT in order to improve quality of regular on campus-teaching, to improve extent and quality of off campus teaching, *and*, to improve the institution's own organisational learning - as well as making a link for e-Learning partnerships with corporations is to be tested empirically. A critical condition for turning an institution ICT learning effective is assumed to be the institution's key actors level of understanding the rationale of organising goal-effective learning. Hence, what is meant by this rationale is the next issue of this study's conceptual frame.

8.2 A rationale for organising goal-effective learning

Corporations as learning arenas are different from educational institutions, because they do not have learning as a primary objective. Learning is to serve corporate goals and needs, and in a general sense increase competitiveness, profit, efficiency, etc. However, learning is an individual endeavor, a cognitive process in the minds of individuals. As such, learning is related to both individuals' learning experiences while at the same time aims at serving the larger organizations' learning needs (Lai 1997). The second dimension relates to the content of learning. In educational institutions, particularly universities, learning is based on scientific disciplines or defined knowledge areas. Learning at work on the other hand is interdisciplinary in its nature (Sangster, MacLaran & Marshall 2000), because learning in corporations is built upon work tasks or work situations, and how to master certain competencies or solve specific tasks. A third dimension that differs, is the time dimension. Learning strategies in corporations are often being geared towards just-in-time learning. Just-in-time learning denotes learning at the time of use, or learning a competency or acquiring knowledge at the exact time when a person needs to master that competency to carry out a given action. Just-in-case learning on the other hand, is learning knowledge and competencies in advance of its potential use. This is the time perspective of educational institutions, where students enrolled in a program learn a range of competencies for potential use in the future, or just in case s/he might need to use them in the future. Finally, another important dimension relates to the degree of planning and structuring of learning activities. This again relates to the distinction between formal and informal learning. Educational institutions emphasize formal learning, which is course based and where emphasis is put on validation of acquired knowledge through testing/evaluation. This is not the primary focus of learning in corporations, where learning is a mix of formal course based and informal learning, and where the true test of knowledge lies in its application.

At the same time as educational institutions and corporations learning activities are markedly different, the way their efforts to organize learning also share important properties, at least at an abstract level. It is however, important to bear in mind that such a model only takes into account deliberately planned learning activities, and not informal and ad hoc learning, although this represents the largest proportion of learning in corporations/work settings (Trondsen 2000). Taking into account that e-learning represents pre-designed learning activities, a model for planned learning even in work settings is warranted.

At a general and highly abstract level, the process of organising and planning learning activities needs to take into account the following considerations, and the relations between them: why learning activities are being planned, who the learners are, what is to be learnt, how is it being learnt, where and when is the learning activities being carried out, and what effects they have? These questions correspond to the didactical categories: goals, content, that is the knowledge, skills and competencies to be mastered, methods of instruction, and evaluation. In addition, explicit emphasis is put on the participants' preconditions, in terms of prior knowledge, learning styles and motivation as inputs in the planning process. The model also emphasises the need for considering the infrastructure for learning, both in terms of where and when learning is to be archived, and that different learning arenas impact on the planning of learning. As seen above, there are indications that emphasis is shifting in all of these dimensions in the organising of learning in society.

This general rationale of goal effective learning was formulated for the first time by Ralph Tyler (1950) and further developed in a Norwegian context by Bjørndal & Lieberg (1978), Ulstrup Engelsen (1997) and Thune & Welle-Strand (2000).

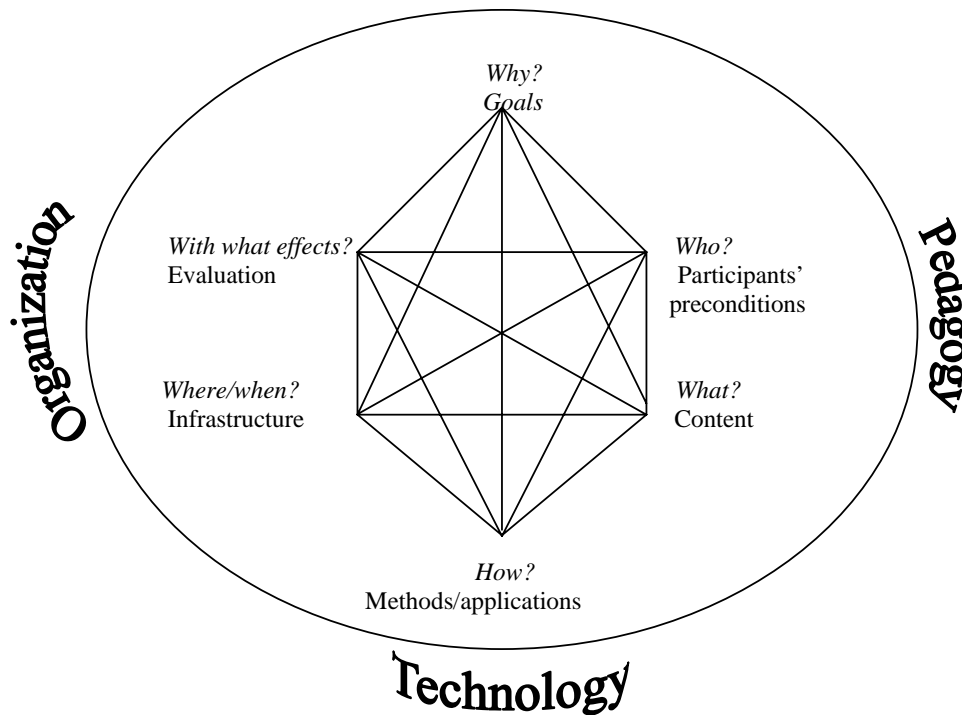


Figure 3. A general rationale for organising goal-effective learning (Welle-Strand & Thune 2001)

The model addresses two central concerns. First of all, the didactical categories are consistently related. This means that to plan goal-effective learning one needs to take into account, the different elements that needs to be in place, but also the interrelations between them. How participates, for instance, will impact on both the content used, the methods, etc. This means that a shift in emphasis in one of them, for instance towards using e-learning applications, requires that one needs to carefully think through how this change will impact the other categories. Optimal goal-effective learning is dependent on the level of consistency between aims, content, working/ learning activities, applications, evaluation, students' learning preconditions and infrastructure.

Secondly, according to several authors (Kristiansen et al, 2000, Fjuk, 1999) the challenge to e-learning in corporations is to facilitate for learning in such

a manner that technology, pedagogy and organisation are related and create a coherent, manageable and logical system for learning activities. The planning model's categories and their relations can be placed within such a triangle of considerations, however they are here seen as continuous rather than specific. The idea of treating these considerations as continuous is that they are greatly overlapping, and that most categories in the "diamond" corresponds to at least two of the dimensions. For example, technology is often considered to be only specific e-learning applications, but it is important to bear in mind that ICT can be both infrastructure, methodology and content, as well as part of the working/learning activities. The same logic can be applied to the other dimensions. The organisational dimension applies to the setting of goals, selection of participants, keeping track of their knowledge needs and preconditions, issuing evaluations, but also to creating space and time for learning. The pedagogical dimension also relates to most categories, and not at least to having an overview of the interrelations between them. What the model tries to communicate then, is that to balance the considerations of organisation, technology and pedagogy, is to see them not as separate spheres, but greatly overlapping.

A particular focus of the empirical testing will be to identify *how* functional ICT is actually understood (by planners/managers) and *applied* (by staff and students/learners) in the university and in the corporation.

8.3 The LRC as an e-Learning Meeting Place of university/ corporation partnership

The higher education institution's concrete structural response to ICT-based learning for own and partnership needs is based on a model developed by Thune & Welle-Strand (2000) - cf. Fig. 4 below.

