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Transforming University Practice Through ICT – Integrated Perspectives on Organizational, Technological, and Pedagogical Change

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ABSTRACT

The article focuses on the use of information and communication technology (ICT) for strengthening and transforming university practice in line with the social and technological conditions of the new ideas for *interactive* universities. The purpose is to use ICT as a change-agent in order to establish new practices – new pedagogical methods, new methods for collaboration and new forms of interplay between physical and virtual learning environments.

The article is based on an ongoing case in which both the authors have been engaged: the IT Innovation project (ITI) and E-learning Lab North Jutland (ELL) at Aalborg University in Denmark. The article presents the different initiatives and strategies for innovation of the university and subsequently discusses the work in the perspective of organizational learning and planning theory.

INTRODUCTION

The role of universities is changing in the new millennium as a result of at least two conditions: (1) In the era of the ‘knowledge society’, universities will obtain a key role in the development of the society and the region. Universities will become proactive actors in the development of the knowledge economy. A new label for this sort of universities is emerging: “interactive universities”, which stresses the active interplay between universities, the private sector and the public institutions with respect to research, education and lifelong learning

(Bangskjaer, 2001).¹ Universities are obliged to conduct basic research independently of specific interests. However, there is a growing accept of the need for strong interaction between the knowledge produced at universities and the practices and experiences of the private and the public sector. Especially, in societies like the Danish with primarily small and medium sized companies who do not have adequate resources for research or education of employees, the public universities have to play an active role in the development of research-based knowledge, new methods, and education. (2) The other fundamental change is caused by information and communication technology (ICT). ICT in itself plays a special role in the development of the "knowledge society", because ICT accelerates the speed of the knowledge production processes and the use of knowledge (% OECD res. Lundvall, 2001). In addition, ICT transgresses the barriers of time and space. This may lead to an increasing competition between institutions on one hand and, on the other hand, offers new ways of collaboration and networking within research, and new ways of organizing education and lifelong learning (Dirckinck-Holmfeld & Fibiger, 2002). As ICT is strongly embedded in knowledge production and in the organization of new educational and collaborative research, it is essential for universities to take up the challenge of ICT and to integrate ICT in their basic activities such as research, educational programs, lifelong learning, and other related activities.

This article addresses the problem of how to develop and innovate the university to integrate ICT in all its activities: education, research, administration and services. The point of departure is that this is not a trivial technical question. On the contrary, it is a systemic question, which integrates organizational, technical and pedagogical issues. In order to address the problem, we have to discuss the main purpose of ICT development. Is it a tool for the support of existing work processes and/or is it a phenomenon of radical significance, which can be used as an opportunity (and change-agent) to rethink the practice of the university? Further more, we have to ask the question of what kind of

¹The label "interactive universities" is coming from management literature: Bangskjaer, B. (2001). *Interaktive universiteter er markedsorienterede universiteter. Universiteter for fremtiden - Universiteterne og videnssamfundet*. P. o. J. Maskell, H.S. Frederiksberg C, Samfundslitteratur. Hornum, K. (2001). *Interaktive universiteter - i tæt samspil med erhvervslivet. Universiteter for fremtiden - Universiteterne og videnssamfundet*. P. o. J. Maskell, H.S. Frederiksberg, Samfundslitteratur.

We have adopted this notion because it expresses a new role for the university as *the interactive place* for knowledge production and dissemination.

organization is the university? Which means exist within the organization in order to assist innovation? How is the expression and development of the different milieus and cultures in the organization ensured? How are the actions and strategies aligned, in order to avoid making the same mistakes again and again? Finally which competencies are needed in the organization in order to support the development?

In the book: *Gør IT en forskel i undervisningen?* ("Does IT make a difference within education?") by Gunnar Eggert Jørgensen and Poul-Erik Banff (2001; the authors pp. 15–16) present a sort of taxonomy for the complex transformation of IT and education.² They summarize the discussion about IT and education in four different and yet mutually related argumentations, which show a step-wise extension of the perspective of the integration of IT within education. The four steps are the following:

1. Transformation of single disciplines, the content, pedagogy and didactics with the objective of developing new methods for learning through IT (the didactic level).
2. Transformation of the access to education through the development of flexible IT-based educational reforms within the perspective of lifelong learning (the level of flexible and distributed methods for teaching and learning).
3. Transformation of educational institutions through the integration of IT in all activities on all levels with the perspective of ensuring that IT-qualifications are integrated within all activities as a prerequisite for the job of the future (the level of IT-related institutional development and transformation).
4. Development and transformation of the educational institutions through continuous development of the organizational readiness for coping with innovation and transformation processes (the level of the organizational learning).

