

Networks and Nodes

The Practices of Local Learning Centres

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To Tina

Acknowledgements

I remember as a young child standing in front of a candy machine. All of us boys were gazing with desire at the delicious chewing gum displayed in the glass jar. It came in beautiful colours (red was my favourite) and we simply knew that they would taste fantastic. I see myself feeding the machine with my last coin, quickly turning the switch and then waiting impatiently. The next moment we all fell silent. The coin was jammed. No matter how hard we tried to release the switch, the desirable chewing gum stayed put. If I close my eyes I can still remember that episode with a smile. The situation with the machine was as much a fight to a small boy as it has been to write this thesis many years later. The context and the problems vary between the two situations, but the experiences are rather similar; excitement taking on a thrilling and challenging project as well as a sense of frustration when progress is jammed. I never got the chewing gum, but I would say the coin has finally been released and the struggle has come to an end.

This thesis grows out of the support of colleagues and friends. I would like in particular to thank my supervisors Madeleine Abrandt Dahlgren and Stefan Larsson. I am most grateful to both of you. Some people have inspired me, reading drafts and offering comments. Martin Lundberg, thank you for being part of my journey from the start. I have made some good friends from the department of Sociology. Thank you for standing by me John Boman and for all good meals Christer Johansson. Thank you for your patience Bo Davidson and Maude Tillfeldt. I will always remember my time in the research school 'Adult Learning' at Linköping University. In particular Andreas Fejes and Anita Nordström made a strong impression on me. I have also spent time working in different European projects during my period as a postgraduate student. Thank you for a good time Stellan Boozon, Kennet Lindquist and Lars-Owe Dahlgren. I would also like to thank Alison Lee, Song Ee Ahn and Alexander de Courcy for brilliant feedback on my manuscripts. Lena has been a source of inspiration. Thank you for believing in me. I also want to thank my family Pelle, Vera, Lasse, Susanne, Inger and Tommy. Finally, I would like to thank Lars Ahlvar who taught me the joy of motorcycling. I am looking forward to next summer. If we are lucky we might come across a chewing gum machine. This time I won't take no for an answer.

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1. Introduction

This thesis aims to investigate the practice of local learning centres in Sweden. Adult education has been subjected to sweeping changes in recent decades. One reform is the Adult Education Initiative that started in 1997 and lasted until 2002. The reform aimed to raise the level of education and reduce educational divisions (Lumsden Wass 2004). The Swedish adult education policy has focused on economic growth strategies in order to limit the effects of unemployment (Thång and Wårwik 2000). Subsequent reforms aimed to develop an infrastructure of adult education. Investments in information and communication technologies, teaching aids and learning environments were made (Hattinger, Hellsten and Lundh Snis 2007) to enhance access to education and expand opportunities for distance education (Government bill 2000/01:72). Improvements in collaboration between educational organisations and authorities connected to adult education in a wider perspective have also been prioritised in order to enhance flexible and lifelong learning (Agency for Education 2000). In the wake of governmental initiatives, subsidies from the European Union and municipal initiatives, local learning centres have been established.

The concept of local learning centres (LLC) is known all over Europe. The development of LLC is underpinned by the Lisbon goals 2010 for adult education regarding growth, employment and increasing investments in human capital through more effective education and skills (Commission 2002). In Sweden, the number of centres has gradually increased since the mid-1990s. In 2001, approximately 45,000 individuals were engaged in studies at 225 local learning centres and in 2004 almost 90 percent of the municipalities in Sweden had established some kind of learning centre (National Rural Development Agency 2002). The development process has generally been guided by the concepts of lifelong and adult learning taking on work-related training, personal development and active citizenship as social inclusion (Buiskool *et al* 2005).

The local learning centres are presented as learning environments and centres of competency. The LLC organisation provides adult education at different levels in a local context. Access to local learning centres is said to increase the distribution of university education and encourage further education among students (National Rural Development Agency 2002). The local learning centre organisation strives to reach new target groups such as people with lower levels of initial training, the unemployed, immigrants and illiterate people. Specific sub groups are defined as adults who drop out of education, the elderly and women (Buiskool *et al* 2005).