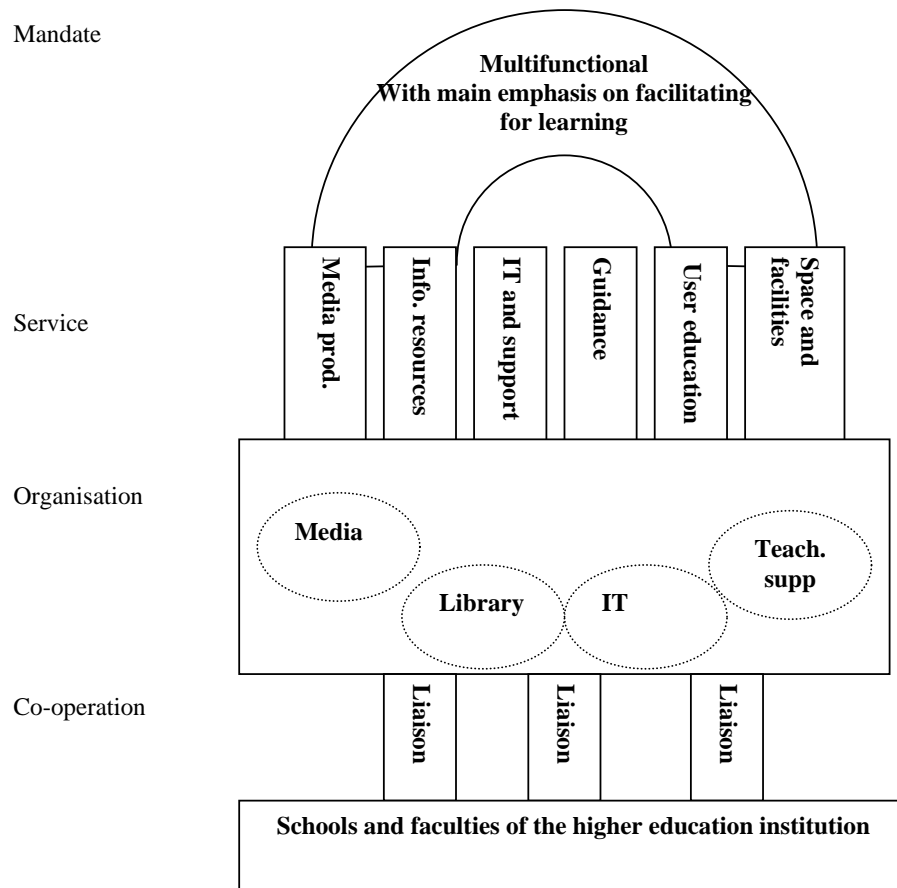


Figure 4. The LRC as an e-Learning Meeting Place of university/ corporation partnership

Based on developments at UK universities and ongoing developments at Norwegian School of Management BI, Thune & Welle-Strand have designed a model of an e-Meeting Place for university(ies) and corporation(s). The simplicity of their idea is that a traditional library of the university is transformed into the main resource centre of e-learning (the teaching/learning resource centre - LRC). The LRC is expected to serve both institutional and corporate learning needs, in a flexible use of internal and external human, ICT and other material resources. As more emphasis is put on independent learning and flexibility of delivery, these services are moving to centre stage and development of learning resource centres

epitomises such a development. However, though in principle LRCs are integrated in the university as an organisation, there are indications that learning resource centres with an educational mandate, still operate somewhat unattached. If such centres are to fill the role of a functional structure for learning in an independent learning paradigm, certain conditions have to be met. There is a need of a holistic and relational perspective on independent learning by the institution's leadership when planning learning resource centres, and it has to be established structures making co-operation between academic and support staff necessary.

Both universities and corporations are expected to be moving away from traditional "just in case" learning organisation towards more student-centred "just in time" learning.

8.4 Empirical research questions operationalized

Answers to the following specific questions are assumed to make possible a conclusion to the overall research question of the study:

- i. How does universities and corporations e-react as *organisations* to the current context of a global informational society and a global economy?
- ii. How well are *educational rationales* understood and implemented by universities' and corporations' management and staff?
- iii. To which extent has *a functional e-Learning Meeting Place* for learning partnerships between university and corporation been established?

In order to respond empirically to these three research questions, the following specific questions was addressed to the two sources, policy documents and key actors of BI and Telenor:

1. What are current policy aims of ICT-based learning and teaching?
 2. How is ICT understood as a new tool for providing learning?
 3. What are current ICT applications for learning at the institution/corporation?
 4. What are seen as challenges and recommended improvement areas?
- The pilot study's responses to these questions will be used to revise and refine the theoretical framework for researching the relations between learning, ICT and economy in the global informational society. The revised framework will make the point of departure for choice of methodology and development of data gathering instruments for the full-fledged LITE project in 2003-2005. Based on the findings of the main project a general didactical framework for economically viable e-Learning will be presented.

9. The Norwegian School of Management, BI

As a privately financed service university in an informational society and a global economy BI is facing tough challenges in adapting to the new business surroundings. In order to respond to stronger competition and the need for flexible learning and teaching BI's investments in ICT are increasingly growing and ICT is recognised as of great significance in BI's policy documents. BI's economy and existence depend on the students and corporations as customers, and the policy documents emphasise the importance of BI's reputation as a modern, customer-oriented learning partner. This implies an urgent need for BI to develop a modern learning environment, focusing on the opportunities made possible by ICT (BI's Organisational Committee 2000). In the following BI's declared, written policies are contrasted opinions by a selected sample of key actors at the institution. The sample consisted of eight persons five in academic positions (professors/researchers, one academic serving in an administrative position (deputy director) and two administrators in positions as directors (Centre of Net Studies and the Library).

9.1 BI's policy aims on ICT-based learning and teaching

In BI's *Strategic Plan 1998-2000* a deep concern for the challenges following from the knowledge economy is exposed. Lifelong learning education and the possibilities made available by ICT are promoted as means to meet these challenges. However, in spite of these articulated needs and efforts, the *EQUIS Report*⁶ from 1999 concluded that BI is not yet utilising ICT to its full potential.

According to EQUIS the use of ICT is one of the areas in which BI should seek improvement in order to stay competitive: "The knowledge economy represents a major challenge for BI as an institution of research and education. Continuing education and improved usage of the possibilities offered by ICT are essential to this effort" (1999: 6-3). The near future challenges for BI in the areas of research, teaching and faculty-related administration are to develop the ICT support relevant for today and the future. The conclusion, which is drawn in the report, emphasises that the most pressing challenge for BI is "to put academic computing on the agenda as an issue of strategic importance that must be coherently approached" (EQUIS 1999:8-10).

⁶ European Quality Improvement System

As a follow up of the *EQUIS Report* an even stronger emphasis on ICT is identified in the institution's present strategic plan. One of the most distinct aims articulated in the *Strategic Plan of 2000-2002* is that BI shall become a leading higher education institution applying ICT: "BI shall integrate the use of ICT in all of its value creating activities and supply the classroom with a virtual learning arena" (Strategic Plan 2000-2002). Emphasis is put on ensuring necessary infrastructure and support, and to extend the use of web-based learning systems in studies and courses as well as applying ICT to make the administrative working processes more efficient. The use of ICT is viewed as one of the most important competitive means to win the market, and is assumed to provide efficiency both within economics as well as for learning and teaching purposes.

9.1.1 Key actors' assessment of BI's policies for ICT-based learning

How do key actors at BI look upon the institution's written policies on ICT-based teaching and learning? The following question was asked: *What do you think are BI's future policy aims for ICT-based learning?* There are widespread scepticism to BI's declared efforts within this field, and several interviewees view the articulated policies and aims as without substance, as expressed directly by two of them:

- I am not optimistic concerning BI further efforts - I believe there are only great words, though they say this is the greatest project at stake made in BI at all times.
- There are no explicit strategic efforts, only words which not necessary are based upon theory.

All interviewees acknowledge that BI has an articulated aim of becoming a leading institution in terms of use of ICT, but five of them see the Plan as too ambitious, expressed by one in the following way:

- In the Strategic Plan of 2000-2002 it is emphasised that BI shall become leading within ICT, but what does this mean, and compared to what/who shall we become leading in relation to? This is a too ambitious aim.

Four of the interviewees point out that the management must be more dynamic and assign more resources in order to fulfil the policies within ICT-based learning. It is also stressed that BI's policies within this topic seem not deep-rooted into the institutional practices, which may indicate either that BI does not have the ability or the necessary willingness to put this at stake, according to respondents.

9.1.2 ICT-based learning and cost-effectiveness

Within BI's policy documents the use of ICT-based activities is assumed to be a competitive means providing cost-effectiveness. However this statement is not based upon any further arguments. In order to ponder into this issue the interview persons were asked: *What do you think would be effects from investing in ICT-based learning/teaching, in terms of cost-effectiveness?*

Some of the respondents emphasise that ICT is not very cost-effective presently, but it is assumed that it may become cost-effective under certain conditions:

- ICT is not very cost-effective. Not until traditional teaching is replaced by ICT-based learning will it be cost-effective, because then reduced time on earning will have economic significance.
- ICT is cost-effective if its full potential is utilised, but then ICT must be related to organisational and personnel issues.

The interview persons do not seem to commonly share the view in the policy documents of ICT-based learning as providing cost-effectiveness. This may indicate that BI's management has not sufficiently communicated the arguments in favour of increased use of ICT. been capable of communicating and arguing this aspect.