The authors point to the fact that individual teachers and fiery souls have run many initiatives on ICT and education so far, which has been a necessary point

²In the book, the authors make a qualitative thematic analysis of the work on IT in Danish educational institutions. The analysis focuses on the question whether there is a relation between IT and the development of the pedagogy and the organization of the practice of teaching. The analysis takes its point of departure in several development projects, which have been funded by the Center for Technology and Education (CTU). (www.ctu.dk). Today CTU is an integrated part of Learning Lab Denmark (www.learninglabdenmark.dk).

of departure, however, in order to integrate ICT in all activities, the educational institutions as such have to go through a transformation.

The goal of this article is to discuss ICT as an agent for transformation of the university and as a mean for organizational learning in line with Jørgensen and Banff's Step 4. The article takes its point of departure in a case: the IT Innovation project at Aalborg University in Denmark (ITI) and the related E-Learning Lab (ELL). The paper begins with a presentation of the strategy and the initiatives made by ITI. Afterwards, two perspectives on institutional change will be presented, that is, communicative planning theory and organizational learning. The article will be concluded through a discussion of the experiences so far using the concepts of organizational learning and planning theory to reflect on our experiences. Both the authors are involved in the case. Annette Lorentsen as the director of ITI, and Lone Dirckinck-Holmfeld as the director of E-Learning Lab. The project is ongoing and has not yet been formally evaluated. The article presents our basic ideas for innovation, and how we have conducted the development work.

SETTING THE SCENE

Aalborg University is a relatively young university, founded in 1974. Today, it has more than 12,000 students at all academic levels from bachelor to Ph.D. Around 1990, Aalborg University initiated the systematic use of computer conferencing in open learning programs. At first, it was regarded as a peripheral activity. Today, there is an increasing understanding of the needs for the entire university to systematically integrate information and communication technology in all its activities. In the summer of 1998, the University Board therefore designed and approved the IT Innovation project (ITI) in order to stimulate and direct the integration of IT in all activities at Aalborg University. The project runs for 5 years and has from the beginning had a minimum budget around 2 million dollars.³ The organizational characteristic of Aalborg University is that of an "interactive university" – stressing collaboration with companies and public institutions.⁴ As mentioned

³In 2001 this was doubled through the project Virtual Learning and Learning environments (ViLL) and E-Learning Lab – North Jutland with funding coming from the regional project on the Digital North Denmark and from private companies and financial sponsors: IBM, Ericsson, Telia Telecom, Spar Nord Fonden, Aalborg Universitets Jubilæums Fond, and the educational institution EUC North.

⁴The notion "interactive university" is used by Klavs Hornum (2001) in a characteristic of

Aalborg University has had a rather long tradition for integrating ICT for lifelong learning starting in the middle of the 80s. At the moment, more than 15 master programs are based on web-based learning with seminars (www.auc.dk/aaben). The university is founded on the pedagogical concept of problem-oriented project pedagogy (POPP), which means that the educational processes are based on enquiry (problem orientation), collaboration and project work. The management structure is primarily bottom-up which means, that instead of hierarchy and division of labour, there is a considerable degree of autonomy where knowledge is created and, to a large extent, controlled by the knowledge producer himself/herself. This means that autonomy is the key principle of operation. The dominating organizational structure (especially within the arts and social science) is that individuals, not a group of individuals interacting with each other, create knowledge. The same autonomy may be found at the meta level in the organization. Departments and faculties operate relatively autonomously and the level of the presidency has in fact only few tools for direct actions. The strategy of ITI had to reflect these organizational conditions. ITI has therefore sought to combine a respect for the basic autonomous organizational principles and a wish for concerted action.

THE OBJECTIVE OF THE IT INNOVATION PROJECT

The IT Innovation project aims to support the integration of information and communication technology into the existing university culture in a broad sense, and to enhance the quality of the university.⁵ The overall strategic goals of ITI are:

- To ensure that the necessary preconditions – technical, pedagogical and communicative – are present for a qualitative application of information and communication technology in all the activities of the university.
- To make use of information and communication technology in the overall activities of the university, wherever it can provide a *qualitative* improvement.