The local learning centres have contributed to a flexible learning situation and brought distance education further into the process of regional development. Hellsten and Roos (2002) claim that the local learning centre has created new opportunities for education by means of information and communication technologies such as videoconferencing. It has been argued that the expansion of flexible learning strategies and advances in information and communication technologies have altered the conditions for teaching and created new learning environments (Garrison 2000; Edwards and Usher 2003). It has also been said that information and communication technologies are components that impact practice (Bijker, Hughes & Pinch 1987; Lee 2009) and learning by changing relations in space and time. Geographical proximity and access to local learning centres have been seen as important factors for engaging in studies in the first place (National Rural Development Agency 2002). It has also been argued that distance education at local learning centres offers opportunities for combining studies with work and family life. Local learning centres seem to make people remain in the municipalities and broadening recruiting by attracting new groups of students with no previous academic family background (ibid.).

Policy documents state that the local learning centres should function as hubs in the economy bringing prosperity to the municipalities (NUTEK 2000). Gisby and Karlen (2005) argue that local learning centres have emerged as a method for promoting local growth and development. The societal transition from an industrial to a learning society will require new structures for handling information and knowledge. Here, collaboration between municipalities has been depicted as a key issue when it comes to disseminating knowledge and experience. Cooperating in different network constellations has been proposed as one possible way of co-ordinating the activities of the municipalities. Networks of co-ordination would, for instance, profit from co-operation which can facilitate a better basis for negotiations with university colleges and other actors connected to adult education (National Rural Development Agency, 2002).

Although a large number of studies have been conducted in the field of adult education, the local learning centre organisation has not attracted as much interest from researchers. In a Swedish context, only a few studies focusing on the activities of the LLC organisation have been conducted. In these studies, scholars have investigated the practice, mainly from the perspective of the students, and focused on the social backgrounds and motives of students attending local learning centres (Roos 2002), the future plans of students (Roos, Brevner and Bäcklin 1999) and students' experiences of distance education provided by the local learning centres (Roos, Engström and Bäcklin 1999). Additional objects of study found in earlier research concern the development of local learning centres as 'network project organisations'

(Jakobsson 2007), and social networks emerged in distance education provided by the local learning centres (Svensson 2002). Networks of knowledge have been investigated by Holzhausen (1993, 1995), who stresses the development of collaboration in order to exchange experiences and knowledge between small businesses.

In conclusion, the establishment of local learning centres in Sweden comprise some main research areas. Municipal and regional development is one topic where growth and employment are regarded as being important. Successful development seems to be dependent on co-operation between a large number of actors connected to adult education. The development process is supported by the concepts of lifelong and flexible learning taking on the idea of distance education as a key concept. Further, research covers the life situation of students engaged in studies at the local learning centres. Finally, the research field in the context of local learning centres involves the constitution and emergence of networks for co-ordination and collaboration in different settings.

This thesis focuses on the practice of local learning centres in Sweden. The actor-network metaphor has been used as a perspective to capture the relations between the local learning centre and the multi-nuanced context of the LLC organisation. The practice of local learning centres exists as complex systems outside the actual organisation. The thesis describes the complexity of network settings that have different forms and exteriors and analyses the attempts of the network constructors to establish relations and links to surrounding actors. It can be argued that spatial relations have become increasingly important when it comes to understanding teaching and learning practices. Edwards and Usher (2003) note how technologies such as timetables impact the movements of people in space and time and how different material spaces such as classrooms support certain forms of interaction.