9.2 ICT as a new tool for providing effective learning

What is actually meant by ICT-based teaching and learning as it is exposed in the documents and assessed by the interview persons. In BI's *ICT Task Force Report* (2000) it is made clear that ICT applications depend on the target group and the programmes offered. In the ordinary teaching it implies a supplement to the classroom, where ICT is a way of delivering the content more efficiently, and where the students are offered the possibilities for self-studying and alternative activities. In the in-service training ICT is a way of offering the customers more flexibility in working on their own projects. The *Task Force Report* refers to the experiences done within the Management- and Distance Education Units, where the customers not only are interested in appropriate professional programmes, but also request technological support and adjustments (ICT Task Force 2000).

According to the Report then, ICT is seen as important for both on and off campus training activities. In order to contrast the policy intentions with the

key persons' opinions of how it could be applied, the following question was asked: *How do you think BI could apply ICT in co-operation with Telenor on that company's in-service training?*

Opinions vary a lot. In general all respondents, except one, focus on whether such co-operation would be convenient or not. Six of them emphasise that using ICT within this context is useful, but it is also noticed that this target group is very different from the traditional student group on-campus. Some of the interview persons consider this difference as potentially troublesome, while one emphasises Telenor customers as particularly appropriate for ICT-based learning strategies since they are daily working with information technologies. One of the interview persons has no opinion about this issue at all and one does not consider the difference between on and off campus student groups as critical. Following are three direct assessments:

- The possibilities for constructive co-operations are only limited by the imagination. However it is important to remember that training in higher education and in corporations are very different. A main question is thus for what purpose Telenor would use ICT-based training.
- Home pages as an extra distribution channel may be useful also as part of such co-operation, because it increases the service. However, it is important to remember that corporation customers do often have higher barriers than on campus students do in using ICT-based activities. I thus do not consider ICT as a critical factor.
- There are plenty of opportunities within this topic and it is an exciting field. Telenor employees are often used to working on the Net and work with computers in their daily work life, and is therefore a particularly appropriate group for net-based training.

The *ICT Task Force Report* (2000) focuses the importance of understanding that it is more to ICT as a learning tool than merely web-based teaching services. As the term ICT indicates it is also great possibilities for communication, and not only information and technology. According to the Report ICT-based teaching offers new opportunities for learning, both regarding individual learning processes, in respect of self-study, obtaining information, lessons via video streaming, electronic tests and transmitting, as well as the social learning processes. The latter may be provided by bilateral picture and sound lessons, business plays, cases, web-collaboration and chat groups (*Ibid.*).

How are these possibilities attended in practice, in the opinion of the respondents? They mentioned the use of e-mail, home pages with information about content of the courses and answers and question sites, and discussion groups. In addition, video conferencing was mentioned. However, all these possibilities were emphasised as supplements to traditional teaching:

- My courses are based on traditional lectures, supplemented by net-based discussion groups and question-answer sites, as well as the lecture content being presented on the Net. home pages and blackboards are here used as tools. In addition, video conferencing has been applied in some courses at BI.
- All communication in my courses outside the lecture room takes place on the Net, by means of home pages with information, structure of the courses and lecture notes. E-mail is used in questions and answers. This digital distribution is a supplement and not competitive to traditional teaching. The only thing, which is different also in the classroom teaching, is that a PC is linked so the lectures are transferred directly from the files.

The interviews confirm that ICT-means is being applied as a support to regular teaching.

9.2.1 ICT and the quality of learning

According to BI's policy documents it is an aim for the institution to facilitate a learning environment through the use of ICT, and the use of ICT is viewed as one of the most important competitive mean to win the market. ICT is assumed to provide efficiency both related to economics as well as for learning and teaching purposes (Strategic plan 2000-2002). In the *ICT Task Force Report* (2000) ICT in ordinary teaching is proposed as a supplement to the classroom, in order to deliver the content more efficiently, so that the students is offered the possibilities for self-studying and alternative activities. This may be seen as an element of technical effectiveness. What about the quality of learning itself? – as seen by the interview persons? The following question was asked: *What do you think would be effects from investing in ICT-based learning/teaching, in terms of quality of learning (process and end products/competence achievements)?*

Six of the interview persons believe that ICT contribute to better learning effects and quality of learning, especially related to the opportunities for

flexibility. Two of the interview persons assess ICT as more appropriate within quantitative subjects, and two emphasise that it is in combination to other learning methods that it is effective. One of the interviewees claims that ICT per se does not have any particular effect on learning at all, phrased in the following way: “Net-based teaching as it is conducted today, for instance the use of PowerPoint during the lecture is only distribution of information. One thing is that the students find searching for information funny, but they do not learn anything. There is still a lack of evidence of that the students learn more and become cleverer when using technology”. Among those in favour of ICT-based learning the following arguments were put forward:

- ICT-based learning is effective because it provides the opportunity for flexibility.
- There is no doubt that the quality of the learning becomes better, because it provides the opportunity to better adjustment to each individual.

Except for one person, there is a general positive belief in the benefits of ICT-based learning in terms of quality.

9.3 Current ICT applications at BI

We have above seen that ICT is proposed as a tool for providing new opportunities for learning in BI’s policy documents, but that according to the interviews the current applications are to a large extent limited to bring information about the courses. This issue was followed up by asking: *To what extent is BI actually applying ICT in its teaching and learning activities?*

According to the *EQUIS Report* (1999), BI’s recognition of the importance of training students to master common computer applications in the mid-80s has put BI at the forefront of ICT developments. While introduction courses are offered at all BI’s business colleges nation-wide, some courses include interactive computer-based simulation models in the learning process. BI’s ICT platform has developed gradually over the last ten years (*Ibid.*). Internet was introduced in the early 1990s, and access to the net as well as e-mail accounts have been provided for students in the Sandvika Campus (main campus/Graduate School) since 1997 and at the Business Colleges since 1998. E-mail is increasingly substituting regular mail in BI’s communication

with students and a number of courses use web-sites as teaching support (EQUIS 1999).

The Centre of Net Studies (the former Distance Education Unit) has been at the forefront of offering Web-based courses, and has of course developed a relevant ICT infrastructure. At the Centre a strong emphasis is put on interaction among the students, between student groups and teacher and between the individual student and his/her teacher. Applications such as one-to-one e-mail, chat groups, discussion trees, articles, links and assignments complement and supply the modules offered (*Ibid.*). Report from the Organisational Committee (2000) notes that the broad scale use of ICT at the Centre has not been developed due initiatives by the departments and academic staff, but by the professional educationalists at the Centre.

The general interest in web-based communication has created an increasing demand for training in basic computer skills, and voluntary introduction courses to the Internet have been implemented at most BI campuses nationwide. The *EQUIS Report* notes that this kind of interaction is also increasingly demanded for and applied in on-campus courses. However the full use of ICT is not yet applied systematically in all open, regular degree programmes (*Ibid.*).

According to *Annual Report* (2000) BI has ten years of experience of combining learning and ICT in its teaching activities, and represents one of Norway's oldest and largest web-based learning environments. BI claims itself to be at the forefront in developing electronic teaching activities, and recently video conferencing lectures have been tested. Centre of Net Studies has developed their own ICT-platform (Apollon) and a number of the BI Executive School's master of management programmes has integrated web-based applications in their activities. However, a need for more coherence of the ICT applications is expressed. Coherence is particularly needed in course design. This is seen as important in order to give the customers' a more complete information of content as well as application form of the different courses (ICT Task Force 2000).

The *ICT Task Force Report* (2000) recommends that BI's Centre of Net Studies and the Master of Management programmes continue their present development and put a particular focus on a video conferencing system in meeting and teaching activities and other web-based activities. Within this context the present co-operation with both Telenor and IT Fornebu Knowation is seen as particularly important (*Ibid.*).

In order to confront these written policies with BI grassroots opinions the interviewees were asked: *How do you see BI currently applying ICT in its teaching/learning strategies?* As referred to above, the *EQUIS Report* (1999) concluded that the full use of ICT is not yet applied systematically in all open, regular degree programmes at BI. The latter observation is supported by the interviews. Next to all of them describe the use of ICT as quite varying and often based upon some individuals' initiatives and efforts, expressed in the voice of two of them:

- BI as an entirety does not use ICT-based learning, but some groups and individuals use ICT in their activities.
- The use of ICT-based learning activities at BI varies a lot, but some individuals distinguish themselves positively.

The policy documents also claim that BI is in the forefront in applying ICT-based learning and teaching. However, the interview persons do not commonly share this view:

- BI seems to have reached far within this topic compared to others nationally, but this is not an indication of that BI has reached far internationally, but that Norwegian institutions are far behind internationally.
- BI has probably reached more far than the public higher education institutions, but we are not in the front in Norway.

The policy documents' strong emphasis on the Centre of Netstudies as a particularly qualified user of ICT is to some extent supported by the interview persons. However two of them claim that this is only an "electrification" of traditional courses:

- Department of Information Management, the Executive School and the Centre of Net Studies use ICT, but this is just as support to traditional teaching. The Centre of Net Studies translates traditional correspondence courses directly to electronics.
- The Centre of Net Studies makes a strong bid for digital deliverance of courses, but these courses are already developed. Thus, these are self studies rather than web-based teaching.