⁵The section draws on the following policy papers: Lorentsen and Christensen (1998, February) With Information- and Communication Technology on the Road to the University of the 21st Century. Proposal from the Virtual University Working Group to the Aalborg University Senate, February 1998, and Lorentsen and Christensen (1998, June) With Information- and Communication Technology on the Road to the University of the 21st Century. Status Report from the ICT Project Group to the Aalborg University Senate, June 1998. More information can

- To encourage, disseminate and build up-to-date information and communication *competencies* at Aalborg University.
- To *open* the university internally as well as externally, in order to stimulate interdisciplinary interaction and mutual collaboration (*ibid*).

In order to reach these strategic goals, five areas of work were pointed at from the beginning:

- The basic infrastructure and the qualifications of the staff and students.
- The physical university & IT (ordinary educational programs).
- The open learning programs & IT.
- The openness and “transparency” of the university through IT.
- Research & IT.

And the project concentrated on the following activities:

- *General institutional efforts* which primarily focus on the infrastructure and qualification conditions.
- *Model projects*, which focus on areas of general significance or strategic importance to Aalborg University.
- *Project catalogue*, that is, general projects which produce knowledge about and experience with more limited problems.
- Seminars and workshops for the university staff and the partners of the university.
- Electronic forums for the exchange of inspiration and experience.
- Networks of IT-contact persons (students and staff) in study committees, departments and administrative units.
- Co-operation with innovative educational institutions regionally, nationally and internationally.
- Research on central issues concerning the adaptation of IT.

The organization of ITI was illustrated by the metaphor of a tree (Fig. 1). The *crown* of the tree contained the projects – the many and varying IT initiatives to be found scattered around the university. *The branches* were the experience-sharing groups, which maintain the connection between the projects, and ensure that they operate in a concerted fashion. *The trunk* consists of the ITI project group – the secretary, consultants and researchers who follow and provide perspectives to the effort of the enterprises and maintain communication between the crown of the tree and the roots. *The roots* represent the contact

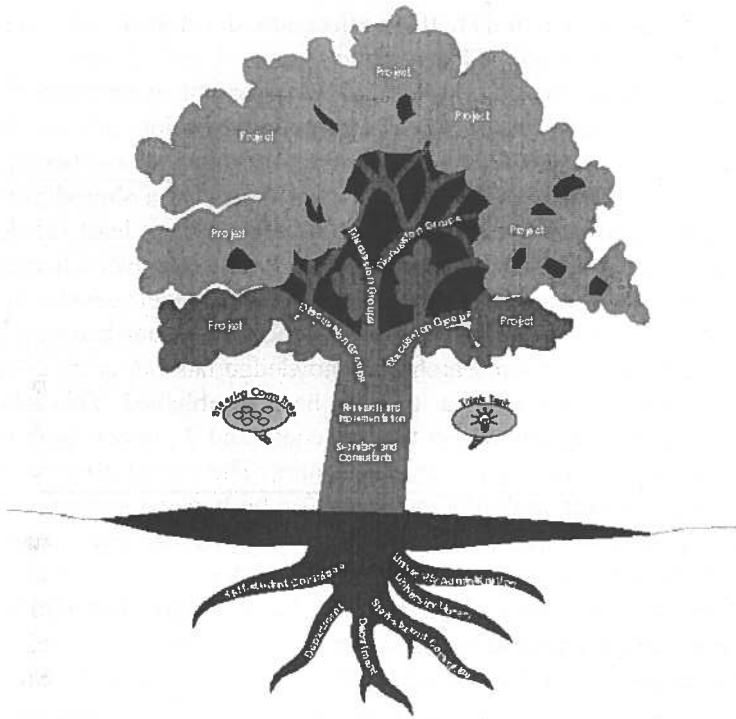


Fig. 1. The IT Innovation project.

persons of the staff-student study committees, departments and administrative units, which maintain contact with the fertile soil of the university. This ecological metaphor is complete when added a *steering committee* and a *think tank* – irreplaceable for the control, inspiration and new thinking – which serve to pollinate the blossoming projects so that they bear fruit. The IT Innovation project is a networked organization. The role of the project is primarily to function as “a catalyst” which stimulates the IT adaptation. Within specific areas, ITI makes overall strategies, which are implemented in the formal organization of the university. The condition for the project is to use or strengthen the existing organizational structures, sections and centres dealing with IT within the university. At present there are approximately 60 projects, among these about 15 model projects are affiliated. Monthly workshops and seminars are arranged, as well as more specific activities regarding competence development and the development of the technical infrastructure.