The concept of adult education is full of spatial metaphors. Fenwick (2010) argues that the notion of learning has to be apprehended as a multiple object with many meanings. The name local learning centre is itself a spatial metaphor taking on the idea of 'local' as a geographical place. The local learning centres are also material objects situated physically in the municipalities. The local learning centres are even material constructions designed for learning and teaching practices, gatherings and meetings. The material aspects of the local learning centre are contrasted by abstract conceptions such as distance education and flexible learning. Educational policy appears in the practice promoting flexibility, growth and development, which are concepts taking on logics from different settings and dependent on the context in which they appear. Massey (2005) argues that space is literally made through interactions and Nesper (1994) states that educational organisations are produced in social practices. The notion of local learning centres as well

as all other practices is continually produced by interconnecting relationships (McGregor 2003). The metaphor of networks may work as a perspective in order to analyse complex interrelations that shape the practice. In the thesis, the idea of actor-networks is used since that humans and materiality co-produce a certain articulation in space in time we denote as local learning centres. The metaphor of network is also used to investigate the socio-technical environment of videoconferencing. Similar to the study by Svensson (2002), the thesis scrutinises mediated communication in different group settings. However, the practice of videoconferencing is construed as a 'learning space' taking on both material objects as well as humans as actors. The idea is that the interplay between different types of actors produces a space in which the material environment and technical equipment play a significant role in learning. Using the perspective of actor-network theory may provide a different perspective on the practice of the local learning centre organisation.

The disposition of the Thesis

In the following section, the local learning organisation will be further elaborated. I will present the debate and the main topics connected to the practice of local learning centres. The section thus provides a contextual frame for the first and second studies. In the following section, I will account for research conducted in the context of videoconferencing. Chapter two consists of a presentation of the theoretical perspectives used in the thesis, which are actor-network theory and space. The research project is outlined in chapter three where the aim of the thesis is defined and the research questions applied in the four studies are described. In this chapter I will also account for the different contexts and methods used. Chapter four describes the methods used and outlines the different categories of informants who have contributed to the studies. Chapter five contains a summary of the studies in the thesis. The final chapter discusses the studies and links the results, previous research and the theoretical framework to each other. The chapter ends with a discussion of the implications of the study.

In the Framework of Local Learning Centres

Buiskool *et al* (2005) identify a wide range of providers of adult education in Europe. The different settings of local learning centres range from public to non-governmental organisations with varying characteristics. Local learning centres across Europe are manifested in settings such as 'Open and Distance Learning Centres', 'Adult Education Learning Centres', 'further education colleges', 'folk high schools' and 'Vocational Training Centres'. Local learning centres also exist in the form of language, leisure, religious, counselling

and guidance centres. Buiskool *et al* (2005) argue that scholars and practitioners have not been able to formulate one explicit definition that covers all the different characteristics of the local learning centres in Europe. In the Nordic countries, the term ‘learning centre’ is commonly used. In Sweden, the local learning centres offer a wide range of courses from different educational providers. Education is offered both in traditional face-to-face settings and in the form of distance education. In general, courses are provided at different educational levels to attract different groups of people; citizens, business and public administration. The local learning centres offer undergraduate studies, municipal adult education, vocational training and in-service training for the business community. Further, the LLC organisation offers a learning environment similar to regular schools as regards classrooms, studies, library and canteens. The LLC organisation may also offer counselling and other professional services associated with educational organisations.

Broker, engine and meeting place

Grepperud and Thomsen (2001) define three roles of the local learning centres organisation based on their research in Norway. The LLC is a ‘broker’ of education and is situated between educational institutions and work. The authors see a number reasons for developing local learning centres in the region. First, educational arrangers already established have not been able to provide relevant courses and second, they provide a far too one-sided supply of education in relation to the requirements of business. Third, educational arrangers are seen as being too conservative and inflexible. Grepperud and Thomsen (2001) argue a broker should map the requirements of business and make inquiries in order to balance the needs of business and the capabilities of educational providers. A broker should be sensitive to what the market needs and act quickly (p. 180) to satisfy the demands of education and competencies.