It seems clear that there is a distinct discrepancy between several of the interviewees and the policy documents in terms of the extent and quality of several current applications of ICT-based learning and teaching at BI.

The policy documents emphasise that the activities already applied in The Centre of Net Studies and some of the Master of management programmes ought also to be applied in other units and departments as well. This fits well with the view of five of the interviewees. They claim that there is a great need for knowledge diffusion and exchange of experiences at BI in order to ensure a broad scale of ICT-based learning, expressed like this by one of them: “We must be more able to work across the organisation. It is important that BI not only establishes a common policy and use of ICT within the organisation, but also that we co-operate with our partners about better utilisation. The question is however to which extent BI has the ability and willingness to co-operate. The possibilities are there, but we have to utilise the network to a much larger extent”.

9.4 Challenges and improvement areas

9.4.1. An appropriate ICT infrastructure and strategy

As mentioned above, the EQUIS Report of (1999) recognises great efforts within ICT in some of BI’s units. On line with the Centre of Net Studies, the Library is given much credit for its ICT services and support, and the ongoing planning of a BI’s learning resource centre at the Library is stressed as a step in the right direction. However, in spite of these efforts the Report notes that the ICT-support to the faculties is very fragmented, and “there is no clearly articulated ICT strategy that can be used to operationalise plans, prioritise among critical needs or pinpoint areas lacking in ICT expertise” (EQUIS 1999:8-9). The EQUIS Report emphasises the need for BI to develop an organisational structure for academic computing support. Since the need for ICT support varies a lot for different departments concrete plans ought to be worked out to identify true ICT support needs and investments for each department. Such a plan is also meant to include the organisation of ICT support and the need for expertise within each department (*Ibid.*).

The EQUIS Report’s recommendations of developing an overall strategy for the ICT-based learning activities are over and above supported by the interviewees’ assessments, when they were asked to indicate challenges and improvement areas. They point out the lack of an overall BI ICT strategy as a main problem, and six persons view this as a critical precondition for successful implementation of ICT-based learning on a broad scale. Three of the arguments were:

- It is not sufficient to say that we shall be better in ICT-based activities, there must be a strategic thinking behind such words.
- It must be developed a pedagogical basis for BI's learning activities, taking into consideration that BI is a very complex organisation. The overall ICT policies have to reflect a pedagogical rationale and the complexity of the institution.
- We have to be better in respect of pedagogical issues, and look closer at the practical teaching situation. We should develop a "BI Net Plan", where each field is followed up by priority.

9.4.2 A common BI ICT platform

BI's project "ICT-based Teaching" submitted its final report in the summer of 2000. It proposed a number of recommendations, focusing on the need of establishing a common BI ICT platform. A distinction between platforms providing teaching tools and learning tools is made in this report. While the teaching tools are rather easily applied the learning tools have more functionality and require more efforts from the user. Since the two groups (teachers and students/users) are assumed to have different needs, the Report suggests that BI establishes an ICT platform for each group. *Blackboard* is recommended as a teaching tool and *Livelink* as a learning tool. Blackboard is considered appropriate for its user friendliness and its number of functions, while Livelink is suggested because of its flexibility. Livelink has been applied in BI's Master of Management Programmes, and from these experiences assumed to be easily extended to other users. The Centre of Net Studies' self-developed platform Apollon is also considered, but more in relation to whether or not BI shall develop such programmes by themselves. The Report suggests that the recommended ICT platforms, Blackboard and Livelink, are tested in some courses during Fall 2000, and continuously evaluated (*Ibid.*)

To what extent do these recommendations correspond with the interview persons' assessments? Responding to the question of problems/challenges and improvement areas within ICT-based learning half of the interview persons emphasised problems due to an insufficient technical infrastructure, among others the lack of a common platform. However, one of the interviewees held that: "The infrastructure is rather sufficient, but the willingness and the ability to use it are absent".

9.4.3 An ICT-competent workforce at BI?

In the Report from the Organisational Committee (2000) the aim of BI as a scientific higher education institution at the forefront is related to a need for developing appropriate pedagogical and teaching methods: “It is necessary that BI strengthens its efforts in facilitating future learning applications” (Organisational Committee 2000:24). The Report claims a paradigm shift have taken place in terms of how programmes are facilitated and delivered. The critical question is how this may or can be adopted to with the same workforce. The main challenge is to ensure that the employees apply ICT in their teaching and design of programmes. It is recognised that the employees are still more concerned with their subjects’ substance than with learning technology and pedagogy. It is seen as an enormous challenge to develop the adequate attitudes and practices among faculties. In a long perspective these challenges may be solved through a strategic recruitment policy, but there is also a great need to think and act in a short time perspective. BI has to meet the ICT-challenges right now, by delivering excellent learning products, seen from three perspectives simultaneously; subject substance, pedagogy and technology (Organisational Committee 2000).

In accordance with the Organisational Committee (2000), The ICT Task Force Report (2000) also states that if BI shall become a leading institution within the use of ICT, efforts regarding ICT-pedagogical developments have to be taken into account. The purpose of an increased use of ICT in teaching and learning activities is in the first place to make the learning processes more efficient. This may only be done if these new activities replace the ordinary teaching lessons. The Report suggests that the eventual economic savings due to such replacements are used to develop further the pedagogical aspect within ICT-applications (ICT Task Force 2000).

As seen both of the two above mentioned policy documents admit the importance of pedagogical issues, but they are not stressed as very important. There is no clear expressed understanding of how ICT can be used to increase quality of learning. How is this issue assessed by the interviewed key persons? They were asked: *How is the balance between pedagogical and technical considerations exposed in BI’s ICT-based learning/teaching policies and practices?*

All the seven interview persons claim that the balance between technical and pedagogical issues is in the favour of the former, and three claim that there has traditionally been no pedagogical discussion at BI at all. One person holds that: “They get fixed on the modern technology and become enthusiastic it, without considering the pedagogical issues”.

Two of the interviewees argue that the professors should be more involved in the pedagogical work:

- Professional issues must be seen in a wider perspective, including knowledge about teaching, because there is a tendency that the professionals are kept outside forums where pedagogical issues are elaborated and decided upon.
- But they who teach, the professors as pedagogues, have to enter the stage and be involved in analysis and decision making about BI's teaching/learning policies. The administration can not be left manage the pedagogy. Professors have to co-operate and provide more input to the debates.

Some of the interview persons believe the technical infrastructure at BI to be rather insufficient for further efforts within ICT-based learning and teaching to be made. However, the interview persons are also concerned about the *human* infrastructure. Six of them emphasise that there is a lack of knowledge and skills among faculties in using ICT, and emphasise the importance of professional training. Two of them phrase it like this:

- The problem is that many do not see the necessity of using net-based course design, and some consider it more difficult to use than not to use. Courses in how to teach should be offered, because both the technical as well as the pedagogical assistance is insufficient.
- The problem is that the employees do not have the basic knowledge in using technology, and perhaps they will never be able to learn either.

Six of them also mention the lack of motivation among faculties as a condition that may prevent broader use of ICT-based learning. In two persons' own words:

- The challenge is that so many have too little knowledge about ICT, and they have no motivation to seek the knowledge themselves either.
- Many do not understand the use of replacing good teaching with something we do not know the results of. Incentive systems must therefore be established.

- Moreover, this development provides a demand for a new pedagogical role. This role becomes more academic and direct, and may not suit everyone.

The Task Force Report (2000) emphasises organisational- and attitude changes, as well as changes within the reward- and incentive systems to ensure a broad scale use of ICT by professors. As a result of great differences between the employees in how interested they are in using ICT-based activities and in their abilities to do so, the establishment of *a competence centre* is also recommended. The centre is meant to train and support the professors, the administration and the students in using the ICT applications (ICT Task Force 2000). Five of the interviewees have a view corresponding with the ICT Task Force Report's recommendation of an incentive system for use of ICT-based learning as a main improvement area. One of them claim: "To ensure that the professors apply ICT-based learning, this has to be valuable for them as users. To motivate for such use, incentives based on the taximeter system must be developed".

Although the policy documents identify a lack of knowledge, skills and motivation as a challenge for future development, it seems like the interview persons stress these issues more. The documents emphasise an appropriate physical infrastructure and a common platform as the main challenges, and though the interview persons also regard this as important, they focus more on human infrastructure than do the documents. Also, the interviewees emphasises the lack of pedagogical underpinning for the ICT-based activities. This aspect is only to a small extent mentioned in the documents.