During the existence of ITI, the project has developed and adapted its strategy. In the first years, ITI very much stressed and supported the ICT-projects taking place locally and the dissemination of experiences between these projects. During the next years, the dissemination process between projects continued. However, more efforts and resources have been put into systematic actions by ITI such as the development of a shared portal and course catalogue for the entire university, and last but not least the development of a competence building strategy – the university driver's license – for all researchers and teachers at the university is under development. In addition, the research and development project on virtual learning (ViLL) and the establishment of a research and knowledge laboratory on e-learning: *E-Learning Lab NJ* (www.ell.auc.dk) has been established. This laboratory supports 11 model projects within the university and 2 projects with external partners on different aspects of virtual learning. The model projects serve as advanced experiments and provide basis for both development work and research. Furthermore, E-Learning Lab functions as a knowledge and resource centre for companies and institutions wanting to interact and relate to research and student work. E-Learning Lab and ViLL has a budget of 15 million DKK for a 3-year period financed by the companies involved in the lab and the governmental project on The Digital North Denmark (see Note 2). E-Learning Lab and ViLL supports especially the aspects of ITI dealing with the development of new methods of teaching and learning integrating ICT, the tailoring and development of ICT-applications and modules, tools, and methods for integrating ICT within specific programs.

The activities and the overall methods of ITI and E-learning Lab NJ, can be illustrated by the following model (Fig. 2, next page).

Starting in the first column of Figure 2 (creation and exchange of experience), the findings so far stress that there has been a strong interest among the participating partners at the university to exchange knowledge and experiences. It seems that very simple tools such as stimulation of projects and resources for continuous development and qualification of the virtual learning environment have been very important steps for the transition of the university. Especially, the model projects serve as an important reservoir for the creation of experiences. These experiences are analysed and reported in internationally reviewed conferences and magazines, but they are also exchanged within the organization through seminars and workshops.

The seminars and workshops have been a greater success than expected. People from different disciplines and faculties have enjoyed meeting with

Learning Tools	Creation and exchange of experience	Generalization of experience / discovering and creating order	Materialization of experience	Consequences Actions
Model projects General projects	Social experiments	Analysing Conceptual models Research	Articles Reports, Web-page	Implementing in the formal organization Study board, Dept., Service org., University board <ul style="list-style-type: none"> • Adjustment • Checklist • Development • Consultation • Policies • Courses
Seminars	Ad hoc/creative energy/exchange	Presentations/ Lectures	Reports, newsletter, Web-page	
Visitation rounds	Amplifying experiences	Conceptual models	Manuals Research questions Development work	
Demonstration	Experience concretization	Conceptual models	Prototype/ Demonstrator	
Policy making	Expression of interests	Agreement	Action plans	

Fig. 2. The organizational learning model for the IT Innovation project.

each other, picking up experiences from each other. A very positive aspect of sharing experiences has been that experiences gained in one environment have been implemented at a generic level in other local environments. Simple examples of such an exchange of experiences have been the role and the different use of physical seminars in virtual study programs; integrating virtual study tours; the use of chat and synchronous communication; how to support virtual project work. Added to that come the networking function cross-faculty borders which may play an important and long-sighted perspective for the development of the university.

The seminars and workshops are open to all staff (and students) at the university. Guests – from other institutions and companies – are welcome to participate against a small fee. Many guests have participated in the activities of ITI, which has contributed to the opening of the university to the region and to new types of users.