Grepperud and Thomsen (2001) describe the local learning centres as ‘engines of competency’. Interviews conducted with business representatives outline several tasks of the LLC organisation; mapping, investigating and making plans for future competency requirements in the region. An engine of competency should motivate, inspire and develop competency in order to draw attention to the concept of local learning centres. The LLC needs to help business to define, clarify and make use of competencies. Grepperud and Thomsen (2001) argue that the LLC has to co-ordinate educational arrangers providing education at different levels. A key function is to start up new network constellations that link educational arrangers and business with each other. In their research, Grepperud and Thomsen (2001) define the local learning centres as meeting places. They argue that the local learning centre has a role to play, offering a social environment to support studies. The social

aspects of learning are important in order to counterbalance distance education based on mediated communication and information and communication technologies.

Access to learning facilities

The emergence of local learning centres has been described as a way of establishing higher education closer to home in sparsely populated areas (National Centre for Flexible Learning 2004). The development of local learning centres has mainly taking place in regions that lack geographical access to university colleges or universities (Gisby and Karlen 2005). Buiskool *et al* (2005) state that the key issue for the local learning centre is the problem of accessibility. The basic idea of the LLC is described as “*bringing learning closer to home*” (p. 14) and the local learning centres are supposed to enhance accessibility by reducing geographical distance.

Roos, Dahllöf and Baumgarten (2000) show in their research that proximity and access to a local learning centre is a significant factor when initiating studies. The older they get, the more students seem to prefer to study at a local learning centre by means of distance education in their own home municipality (p. 157). The main reason given by students for beginning studies locally is the opportunity to connect studies with family and working life (Roos 2001). Buiskool *et al* (2005) find in their research that local learning centres are easily reachable by public transport or are established in more decentralised locations in the neighbourhood. Also mobile solutions are used that allow education to actually visit the places where people learn (e.g. workplaces).

Buiskool *et al* (2005) argue that distance education has been implemented as a method by local learning centres across Europe in order to bring learning closer to people. In their investigations, they found that information and communication technologies are used in a number of different ways. The authors distinguish ICT as the objective of learning, as the vehicle in the learning process, as a way of opening connections with local or business community (for instance, looking for work) or as a way of creating virtual learning environments (e.g. videoconferencing).

Municipal development and growth strategies

One perspective on local learning centres is the organisation as part of growth strategies. Policy documents describe local learning centres as strategic nodes in the economy (NUTEK 2000). The terms ‘broker’ and ‘engine’ are used by Grepperud and Thomsen (2001) in a similar way, indicating the role of the local learning centre as a focal point of diverse interests. It has been suggested that opportunities for local access to university studies would enhance the attractiveness of rural districts, promote schooling and benefit the econ-

omy (Government bill 2001/02:4; National Rural Development Agency 2002). Hedestig (2002) states that 'higher education' is significant for regional development via virtual learning environments. Nicander (2005) argues for the need of competency as part of the development of working organisations and individuals. In order to be competitive in an international market, Swedish companies have to maintain and develop competency (p. 92). The Swedish Ministry of Industry, Employment and Communications points to the need to develop local learning centres to strengthen growth in regions and to promote collaboration between universities, university colleges and municipalities (Government bill 2001/02:4). The cooperation between 'higher education' organisations and municipalities is also seen as an important factor for local and regional development and prosperity (Jonsson 2005).

Roos, Dahlöf and Baumgarten (2000) argue that studies in local learning centres may strengthen the position of the individual in the labour market. In their research, the authors show how a majority of freshmen students have no previous experience of undergraduate studies. The recruitment of students from non-academic homes counteracts socially uneven representation. The services provided by the local learning centre may prevent individuals and businesses from moving away from the municipality. The goal of the adult learning centres is to enhance the attractiveness of rural districts. The distribution of distance education by means of videoconferencing intends to contribute to developing the community. One way of promoting growth is to increase the collaboration between local learning centres and authorities in the community such as labour agents, the social welfare agency and the social insurance office (National Rural Development Agency 2002). Roos, Dahlöf and Baumgarten (2000) depict the interest of the stakeholders as strengthening the position of the municipalities by increasing the supply of qualified competencies acquired by means of undergraduate studies and distance education.