9.4.4 Current efforts at innovation

As a result of the recommendation from the Task Force report, the Senate Executive Committee (KL) decided to establish a competence centre project (BIK), and in March 2001 this project was started. Also another project is started in the spring 2001: "On Net - BI Learning Web". In order to meet BI's articulated goal of being in the forefront of developing electronic course designs, the latter project is assumed to facilitate BI's teaching environment as a virtual learning arena and to enable the employees to teach in new ways by using efficient learning strategies through ICT (On Net - BI Learning Web 2001). Both these projects can be identified as follow-ups of the needs recognised by the policy documents.

How are these follow up-projects assessed by the interviewed key persons at BI. Two of them do not assess these projects relevant and appropriate, expressed in the following way by one of them: "BIK (BI Competence

Centre), the project "On net - BI web learning", and the Learning resource centre are all managed by people without pedagogical-, professional- and alteration competence". Two other interviewees believe that the projects will ensure the needed training of professors. Since there is no common agreement among the key persons about the usefulness of the projects established, it seems like the intentions of the policy documents have not been communicated sufficiently well to staff level, or some staff do not see the concrete follow up projects as pertinent.

9.5 Summary BI

Summing up the acquired information from the groups of sources, policy documents and key informants, it may be concluded that the two sources do correspond in their understanding of some issues, but not in others.

Strategic Plan 2000-2002 has followed up EQUIS recommendations by stating that ICT shall be used in all value creating activities and make BI a leading institution within the use of ICT. According to the interviewees, these policies are not deep-rooted in BI's practice. The majority claims that there is no substance in these aims, and the current use of ICT-based learning and teaching is both varied and very individual.

Also when it comes to assessment of challenges, problems and improvement areas within this field the policy documents and the interviewed key persons stress different aspects. In particular, the development of an overall strategy for ICT-based activities is seen as very important by six (of eight) interviewees, while this issue, recommended by the EQUIS Report (1999), is not mentioned in the policy documents. There is also a difference between policy documents and interviewees in terms of seeing pedagogical underpinning of ICT-based learning activities as important. This issue is not elaborated in the documents, while the key persons see this as an urgent challenge in order for BI to become a competitive learning environment. What both the documents and the interviewees identified as important is to improve the infrastructure, both in terms of training of faculties and technical support for faculties and students. Four of the interviewees point out that the management must be more dynamic and assign more resources in order to fulfil the policies within ICT-based learning.

10. Telenor

Norway's leading telecommunication company, Telenor, in 2001 changed its status principally, from being a hundred per cent state owned body to becoming a shareholder corporation operating in the international stock exchange market. The changed status implies that Telenor is into stiff competition both nationally and internationally. It operates in a market where success highly depends on a customer and market point of reference, competence, innovation capabilities and efficient work processes. The need of learning to keep pace with the new technology and to meet the increasingly growing competition from a global market leads to the continuous development of new learning methods for its in-service training. As a *telecommunication* company, Telenor is in a particular position as both a user and provider of e-solutions. It is natural to ask to which extent Telenor is utilising its benefits as a provider of technological infrastructure, in its in-service training in order to ensure a high skilled and competitive work force. In this chapter the company's policies on ICT and learning will be scrutinised, as well as contrasted with the assessment by some of the company's key actors in the fields of human resource development and training.

10.1 Telenor's policies on ICT-based learning

Due to the changing market trends, both the organisation itself and the employees face a number of challenges. To ensure capability to meet these challenges, four strategic goals are defined in Telenor's *Strategy for Human and Organisation* (2000). Of particular interest is the emphasis put on the ability to learn and reconstruct faster and more efficient than the competitors, and that this strategic goal of learning shall be supported by efficient working processes, *technology* and flexible organisational structures. Four specific objectives are set, expected to reach the strategic learning goal (*Ibid.*):

- Establish a competence management process, with web-based tools which the different business units may use in their competence work.
- Facilitate efficient and cost-effective learning and knowledge development through the establishment of an e-learning infrastructure and systems for learning and competence management.

- Develop arenas and networks for learning transmission and exchange of experiences, where Telenor Corporate University (TCU) and FoU departments are central actors.
- Co-operation and exchange of experiences within external networks.

The Strategy for Human and Organisation (2000) emphasises Telenor as a technological pioneer and that the company shall be at the forefront of using technological applications: "We shall use efficient and cost-effective technologies and applications, and show our clients how ICT increases the value for employees, owners, customers and partners" (*Ibid.*:9).

How conscious are some of the company's key actors about these policies? They were asked the following question: *What do you think are Telenor's future policy aims for ICT-based in-service training?* The whole sample, six interviewees assume that using ICT-based learning is a future policy aim for Telenor. However two of the interview persons claim that it has been difficult to introduce such activities:

- As a result of the increased focus on market generally, this issue has also become a more current and explicit interest in Telenor as well. According to the resources given, it is obvious that this is a field in which Telenor makes a strong bid for, and the company's leadership is very attentive.
- It has been difficult to re-introduce e-learning after the break down in the merging with Telia⁷, but the relocation at Fornebu⁸ provides new training needs which may be realised through e-learning. This is probably a field in which great efforts are to be put. According to our *Strategy for human and organisation*, the aim is to learn faster and more efficient than the competitors. E-Learning is here proposed as one means.

Even though all interviewees persons see ICT based learning as high on Telenor's policy agenda, one of them that s/he has never seen ICT-based

⁷ In 1999 the leading Swedish and Norwegian telecommunication companies (Telia and Telenor) actually decided on merging, which however, did not materialise.

⁸ Fornebu, the previous Oslo Airport, is the most attractive area for business location in Norway. Telenor got access to it, after a delicate political decision where the Parliament majority voted in favour of Telenor, against (against) the proposition of the Government.

competence development mentioned in Telenor's policy documents: "Though I have never noticed that ICT-based competence development has been on the agenda in Telenor's policy documents, it is obvious that what is happening within the ERAF project is evidence for the great efforts and resources put into e-learning".

In Telenor's in-service training programmes emphasis is put on developing the employees' competence as providers of telecommunication, through among other means the Internet. Varied training strategies are stressed: competence increase can be achieved through internal and external courses, on- and off work training, e-Learning, forums and conferences. In order to have a concrete indication of how the interviewees understood the possibilities of future use of ICT-based in-service training they were asked the following question: *How do you think ICT could be applied in an ICT based "learning co-operation" between BI and Telenor on Telenor's in-service training needs?*

One person is surprised that BI's available programmes within ICT and learning are not mentioned as options within Telenor's policy documents. Another issue is the emphasis put on the combination of ICT-based learning and e-meetings, and this is in accordance with the documents, which stress that e-learning is one means to reach the aim of competence development. This means could well be exploited in a co-operation between Telenor and BI. Several of the interviewees made the point that it ought to be of mutual interest for Telenor and BI to investigate the potential for e-learning co-operation. The potential for such use is viewed as huge.

In the *Strategy for Human and Organisation* (2000) there is a focus on the use of cost effective technologies and ICT applications. The development of a common e-learning system is seen as contributing to faster and cheaper learning inside and across the business units. How is this strategy assessed by the interviewees? They were asked: *What do you think would be effects from investing in ICT-based in-service training, in terms of cost-effectiveness?* The interview persons think that ICT-based learning is cost-effective, if certain preconditions are met, as illustrated by the following statements:

- To become cost-effective e-Learning must include a relevant and rational pedagogy. If the access to the learning content is good, and the access is possible when it is needed, it may be cost-effective.

- It is important to utilise e-Learning related to the advantages of being a large company. The more e-Learning is used in a large company, the larger the effects gained.
- E-Learning is not as expensive as traditional methods, when it comes to sending people away to courses outside the company. E-Learning is also an appropriate alternative in training large groups.

10.2 ICT as a new tool for learning

In *Knowledge* (2001) an emphasis is put on the development of a common learning platform, LMS learning@telenor, and how this enables the employees to collaborate and deliver training tasks, and to give training coordinators the opportunity to admit external learning content. The assumption is that knowledge acquirement and transmission is to some extent a social process, and that electronic learning may facilitate this aspect more efficient. An emphasis is here put on the assumption that the value of e-Learning is in how it is utilised, and it provides the opportunities to meet different learning needs and preferences for learning methods. Some people learn most when the material is visualised, others are great listeners and still other groups prefer learning by doing. By the new technologies of web-mobile and broadband, this is possible to offer.