Figure 3 exhibits the relation between the projects, the ITI project group and E-Learning Lab NJ. The figure illustrates the idea that the projects develop knowledge and communicate the ideas and creative energies to each other and to the organization “through small steps”. The ITI project group provides direction and “creates order” to the experiments and to the goals and assist the

The ITI Project group offers "direction" for changes

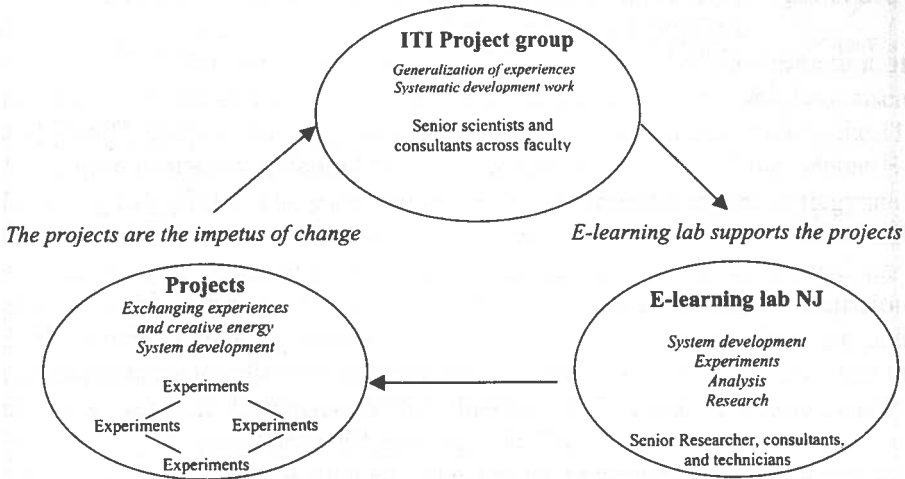


Fig. 3. Relations between projects, ITI, and E-learning lab NJ.

dissemination and implementation of the gained knowledge into the organization. E-learning Lab NJ assists and interacts with the projects and works on the more general development and research questions.

EXPLAINING THE STRATEGY FOR TECHNOLOGICAL AND ORGANIZATIONAL CHANGE

The project departs from a view of organizational learning as a transfer process of knowledge. Instead, learning is viewed as a social construction and negotiation process mediated by artefacts and humans (Wenger, 1998). This view implies that we cannot program technological and organizational change. Instead, we have to view technological and organizational change from a social learning point of view. The point of departure is the university as a loosely coupled institution where decisions are made on all levels in the organization (in contrast to a bureaucratic organization). There is no single unifying goal for the university and when it comes to information and communication technology, the use and – especially our knowledge of future technological applications and possibilities are not at all comprehensive. Our thesis is therefore *that it is not possible or desirable to program organizational and technological change. These changes have to grow slowly and become an*

interactive process between initiators and users, based on experiments and dialogues.

The problem of implementing IT in an organization is discussed in more general terms within the literature on organizational planning. In the article *Coping with Uncertainty in Planning*, Christensen (1985) presents an interesting matrix, which helps to prepare the premises for planning and organizational development, and helps to develop methods, which correspond with these premises. The matrix is divided into two dimensions. The vertical dimension refers to *technology, know-how or means*. The horizontal dimension refers to *purpose, goal and desired result*. Each dimension is divided with relation to the phenomenon of *security/insecurity*. A technology may thus be *known* or *unknown*, that is, it has been tested or not, and you know/do not know the short-term or long-term effects and consequences of the technology. With respect to the *goal*, there are also two possibilities. There may be *agreement* or *disagreement* in terms of the goal. Does the top management determine the goal or is it to be negotiated within the organization, between the participants? Do the participants share the goal? Do they share worldviews with respect to the goal? Christensen makes the reservation that the real world is not as simplistic and dualistic as the analytic model. Often, the lines, which separate the means from the goals, are not clear and distinct. The goal is influenced by the technology, just as the consequences of the technology on social systems are rarely entirely known. Yet, despite of these epistemological and practical preconditions, we find it useful to present a model, which promotes awareness of the planning conditions which we are dealing with.

On the basis of the model, the following problem fields can be detected:

- A. Planning for known technology and agreement on goals.
- B. Planning for unknown technology and agreement on goals.
- C. Planning for known technology and disagreement on goals.
- D. Planning for unknown technology and disagreement on goals.

THE MODEL APPLIED TO PLANNING CONDITIONS FOR ITI

The model is a practical guide for discussion of where we have secure/insecure knowledge about the technology. And do we agree/disagree on the objectives and the goal. When Aalborg University started its IT Innovation

project, we were aware that due to different interests and pedagogical traditions across faculties, it would be difficult to programme changes. We regarded the objectives as something that we should negotiate – and also as something which would develop because of the potentials within the technology. The technology, on the other hand is in terms of consequences and potentials of teaching, learning and research rather “uncertain” as many of the applications are merely experiments in research labs. Therefore, Aalborg University stressed learning by “small steps and experiments” and the “small steps” as means – to negotiate and inspire each other on the objectives as well as to establish “order in chaos”.