Learning Partnerships and Networks

The local learning centres organisation may appear as 'Learning partnerships'. In the learning partnerships, collaboration between the local learning centres is seen as important on both a regional and a national level. Learning partnerships collaborate for reasons of funding and marketing or for political reasons (Buiscool *et al* 2005). In general, learning partnerships across Europe have been supported by government subsidies and grant policies. Learning partnerships often include complementary organisations such as governance partners (institutions that influence the conditions for local development) and resource partners (learning centres, community organisations, education providers and business enterprises). A learning partnership may involve other

partners connected to the practice of local learning centres. For example, technicians, librarians and teaching staff may be part of the partnership (ibid.).

The network constellation in the form of a 'partnership' has been investigated by Jakobsson (2007). The author describes and analyses how a network is established and further developed in the context of adult education and local learning centres. The study seeks to investigate what factors have supported and obstructed the development process. The representatives of the network see the constellation as a supportive 'partnership' for collaborative action. The setbacks can be found in the lack of formal rights to make decisions and differences in organisational cultures (p. 204). The author argues that the network constellation has not been oriented towards surrounding actors and therefore remained internal to a large extent.

The network constellation as a collaborative form of 'partnership' organisation has been investigated by Holzhausen (1993 and 1995). Holzhausen focuses on the exchange of knowledge and experiences among a group of small businesses. The study takes place in the context of knowledge centres. Holzhausen distinguish three different types of network constellations: 'the social business network', 'the communicative network' and 'the collaboration network'. The social business network strives to increase the number of contacts, to formulate common concepts and to stimulate social interaction within the network. In the communicative network, the focus is on the exchange of information and knowledge between participants. The collaboration network concerns allocation of resources. The 'complement' of resources is necessary for small businesses in order to keep up with the competition and technical developments. Resources allocated between the participants are described as marketing, production resources and management of production. Holzhausen (1995) argues that the network constellation assists small business to identify opportunities for development, to link knowledge and information resources and to stimulate contacts with new participants attracted by the network constellation.

Videoconferencing – the core activity of the local learning centre

In recent years, videoconferencing has been established in the context of local learning centres in order to promote adult education and distance learning in rural districts. Videoconferencing is a collective of technologies that enable people to overcome distance and share information. The term 'video-conference' refers to a collective of technologies that links the instructor and the students in two-way audio and video transmissions. Videoconferencing is used to transfer digitized data as images and audio together with video clips,

photographs, music and other information (Wilcox 2000). Videoconferencing is one of many instructional designs originating from the picture-phone. In the 1970s, attention was directed towards audiovisual conferencing technologies designed for groups. In the 1980s, new technological standards, increased bandwidth and lower costs made videoconferencing available to educational organisations (Schlosser and Anderson 1994; Weinstein 1997). In the 1990s, videoconferencing was one of the fastest growing technologies in Australia and North America (Bates 1995). In Sweden, videoconferencing has been established in particular in the context of local learning centres. The combination of communication technologies and conventional school practices has been denoted as virtual education, on-line instruction or virtual universities (Keegan 2000).

One theme picked up by scholars in the field of videoconferencing is technology. Videoconferencing is usually described as a powerful mediator of communication creating new opportunities for teaching and learning (Kinnear, McWilliams and Caul 2002). The prospect of technology as a facilitator of improved communication is significant in research as well as in instructional writing (e.g. Wilcox 2000; Bates 1995; Schaphorst 1996). Videoconferencing has also been described as a practice with technological complications. For instance, students report on negative attitudes towards the cameras (Unander 1999). Technical disruptions are regarded as annoying. The type and position of the microphones are crucial to interaction as are the position of the monitors and the light in the classrooms (MacKinnon *et al* 1994). In general, research reports that the videoconferencing classroom requires professional technical support. Knipe and Lee (2002) argue that the quality of teaching and learning in videoconferencing is not equal to traditional classroom interaction since teaching via a monitor, camera and microphones reduces the quality of learning.