ICT-based learning is in Telenor's documents emphasised as one mean among others to achieve competence development, and such learning is valued for its opportunity to provide knowledge transmission, collaboration and self-paced learning (Knowledge 2001, Strategy for Human and Organisation). How are the effects of ICT-based learning assessed by the interview persons? They were asked: *What do you think would be effects from investing in ICT-based in-service training, in terms of quality of learning (process and end products/competence achievements)?* According to the documents ICT-based learning is only one means among others to provide competence development, and this correspond with the respondents' view upon e-Learning, it seen as only a supplement to other learning methods. Moreover, they emphasise that ICT-based learning provide the possibilities for networking and diffusion of information and knowledge, as well as an opportunity for self-paced learning.

Half of the group of interview persons emphasises the learning management system (LMS) as of great importance for distributing knowledge and making learning accessible within the company. One of the interviewees clarifies LSM a bit further:

LMS is supposed to provide access to learning materials, and we wish to develop standards for both pedagogy and technology, in order to ensure that the materials in LMS is to a large extent similarly constructed. This will contribute to easier access to relevant content. LMS is characterised by great functionality, related both to web-based learning as well as other learning methods. LMS is a system designed for meeting specific competence needs of the company, and is thus a management system.

Some respondents find e-learning strategies as more appropriate for training hard-skills than soft-skills. So far there is high correspondence between policy documents and respondents in the way ICT based learning strategies are seen as a new tool for learning within Telenor, both focusing the possibilities offered by ICT for knowledge diffusion and self-paced learning.

Research and evaluation of the effects of e-Learning is a particular point of interest. While such measures are not mentioned in the policy documents, half of the interviewees are concerned about that little is actually known about the effects of e-Learning. Some persons wonder whether Telenor's ongoing e-learning related projects are properly evaluated. However, one of the respondents states that the present projects are being evaluated.

10.3 Current ICT applications at Telenor

ICT and e-Learning are obviously stressed as important in Telenor's policy documents and by key persons alike. Looking beyond written and oral policy expressions: *To what extent is Telenor actually applying ICT in its in-service training activities?*

10.3.1 The E-Ready Project

In Telenor's policy document, *Strategy for Human and Organisation 2000*, the development of a common market place and support to the learning processes was proposed implemented through the E-Ready project. Due to the relocation of 6000 Telenor workers to Fornebu⁹, a particular need was felt for establishing a learning system in order to improve employee competencies and satisfaction and keep staff informed and motivated during the relocation project as such. "E-Ready" is now (Spring 2001) established. The overall aim of E-Ready is to make Telenor a pioneer in using ICT internally and towards partners and customers. Hence, *e-Learning* as a strategy for competence building is a main objective of E-Ready.

⁹ See note 8

10.3.2 The Learning Management System (LMS)

In February 2001, LMS (Learning Management System - learn@telenor), was started as a pilot before the launching of E-Ready. LMS is a tool for making the workers capable of learning skills, methods and attitudes that they need, when they need it and adapted in a way that is suitable for each individual. The overall aim is to establish a common platform to make learning effective. LMS is a web-based application, bought from Saba. It facilitates the planning process, administration, deliverance and participation in different programmes and learning situations. It is based upon a number of different pedagogical means, both synchronous and asynchronous, online and offline, and individual as well as group-based. The aim is to make possible that the workers participate in a managed learning process where the goal is to transmit knowledge across all borders (Knowledge 2001).

10.3. 4 Key persons' assessment of current ICT and learning applications at Telenor

All of the key persons had noticed that ICT-based learning is on the agenda of Telenor, especially related to the projects established for the relocation to Fornebu. In spite of this recognition some of them claim that beside these projects there is not much e-learning going on in Telenor, and the interviewees express different assumptions about how far Telenor has actually reached within this area. While there is correspondence between policy documents and key persons in terms of stressing e-learning strategies as part of the company's relocation at Fornebu, there are differing opinions in terms of Telenor's actual standing in the field of ICT based learning. Another difference identified is between documents and key persons in terms of the strategy of knowledge/competence management. This strategy is heavily stressed in the documents, while only half of the interviewees recognise this as a central issue.

10.3.5 Telenor Corporate University

Telenor Corporate University (TCU) is Telenor's prime strategic instrument for learning and change. In the present strategic plan the concept of "lifelong learning" is put at the forefront as an overall aim of TCU, focusing on the creation of an international learning environment at Telenor. Through the combination of learning/research on technology, business and science, TCU will provide the knowledge and skills necessary for future leaders in Telenor. The work of TCU is assumed to take place in co-operation with national and international universities and telecommunication experts. According to TCU's strategic plan new innovative tools for learning through technology are used in distributing and obtaining such knowledge (Telenor Corporate University 1998). Within TCU there is established a centre for

knowledge sharing and practices - CORE. The aim is to facilitate a strategic focus on efforts related to the creation, codification and transfer of knowledge in Telenor. CORE is a virtual community of people, processes and tools.

In Strategy for Human and Organisation (2000) TCU is emphasised as very important because it offers the different business units the opportunity to provide possibilities for development outside their own units and is thus contributing to making Telenor a more attractive work place. The development of a common e-learning system is seen as contributing to faster and cheaper learning inside and across the business units (*Ibid.*).

Contrasting the ambitious policy document descriptions of TCU with the opinions of the sample of key persons there is surprising discrepancy. The group of interviewees did not see this unit as of any particular importance. There may be several reasons for the different assessment. One may be that the interviewees are mainly concerned about the relocation to Fornebu, and that this project as such, involving the whole corporation, for the time being is Telenor's most important "learning project" requiring employees working together independent of which unit they belong to.

10.4 Challenges and improvement areas

In order for Telenor to learn and reconstruct faster and more efficiently than the competitors the creation of a learning infrastructure is emphasised in Strategy for Human and Organisation (2000). This process consists of three main elements:

- Competence management process: Establishing a web-based tool for competence management and planning.
- E-learning and systems for learning management: Establishing a technical infrastructure for individual learning.
- Learning arenas: Establishing learning arenas and networks.

The establishment of a corporate learning structure, through LMS, is viewed as one of the greatest efforts in Telenor's history of competence development. The challenge is to utilise the experiences gained during the relocation to Fornebu, and out-roll this knowledge company-wide (*Knowledge 2001*).

In order to contrast the policy aims with the opinions of the sample of key persons, the latter was asked the following question: *What do you foresee as problems/challenges when implementing ICT-based in-service training in a broad scale?* While the policy documents emphasise the importance of establishing a learning structure through a competence management process, e-learning and systems for learning management and learning arenas, the key persons, on the contrary, stress the lack of an overall strategy/framework for these activities in the company. Moreover, half of the interview persons see the company management's level of attention as problematic. Further, the interviewees see the Telenor employees' motivation for e-Learning and change as problematic. This assessment is in sharp contrast to the policy documents, where the importance of developing the employees' competence as providers of telecommunications and to "use what we are selling" is stated. Competence can hardly be developed without motivation.

10.4.1 The issue of pedagogy

Related to the question of motivation, the interviewees was asked: *What do you regard as the areas in which Telenor can/should seek improvement to ensure a broad scale of ICT-based learning in its in- service training?*

As already mentioned above, the development of an overall strategy/framework for the ICT-based learning activities in the company is a paramount precondition for further competitiveness. Next, all interviewees stress the need for development work on pedagogical issues. Pedagogy and motivation for learning – is part and parcel of all efforts to change structures, processes and content of the company. Though pedagogy is mentioned in relation to the E-ready Project (Knowledge 2001), it is according to the interviewees a great need for further work and emphasis on pedagogy, as a strategy for goal-effective and efficient learning.

The issue of pedagogy was followed up by the following question to the interviewees: *How is the balance between pedagogical and technical considerations exposed in Telenor's ICT-based in-service training policies and practices?* Next to all of them think that the technology has been at the forefront until recently, but that the present tendency is to focus pedagogy to a larger extent. This point of view is different from the policy documents, where pedagogical issues are not given particular attention.

10.5 Summary Telenor

Telenor's policy documents have been scrutinised in terms of the company's ICT based learning strategies, and a sample of key persons from the

company has been asked to assess the strategies. The two sources show corresponding understanding on some issues, and differences on others.

ICT and learning are focused in Telenor's policies and practices. In the documents a great emphasis is put on the importance of competence development and management, in order to meet Telenor's overall aims. ICT-based training/learning is stated as one important strategy to create competence within Telenor in general and management competence in particular. The relocation to Fornebu is in itself seen as a "learning project". The experiences and knowledge gained during this project are supposed to be rolled out to the rest of the company, ensuring a broad scale of efficient competence development processes.

Policy documents and key actors have a similar understanding concerning ICT-based in-service training in Telenor. However, in specific areas the key actors stress issues lacking attention in the policy documents. Firstly, an overall strategy and framework for ICT based learning activities are lacking in Telenor. Secondly, pedagogical issues concerning ICT-based learning are not given sufficient attention. Thirdly, lack of motivation among employees for learning and change is seen as a problem. Fourthly, half of the interview persons see the company management's level of attention as problematic. Fifthly, while the policy documents display high expectations to Telenor Corporate University as a means of competence development, this unit is not seen as of particular significance by the group of interviewees.