Today, we have – at least within certain areas – more secure knowledge about the technology, and seen from that point of view we could program technological and organizational changes. However, the implementation strategy still has to respect, that in order for the participants to learn, we cannot just transfer or program the experiences and knowledge. In line with the understanding of learning as a social construction process and experiential learning, the participants have to be able to negotiate and discuss their experiences. Therefore, an important task for ITI and E-Learning Lab NJ have been to support experiments and establish forays in order for the participants to learn from each other and to negotiate their findings.

On the basis of the work of Christensen, the conclusion has been that the matrix can be used to clarify “where we are” and to choose the proper tools, which correspond to this condition. As such, the model may be used as an organizational “tool” for reflection.

The overall lessons we have learned with respect to ICT and universities are that objectives as well as our knowledge on the technology are uncertain. The overall methods to use are therefore – at least in the beginning – “small experiments” as a means to get “order out of chaos” (B & D). When knowledge about the technology get more secure, we can make more systematic implementations, however, we have to take into account that the participants – the teachers and students – have to experience the benefits of the technology and the new ways of learning and working.

ORGANIZATIONAL LEARNING AND IT-INNOVATION

In order to understand the conditions for an organization dealing with “small experiments” and “chaos”, it may be relevant to expand Christensen’s matrix

on planning conditions with input from theories about organizational learning. There are several theories on organizational learning. In the following section, we will draw on experiential learning, which is in line with the ideas described in Christensen (1985). The experiential learning model is originally developed by Kolb (1984) in order to understand human learning on the individual level. Dixon (1994) has later taken up this model as the basis for understanding organizational change.⁶ The experiential learning model builds on the following four structural dimensions (Kolb, 1984):

- E. concrete experiences
- F. reflective observation
- G. conceptualization and integration
- H. active experimentation

The learning model is dynamic and circular – the four dimensions interact. The construction of meaning takes place dialectically between reflection and experimentation, apprehension and comprehension. It is important that all the activities are supported in the learning cycle. If the organization only makes experiments but never manages to reflect on and conceptualize the knowledge, the organizational development will be ad hoc and random. However, if development is only based on detached reflections or conceptualization, the knowledge base will be too simplistic and abstract due to the lack of integrated tacit and experiential knowledge.

In Kolb's learning model, the individual engages in concrete experiences; at the collective level, it is necessary that all participants or projects are learning. However, for the organization to develop, the big question is: How do we integrate learning experiences so that the organization does not simply repeat the same learning experiments again and again, but rather builds upon previous experiences? The organization also has to move through the experiential learning circle. It is not sufficient only to make experiments and generate experiences. The experiences have to be collected, analysed,

⁶The most prominent difference between human learning and organizational learning is the complexity. According to Nancy Dixon (1994), organizational learning principally contains similar elements in the learning process (cf. the learning model). However, organizational learning is far more complex than personal learning. The organizational learning process implies that the organization must reach a collective interpretation of the experiences and a reorganization of the cognitive and cultural framework of the organization to such an extent that common action is possible.

reflected on, generalized, integrated and used to raise new questions and new experiments and research. In the organization model for technological and organizational change, the ITI project group and E-Learning Lab NJ are responsible for generalizing the organizational knowledge.

DISCUSSING THE ORGANIZATIONAL LEARNING EXPERIENCES SO FAR

In the following, we will discuss the organizational learning experiences with point of departure in Figures 2 and 3. We will begin with the first column of Figure 2: creation and exchange of experiences.

Model Projects and General Projects

Model projects are a sort of demonstration projects for new teaching and research methods, which receive consultative services from ITI and E-learning lab. General projects cover small or big experiments within the university practice, within research, teaching and administration, wanting to link to ITI, however, without specific help.⁷

The ideal for ITI is in line with the experiential learning circle and Christensen's matrix on planning conditions to establish a solid interactive platform between the projects, the ITI project group and E-Learning Lab NJ (Fig. 4). The idea is to establish an organization where the projects are subject to the transition process, and the ITI project group and E-Learning Lab assist this process – through contribution of experiences from other projects, as well as theories and methods from the academic area. However, because of lack of resources to help each of the projects, it is difficult to establish this interaction between all. So, when taking Christensen's advice on projects and experiments seriously, the lesson to be learned is that it requires enormous resources to assist experimenting projects. Because of the ViLL-project and E-Learning Lab NJ we have now received more resources, however, which has made it possible to help the model projects according to our ideals.