The distance between students and the teacher is a second theme in studies investigating the practice of videoconferencing. Videoconferencing can be described as a practice that aims to connect actors who are separated geographically. Videoconferencing can also be defined as a practice that strives to reproduce communication as naturally as possible. The reproduction of face-to-face interaction by means of videoconferencing involves body language, facial expressions and other gestures. Unrestricted face-to-face interaction between students and teachers has been seen as a highly desirable component of the teaching-learning process (MacKinnon *et al* 1994). The lack of communication has been identified as the main obstacle to successful videoconferencing by practitioners and researchers. The 'drawbacks' concern defective communication among participants. Knipe and Lee (2002) argue that mediated communication always results in disruptions and misunderstandings. McHenry and Bozik (1995) state that the physical and psychologi-

cal distance affects the experiences of videoconferencing negatively. The dispersion in space poses potential problems as regards the quality of learning (Wolcott 1996).

A third theme is the role of the teacher. Unander (1999) links the teacher's ability to stimulate and motivate participants to the actual outcome of interaction. The author argues that the language used by the teacher as well as the tone of his/her voice is crucial when it comes to students' attitudes towards videoconferencing. Dupin-Bryant (2004) asserts that the teacher in videoconferencing often takes on a teacher-centred approach due to geographical separation and technological barriers. McHenry and Bozik (1995) claim interaction is the responsibility of the teacher and MacKinnon *et al* (1994) argue that instructors should sustain the interaction of participants by means of dialogue. The teacher must invite participants to interrupt speakers in order to ensure dialogue rather than monologue.

The group organisation in remote settings is a subject that has attracted some interest. In contrast to individual distance education, group-based videoconferencing makes individuals feel that they belong to a cohort of students and that they share the same experiences (Olsen 2003). Svensson (2002) investigated group behaviour in temporary student gatherings and discovered that communities were established and reformed based on collective negotiations. The roles of the teacher and students were determined in communities adopting typified patterns of communication. Summing up the field of videoconferencing, most research done concerns technology. The actual handlings of equipment as well as the fact that communication is mediated among dispersed groups of students are seen as intriguing problems. On the other hand, communication and the role of the teacher are subjects that have attracted less attention.

The themes picked up by research in the field of videoconferencing concern technology as a mediating tool, the distance between participants and the role of the teacher in class. An alternative perspective on the practice of videoconferencing regards the environment and the material conditions as significant for understanding teaching and learning practices. It can be argued that classrooms have different spatial layouts that may support or make difficult interaction among participants. Mannion (2003) argues that we cannot overlook the material and spatial nature of the learning event. Comber and Wall (2001) examines different classroom organisations and analyse the critical relation between seating organisation, teaching intentions and task demands. Paechter *et al* (2001) focus on the relationship between learning, space and identity and point out that concrete spaces are occupied by embodied learners and that people are changed by experiences in these spaces. The relation between identity and space as an interconnection between spaces and selves has attracted attention. Identity is formed through the appropriation of

space (Mulcahy 2007; Massey 2005). McGregor (2004) explores the social production of space by focusing on the materiality of schools as workplaces. Edwards and Usher (2003) argue that the material design of spaces determines how people construct, disrupt and resist meanings and understandings. The thesis focuses on the practice of videoconferencing (studies three and four) and adopts a materialist view of space and spatial relations. The contribution of the study is that it expands an understanding of videoconferencing as a learning practice constituted by actor-networks. In the fourth study, the focus is on communication and the role of the teacher. The study takes the perspective of the teacher and seeks to describe how participants talk in the videoconferencing classrooms. In the study, the teacher is seen as an actor situated in a socio-technical network. The study analyses how human actors interact with material actors and how participants strive to break through the barriers of technology. Together, the two studies offer a different perspective on distance education practices that call attention to material conditions and power relations in socio-technical environments.