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11. Pilot Findings

In this chapter findings are summarised and discussed in relation to the three specific research questions stated in Section 1.3. The purpose is to grasp key aspects of the current situation of ICT based learning at the two organisations, as a state of the art, and baseline for designing a comprehensive research project, including similar organisations in other countries.

11.1 The State of the Art

The information technology revolution and the rise of the informational society have dramatic implications for education in general, and in particular for tertiary education and life long learning. The ICT revolution contributes significantly to changing the global economy and the organisation of enterprises. Surroundings and market conditions are continuously changing. By implication, this has created extensive needs for innovation and renewed competence in order to make production competitive and profitable – that is: urgent needs for fast, effective and efficient *learning* – on demand, just in time.

Empirical confirmations of the extensive needs of ICT based learning are found in the already prospering e-learning industry. However, this is still mostly a US phenomenon, due to the ICT revolution's start in Silicon Valley and at Stanford University. The industry is rapidly globalising, because US industry stretches abroad, and centres in East Asia and Europe are trying to break into the international e-learning market.

While the e-learning industry is a distinct indication of a new learning reality in economic and practical terms, it is also found to have had theoretical implications. Educational researchers broadly agree upon the necessity of flexible organising of learning in the network society and the global economy, affected by ICT. In terms of theoretical understanding of learning under the new technological conditions a rather one-dimensional line of theorising has been identified - the student-centred and socio-cultural/constructivist approach to learning. However, there is not presented much of empirical underpinnings for the assumptions made.

A dynamic and challenging development in the field of improved learning by using ICT is going on, likely to increase because of the needs of the e-learning industry. The developments within computer-mediated communication allow for an improved availability and productivity of education

services. Certain constraints of ICT as a resource for learning and teaching have also been identified. ICT based learning is not always The Solution. Hence, awareness is needed for making professional analysis of which means will really work for goal effectiveness and efficiency. Learning purpose, type of content, learners' motivation and current competence have to be taken systematically into account before decisions are made about the use of which technology.

The bulk of tertiary learning is related to the corporate world. In terms of the economic aspect of learning and ICT, this world is the real test of its relevance and usefulness. The dynamic and unstable market has led to an emphasis on development and marketing of new products, more flexible organisation structures and focus on innovation as a competitive strategy. It is found that the knowledge creating company and the learning organisation attempt to focus on humans' contribution to innovation through fostering a culture for learning and knowledge exchange. Learning in corporations or work settings in general comprises dimensions like goals, content, structures and situations. Learning is to fill both individual and corporate goals, and the two are related. To a larger extent than before learning is seen as a strategic instrument, encompassing also learning in the whole value chain. Of increasing importance is so called customer or end user learning. Just-in-time learning is increasingly emphasised, and there is a trend towards convergence of work and learning activities. Learning in corporations is dominantly informal, however, through the development of corporate universities strategic learning initiatives are becoming more planned and systematic, rather than ad hoc.

A variety of e-learning solutions is found: Technologies for communication, solutions for information access, retrieval and sharing, and e-learning programmes delivered via web technologies or CD-ROM. Traditionally, the latter type of e-learning solution has been delivered via CD-ROM due to the use of multimedia components like video and animations. With increasing band-width, the Internet is becoming the most important way of delivering learning in corporations. Online learning, however, encompasses different solutions such as e-mail, bulletin boards, tutorials and real-time conferencing. For e-learning to be a successful strategy a systematic and educational rational approach to learning is considered vital. As a general framework for e-learning management, three equally important considerations should be conceptualised and balanced: *Organisational, pedagogical and technological considerations*. It is assumed that a lot of corporations in implementing e-learning focus almost exclusively on the latter category, paying little or no regard to what the organisation needs and

what it already has to offer, resources, space and time, and interrelated – the work structure.

11.2 ICT based learning in universities and corporations

The first research question of this study was: How do universities and corporations “e-learning react” as *organisations* to the current context of a global informational society and a global economy? The question is responded to firstly, by analysing the findings from the reviewed literature, and then from the two Norwegian organisations.

Universities in general are just taking the first, uncertain steps in order to apply ICT based learning and research strategies. Development is most rapid in the US, where private and public institutions make alliances in learning product development and delivery. There is an increasing pressure from the e-learning industry and private virtual universities (e.g. Phenix) included. Also the development of corporate universities challenges the situation of traditional institutions. US present a segmented picture of university reactions to ICT, reflecting the different types of higher education in this country. Depending on the level of sophistication of the learning product and the academic status of the university, institutions behave differently, and engage in different types of alliances or consortia, for their production and distribution of content to varying groups of students as customers. A general US trend is that universities both try to apply ICT based solution to themselves, as well as involving themselves increasingly in the e-learning industry. Such involvement is either as main partners of consortia or they are leasing some of their professors or particular products to the e-learning industry or the virtual universities.

The European and Scandinavian scene shows minor indications of the same tendencies as in the US. While considerable amounts of infrastructure are already in place, the institutions, most of them publicly financed, are struggling to become innovative and dynamic. The current situation is partly due to the institutions’ dependence on state funding and still rather centralised governance by the ministries of education. Partly, the relative absence of an e-learning industry adds to explain the lower e-dynamic in this part of the world.

11.3 ICT based learning at BI

In the present pilot study, however, a Norwegian independent, or private, university is the empirical case. *The Norwegian School of Management BI*

has during recent years demonstrated a considerable stronger dynamic than is common within Norwegian higher education. This quality was formally and officially confirmed by the recent EQUIS Report. However, the same report pointed to BI's current use of ICT based learning as a main shortcoming of the institution, and the area where the potential for improvement was quite large. BI's Strategic Plan 2000-2002 has taken the EQUIS' recommendations into account, stating that ICT shall be used in all value creating activities and make BI a leading institution within the use of ICT. Since BI generally presents itself as an international university, the ambition of the Strategic Plan may fairly be interpreted as an ambition of being at the forefront internationally in the use of ICT based learning.

Key staff at BI does not see these policies as deep-rooted in BI's practice, and a majority claim that there is no substance in these aims. The current use of ICT-based learning and teaching is both varied and very individual. The development of an overall strategy for ICT-based activities recommended by the EQUIS Report (1999), is not clearly expressed in the policy documents. The pedagogical issue is not elaborated in the documents, while staff sees this as an urgent challenge in order for BI to become a competitive learning environment. Policy documents and staff agree on the importance of improving the infrastructure, both in terms of training of faculties and technical support for faculties and students. Half of the interviewed staff group is concerned about the need for more top management involvement in the e-learning issues.

In terms of the current reality the interviewed key actors hold that the current practice is non systematic and mostly left to staff individual preferences. The key actors interviewed are happy with BI's present aim of building ICT infrastructure for staff training and technical support of staff and students. However, they are clearly not happy with the present situation in terms of applying the infrastructure for BI's general production process – the teaching of undergraduate and graduate programmes. They see the present Strategic Plan more as rhetoric than reality. Their explanations of the current unsatisfactorily state of e-Learning at BI are the following: There is a lack of an overall strategy for ICT-based learning activities and there is an absence of acknowledging the pedagogical dimension of ICT based learning. These shortcomings are primarily related to the Strategic Plan, but half of the interviewees are also concerned about the need for more top management involvement in the e-learning issues.

Judging from the sum of available information BI is in a good position in terms of ICT-for-learning infrastructure. However, for the infrastructure

investments to be profitable, it is required to have an overall policy making more clear for which learning purposes which technology is proper, and a pedagogical understanding of the relation between goals, content type, learning methods and participants' (professors and student alike) motivation for being ICT-learning active.

11.4 ICT based learning at Telenor

According to the literature there is a strong general trend of *corporations* going for e-learning solutions. Competitive corporations make a qualified choice between a variety of e-learning solutions: Technologies for communication, solutions for information access, retrieval and sharing, and e-learning programmes delivered via web technologies or CD-ROM. With increasing band width, the Internet is becoming the most important way of delivering learning in corporations. For e-learning to be a successful strategy a systematic and pedagogical rational approach to learning is vital. A general framework for e-learning management requires three equally important considerations conceptualised and balanced: Organisation, pedagogy and technology. On the dysfunctional side is found that a lot of corporations in implementing e-learning focus almost exclusively on ICT, paying little or no regard to what the organisation learning needs actually are and what it already has to offer, resources, space and time, and interrelated – its work structure.