The idea of supporting the projects and experiments are generally speaking a sound and sustainable strategy. As pointed out by Christensen, this strategy makes it possible to gain specific experiences in the different milieus suitable

⁷We would of course like to help all projects with consultancy help, however due to limited resources, we have prioritised explicitly to help the model projects.

		Goal	
		Agreement	Disagreement
Technology	Known	A) Programming – Predictability – Standardization	C) Bargaining – Uniting different preferences
	Unknown	B) Experimentation – Innovation	D) Chaos – Discovering and creating order

Fig. 4. Prototype conditions and responses to planning problems (cf. Christensen, 1985, p. 66).

for their specific needs and ideas – in other words it helps to establish an *evolutionary* development. It also makes many people and stakeholders take active part in the IT transition, which is important for the enthusiasm put into the development process and for the development of ideas and experiences. However, the strategy also contains some severe risks. The projects concentrate on their own business. In that sense, they may have too little time to prioritize shared issues. There may also be a tendency to focus on shortsighted experiments due to the fact that the projects want to implement the findings immediately in their daily practice.

Through the ViLL-project and E-Learning Lab NJ, we have the possibilities of strengthening the model projects with specific consultative assistance for each project. We try to minimize the risks, for example, using the consultants and the senior researchers to tie the model projects together and to support research in relation to the model projects. Added to that, ITI more systematically contributes with some overall initiatives to support the transition process, such as the development of a shared portal for the whole university and a shared course catalogue in order to make the university more transparent, and a shared competence strategy. (These elements will be further developed during visitation rounds). ViLL and E-Learning Lab help in the process of rethinking the pedagogical approach of problem-oriented project pedagogy in the perspectives of ICT based on the work and the experiences in the different model projects.

Seminars and Workshops

There has been a substantial interest among the participating partners at the university to exchange knowledge and experiences. The 3- to 4-yearly

seminars have been visited by 60–120 participants each time. The workshops have had approximately 25 participants. It seems that these activities have helped the shared construction of knowledge and ideas, and developed collaboration across traditional barriers between different study programs and departments. Furthermore these seminars help the direct implementation work. The participants obtain new ideas from listening to each other, for example, how to implement a study tour within distance learning, how to make process oriented evaluation in the virtual learning environment, how to use synchronous communication tools in project work, how to develop shared portfolios, how to make the department paperless. Because these experiences are shared on the grass-root level they are subsequently integrated in many new specific local environments. Besides, the shared activities help building bridges between the different groups – academics, technical and administrative personnel as well as crossing boundaries across faculties. As such, seminars and workshops help in the process of spreading and sharing experiences, at the same time as they serve to generalize and to reificate the experiences.

Visitation Rounds – Interviews

The projects do not necessarily cover all the interests and experiences in the organization. In order for ITI to systematically take up new overall initiatives, we have been visiting the departments, the study boards and the administrative units. This has been a fruitful method for gaining insight in the shortsighted as well as more longsighted problems of the different milieus, at the same time as it makes it possible to let the more overall strategies and initiatives mirror the experiences and specific conditions of the milieus. However, it also helps to make the activities of ITI more visible to all milieus, which supports the overall legitimation of the project.

Demonstrations

However, we have also experienced that it may be difficult to understand each other due to different worldviews (cf. the work on different forms of knowledge in Nonaka and Takeuchi, 1995), therefore, in order to overcome this, an important tool throughout the process has been to make demonstrations and to use a variety of communicative codes. Our experiences so far have been, that demonstration projects give the participating partners a sort of “shared language” across disciplines. Demonstrations make the problems to be dealt with more specific, as well as it gives the participants a taste of what is technologically possible.

Policy Papers

In order for the formal organization to change and develop, the experiences in the projects have to be generalized and written as policy papers. ITI helps in that process. Faculty members of ITI actively participate in boards and advising committees for the development of the university. However, it is a rather slow and complex process to get all the different boards and levels in the university to agree upon the strategies and transition processes.