2. Theoretical Framework

Actor-network Theory

In four separate articles, I frame the practice of local learning centres by using the perspective of actor-network (ANT) and by applying the concepts of space. The theoretical perspectives used in the thesis concern networks of relations between people, things and ideas. From the viewpoint of ANT, networks underpin all aspects of social life. The family and the school are examples of institutional networks existing during childhood. As grown ups, we engage in education and working life, constructing a large number of social networks. We are not only part of institutional and social networks in everyday practices, we also live our lives in different kinds of technical networks. For instance, when we use telephones, trains and the Internet we become actors in socio-technical networks. Apparently, we live our lives in different networks in which the social and technological dimensions are not easily separated.

Theories used in this thesis treat the social and the technical dimensions as inseparable. For instance, the local learning centre is architecture built for certain activities and the videoconferencing classrooms are spaces materially designed for interaction between students, teachers and technology. The idea of actor-network theory is to integrate, what has been separated as human and social and material and technical, in the same conceptual framework. The actor-network theory may provide a useful perspective on the practice of local learning centres and videoconferencing.

Actor-networks are constituted through relations, connections and links between people and things. The perspective of actor-network theory, developed by scholars such as Bruno Latour, Michel Callon and John Law, aims to simplify complex relations of objects found in socio-technical environments (Bijker, Hughes and Pinch 1987) and in the performance of the educational (Fenwick and Edwards 2010). Actor-network theory has been developed to analyse situations where it is difficult to separate humans and non-humans and where actors have variable forms (Callon 1999). Latour (2005) explain the composition of an actor-network in terms of a series of heterogeneous objects that are linked to one another for a certain period of time. Law (2000) argues that the network is an effect of an array of relations and that the network holds together as long as those relations do not change their shape.

The metaphor of network leads to an understanding of objects and actors as interconnected in order to form socio-technical networks as representations of the environment. The notion of actor as the object in a network may

assume a human character and intentional conduct (Czarniawska and Hernes 2005). We understand actors as distinct from traditional actors of sociology by including non-human components. For instance, the construction of knowledge takes place in networks of education that involve actors; both inanimate, such as books, pens and computers and animated actors such as humans (Usher and Edwards 2005). Additional examples of objects that become actors include texts, graphical representations, architectures, ships and aircraft (Law 2000). The perspective of actor-network theory places different objects on the same level, seeing all of them as actors equally important to our understanding of how actions are carried out in an environment. Law and Hassard (1999) argue that the connection between actors is actually the result of one actor acquiring strength and power over other actors. Actors have an interest in trying to convince other actors to create an alignment. When this 'persuasive' process becomes effective, it results in the creation of a network of aligned interests.

The notion of 'immutable mobiles' is used in the thesis. Latour (1993) stresses objects as being 'immutable mobiles'. Objects are movable since they are moving forward in space and time and immutable because they hold their shape as a network. The LLC organisation as an adult education arranger comprises a number of objects such as the material facilities (e.g. buildings and classrooms, communication technologies) and conceptual objects (e.g. distance education, pedagogy, employment capacities, economic growth strategies) as well as human actors (e.g. principals, teachers, students, officials and politicians). Despite the large number of actors acting in a constantly changing environment, the actor-network of the local learning centre stays together. The actors remain as an actor-network and the practice pursues the activities of adult education. New competition on the market or new policies, for instance, may not dissolve the immutable mobile of the LLC. The 'immutable mobiles are solid as they move around. Law (2000) argues 'immutable mobiles' are themselves networks passing through other networks.

The creation of and interrelations between actor-networks in the environment of local learning centres can be analysed by using the concept of translation. Callon (1986) argues actor-networks are created in the process of translation. Callon describes the process as consisting of four 'moments'; *problematization*, *intressement*, *enrolment* and *mobilisation*, which involve the negotiation of identity and possibilities of interaction. The aspect of 'problematization' refers to the ways network builders define acceptable identities and interests (Nespor 1994 p. 13-14) that are consistent with their own interests. In the process of discerning similar interests, or acceptable identities of actors, the focal actor has to detach the interests of the actors. New actors have to accept the status of the focal actors as being appropriate.