ICT and learning are distinctly present in Telenor's policies and practices. In policy documents a great emphasis is put on the importance of competence development and management, in order to meet Telenor's overall aims. ICT-based training/learning is stated as one important strategy to create such competence. Policy documents and key actors have a similar understanding concerning the importance of ICT-based in-service training at Telenor. In certain areas the key actors stress issues lacking attention in the policy documents. Firstly, an overall and consistent strategy and framework for ICT based learning activities is missing. Secondly, pedagogical issues concerning ICT-based learning are not given sufficient attention. Thirdly, lack of motivation among employees for learning and change is seen as a problem by the key actors. Fourthly, half of the interviewees see lack of top management involvement in the e-learning issue as a problem. Fifthly, while policy documents display high expectations to Telenor Corporate University as a means of competence development, the group of interviewees does not share these views.

ICT based learning is definitely a concern in Telenor's policies and practices, as expressed by both policy documents and key actors. Telenor has just recently changed its owner status from being one hundred per cent state to a shareholder company, registered on the stock exchange. It is also in the midst of relocation in terms of site. Over and above Telenor is "young" as a profit-based international corporation. This fact may contribute to account for the corporation's relative lack of e-learning dynamic compared to the US corporate world.

11.5 Similar Challenges for BI and Telenor

There are peculiar similarities between Telenor and BI in terms of what the key actors see as key challenges for their organisations to become e-learning rational. Three issues are referred to by both: 1) lack of an overall strategy for ICT based e-learning, 2) lack of pedagogical understanding for the use of ICT based e-learning and 3) lack of involvement from management. At this point caution ought to be made; these data are from a pilot study only. They do not claim to represent the "true" picture of either BI or Telenor. However, they are assessments by highly qualified personnel. The similarity in assessments of what are problems certainly makes some food for thought. Is there a "technology bias" operating? A belief that e-learning simply means an ICT infrastructure? Or, is the market situation of both institutions still so favourable that they can afford to apply ICT based learning as just "fashionable rhetoric dressing" in their strategic plans? Compared to their e.g. US counterparts who implement ICT based learning strategies because they have "to learn or burn", the Norwegians' heat may not yet be hot enough.

11.6 Understanding of educational rationales

The second research question of this study was: How well are *educational rationales* understood and implemented by universities' and corporations' management and staff? It was found that the policy documents at both BI and Telenor were not concerned about pedagogy, meaning the logical consistency between a learning goal, the relevant content, relevant learning activities/methods, evaluation and certain frame factors/conditions. By implication this may be interpreted as a lack of concern about whether ICT actually is relevant for certain purposes/contents, less for others and not relevant at all for some purposes. This interpretation is supported by the assessments of the two groups of interviewees. Common for them is that the policy documents are seen as insufficient in presenting a strategy for ICT based learning in general, and their lack of a pedagogical anchoring in

particular. There are two possible reasons for this policy lack of concern about pedagogy. It may be conscious or incidental. If the first assumption is the correct one, it means that pedagogy is seen as an irrelevant issue. The technology investment is totally sufficient in itself. When the technological infrastructure is in place effective learning will be an automatic effect. If the absence of pedagogical concerns in the documents is incidental, then there is insufficient competence among the policy writers of the field of learning and pedagogy.

For an organisation having the ambition to become strong on e-learning these are important issues to clarify. According to a majority of interviewees and to theory it may be highly counterproductive if the application of ICT for learning purposes is not balanced to the character of the organisation (e.g. type of staff) and to pedagogy. At both BI and Telenor there is presently a kind of organisational schizophrenia – a split in expressed understanding of pedagogical conditions for ICT based learning (cf. Section 8.3, the LRC as meeting place between institution and corporation).

11.7 Meeting places for e-learning partnerships of university and corporation

The third question for this study to answer was: To which extent has *a functional e-Learning Meeting Place* for learning partnerships between university and corporation been established? The literature is scarce on information about this issue, and in the empirical case of this study, BI, the idea of “learning resource centre” that could be such a meeting place is just in its embryo. The findings from UK by Thune and Welle-Strand (2000) of universities developing LRC’s show however that efforts are taken to reorganise existing resources in order to create an e-learning meeting place. Such a structure could naturally act as an e-learning meeting place between university and corporation. It will be the task of future studies to investigate if the LRC’s are developing in that direction.

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12. Conclusions and Recommendations

12.1 Conclusion

The literature review and the empirical pilot have confirmed that the ICT-revolution has had a dramatic effect on universities' and corporations' policy ambitions and implementation of ICT expected to facilitate learning, and to improve value creation. However, it is not found convincingly empirically underpinned that most ICT investments for learning purposes are cost-effective. In policy documents, as well as in practical implementation, there is found a lack of overall and consistent strategies for the use of ICT based learning. And, the study has found an organisational divide between policy writers and staff in terms of seeing pedagogical understanding as a precondition for successful implementation of policies. Such understanding is practically absent in the policy documents, while strongly expected by staff. From the staff's point of view, both at BI and Telenor, the top management ought to show more concern for a rational use of ICT based learning in terms of how it is organised in relation to staff's needs and motivation. E-learning meeting places between universities and corporations have not yet been developed.

Additionally, a pedagogically sound solution needs to focus on how people actually learn and how to best facilitate for different modes of learning. This also touches on the need to balance individual and corporate needs and goals. Such considerations ought to be reflected in an articulated corporate learning strategy endorsed by the top management and implemented in such a manner that both time and space are created to facilitate for learning.

There are many challenges for corporations embarking on e-learning. Certain issues are of particular interest for research. Though there is a lot of information on e-learning solutions, knowledge of the actual use is still limited. If e-learning solutions are to improve, one would need more than information on what types of technology are used; one would need to know *how* they are used. Moreover, knowledge of the effects of e-learning is still limited, especially long-term effects. The effects on value creation is of particular importance. Research on motivation and learning styles/orientation with regards to e-learning is another interesting topic, as e-learning most often is a solitary endeavour. On the organisational side, research into management of e-learning and impact of effective management is limited, if existing at all.

This pilot study has made it obvious that more research is needed in order to better understand how ICT based learning can become more cost-effective and efficient within universities and corporations. A particular focus of such research ought to be rationales of learning organising and the administration's competence in applying such rationales. The assumption is that such competence would significantly increase value creation.

12.2 Recommendations

The findings of and conclusions have given direction, motivation and new ideas for a follow-up comprehensive research project, including several universities and corporations in three countries.

The purpose of a new extensive project would be, firstly, to get a more profound understanding of the preconditions for successful ICT based learning in universities and corporations. A second purpose would be to implement practical "experiments" with ICT based learning "on demand" and "just in time" in order to see which strategies actually are cost effective and efficient for the particular company or university.

The "empirical objects" would be a sample of larger Norwegian corporations and universities, and a sample of one university and one corporation in France and US (e.g. INSEAD and France Telecom, and Stanford University and Pacific Bell)

The organisation of the follow-up project would be based on mutual interests by researchers, universities, corporations and the Research Council of Norway. Hence, the financing of it ought to be shared between corporations, universities and the Research Council. The interests of the corporations would be to develop strategies for more efficient in service training and organisational learning. For the universities the interests would lie in the possibility of increasing their teaching's quality, relevance and competitiveness, as well as of developing e-learning meeting places for partnerships with corporations. New knowledge on ICT and learning fitting in with the existing programmes of the Research Council would motivate this agency.

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Annex 1: Interview Guide

Questions for semi-structured interviews of staff at BI and Telenor

BI

1. How do you see BI currently applying ICT in its teaching/learning strategies?
2. What do you think are BI's future policy aims for ICT-based learning?
3. What do you think would be effects from investing in ICT-based in-service training, in terms of a) quality of learning (process and end products/competence achievements) – and b) cost-effectiveness?
4. What do you foresee as problems/challenges when implementing ICT-based in-service training on a broad scale?
5. What do you regard as the areas in which BI can/should seek improvement to ensure a broad scale of learning/teaching activities?
6. How is the balance between pedagogical and technical considerations exposed in BI's ICT-based learning/teaching policies and practices?
7. How do you think BI could apply ICT in co-operation with Telenor on the company's in-service training?

Telenor

- 1 How do you see Telenor currently applying ICT in its in-service training?
- 2 What do you think are Telenor's future policy aims for ICT-based in-service training?
- 3 What do you think would be effects from investing in ICT-based in-service training, in terms of a) quality of learning (process and end products/competence achievements) – and b) cost-effectiveness?
- 4 What do you foresee as problems/challenges when implementing ICT-based in-service training on a broad scale?
- 5 What do you regard as the areas in which Telenor can/should seek improvement to ensure a broad scale of ICT-based learning in its in-service training?
- 6 How is the balance between pedagogical and technical considerations exposed in Telenor's ICT-based in-service training policies and practices?
- 7 How do you think ICT could be applied in co-operation with BI on Telenor's in-service training?

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