Conceptualization

Another essential aspect of organizational change is to be able to accumulate experiences and conceptualize these experiences in order to assist the projects to “create order out of chaos” (Column 2) and also to avoid making the same mistakes again and again. In order to do so, ITI has been able to allocate some financial resources to associate senior scientists and faculty members, who have experiences within the area regarding both implementation and research. And through the ViLL project and E-Learning Lab NJ, where the local bank, “Spar Nord Fonden” has financed a research professorship, we have got resources in order to make a research based innovation process. Having the ITI project anchored through senior researchers and faculty members, furthermore, helps the project to obtain the necessary political strength and legitimacy in order to integrate the findings in the formal part of the organization.

The third column concerns the materialization of experiences. There are several tools, which enhance this process: reports, articles, notes, handbooks, prototypes, templates, policy papers, and so forth. One important tool, which we are currently exploring is how to use the web as a shared organizational tool for materializing experiences. In principle, the web can be accessed from everywhere in the world, just as information may be added from everywhere. It may indeed help a distributed organization (such as the university) to have easy access to the materialized experiences. However, we have also realized that in order for projects to learn from the experiences of others, it is not sufficient to have access to shared information and prototypes. In the adaptation of the experiences of other projects, it helps when this are supported by formal and informal dialogue foray and when the human consultants help in the specific process of tailoring the experiences.

The very last column (Column 4) is that of implementing the experiences into the formal organization. The IT Innovation project gains and accumulates experiences and knowledge regarding IT, administration, learning and research. However, if this knowledge does not become integrated in the formal

organization, the organizational learning circle will not succeed and many resources will in fact be wasted. In order to deal with this problem area, ITI works with different tools – check-lists, strategies for building up competencies, IT-ambassadors in study and research boards (department committees), bringing relevant key-actors and boards in the organization together.

SUMMING UP

In a loose-coupled organization as the university, we cannot force or program IT organizational change. The knowledge of the area is too uncertain and changing dynamically, and the goals too richly faceted. If we program the development, we risk a restriction of the creative energy of the participants, the teaching, and the research and risk to formulate limited short-term solutions. However, if IT is implemented anarchistically in the organization, many experiences will be lost and the solutions will not be grounded in the accumulated experiences of the organization. Therefore, in order for the organization to act effectively, we have to formulate some shared policies and implementation strategies, however, these policies have to be grounded in the experiences and the visions of all participants. In order to satisfy these contradictory demands, the ITI organizational learning strategy has been “a bottom-up model with top-down initiatives”.⁸ The model has taken its point of departure in the experiences gained at grass root level in the organization. In order to accumulate the knowledge in the organization so that the organization avoids making the same mistakes again and again, the activities have to be co-ordinated and to be given direction in an interactive process between projects, the formal organization (study boards, departments, and service units) and the ITI project-group. The IT Innovation project has chosen a network-based organizational learning model. The project seeks to manage a series of paradoxes and contradictions: To gain a clear view and a sense of direction and still be capable of opportunistic grouping and experimentation based on the projects. To have a core ideology, but also to be open for vigorous

⁸Ole Prehn, Dean of the Faculty of Humanities, Aalborg University introduced this label: “a bottom-up model with top-down initiatives” for ITI in the opening ceremony of the centre. Nonaka and Takeuchi (1995) use the term: “Middle-up-down Management”, which somehow covers the same. It is, however our impression that the top management level plays a more active role in the middle-up-down management strategy, than in ITI’s strategy. This may be an important issue to reflect upon in succeeding work – how to strengthen the top management level in the work of ITI?

change and movements. The ITI network seeks to organize and to learn, to innovate and to develop the core values of the university, while still organizing for efficiency and collaboration.

The "bottom-up" strategy focussing on "small steps", projects, experiences, seminars and workshops for the first couple of years has been a sustainable strategy, which has established an awareness in the entire organization of the need for change and also some direction for the change. However, maybe now, it is time to rethink the innovation strategy. Do we have insights and share goals and visions that make it possible to take a more top-down approach and in a way program the innovation (cf. The field of programming in the matrix of Christensen)? And do we have to rethink the "bottom-up-top-down" process, and in line with the experiences from Nonaka and Takeuchi (1995) ask how we can explicitly strengthen the top-level in the organization's engagement in the transformation and innovation process? ITI has been focussing very much on the grass-root level in the organization with great success, however, maybe it is time to focus on the management top-level in the next period!

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