The programme or the praxis of the focal actors is established as an obligatory passage point in the network of relationships that are under construction. Problematisation describes a system of alliances or associations defining the identity (Callon 1986). The second moment of translation called *interessement* involves a process of convincing other actors to accept the definition of the focal actor or, as Callon puts it, “interessement is a group of actions by which actors attempt to impose and stabilise the identity of the other actors defined through problematisation” (Callon 1986 p. 8). The moment of interessement is a process of trying to integrate actors in the network. If interessement is successful, actors are enrolled. *Enrolment* may consist of negotiations, trials of strength that accompany the moment of interessement (ibid.). Enrolment is achieved when another actor accepts the interest defined by the focal actor. Finally, *mobilisation* is the method used to stabilise the enrolled actors (Nespor 1994) and to make sure that the actors follow the representatives or the spokesmen (Callon 1986).

Space

Law (1999) argues that actor-network theory is not a theory of the ‘social’. Actor-network is rather a theory of space in which the ‘social’ has become a certain type of circulation. Space has been imagined as a product of interrelations constantly in the process of being formed (Massey 2005, McGregor 2003). Space is both the interrelation between humans, technical artefact and material design as well as the relations, connections and associations. Networks order the spaces of the school (McGregor 2004). The practice of local learning centres can be interpreted as the result of space-forming activities or as the relations, connections and associations that construct space. The practice becomes the result of space-forming activities as well as space in which humans, technical artefacts and material design are interrelated.

In a materialist interpretation, space exists both in substantial forms as well as a set of relations between individuals and groups. The latter aspect refers to the social construction of space, which embraces both physical and cognitive space (Soja 1985). Substantial space is concrete by nature (i.e. geography) or arises as the “organised and cumulative application of human labour and human knowledge” (Soja 1985 p. 92-93). Examples of such substantial spaces are the facilities of the local learning centres or the technical artefacts used in videoconferencing. Virtual space, on the other hand, can be conceptualised as the cognitive ideas of people. A materialist interpretation incorporates material and virtual spaces seeing them as interlinked and overlapping one another. Spatiality, as Soja puts it, is a social product that “incorporates as it socialises and transforms both physical and cognitive space” (Soja 1985 p. 98).

Spatiality becomes simultaneously the medium as well as the outcome of social action and relationships that are materially constituted (ibid.).

Nespor (1994) and Callon (1986) show how networks are organised, stabilised, maintained and integrated into larger flows of cultural and economic action. Inevitably, the practice of videoconferencing involves sites and events interconnected in a larger flow of network activities. The viewpoint of the local learning centre and the remote classroom encapsulates a context of interrelations and exemplifies a specific articulation and a specific moment in those networks (Massey 2005). The actor-networks of videoconferencing stretch beyond the context of local learning centre and the videoconferencing classroom. Latour (2005) argues that one location potentially seems to contain all others. The remote classrooms are a part or a contingent of the actor-network. A second contingent can be described as the complex of network actors located in the municipalities. The local learning centres and the municipalities in the region are linked to university colleges, which constitute a third layer of network contingent. Using the local learning centre and the remote classroom as examples of actor-networks is therefore a simplification in order to reduce an infinitely and complex world (Callon 1986). The actor-networks undoubtedly stretch far beyond this simplified viewpoint.

3. The research project: aim, questions and context

The aim of the thesis

The four studies in the thesis investigate the practice of local learning centres. The aim is to describe this practice and to establish an understanding of relations that surround the practice. The studies seek to increase knowledge concerning the actor-networks of the LLC organisation and the learning space of videoconferencing. Previous studies show that practices are constructed through interrelations between material and human actors (e.g. Nesper 1994; Callon 1999; Law 2000; Latour 2005). The local learning centre is an organisation that involves a number of dissimilar actors such as material facilities, learning environments, technology, teaching and learning, networking strategies and policy concepts. The actors co-produce a 'learning space' that can be captured through the perspective of actor-network theory. Studying the field of local learning centres is valuable since the practice has not been fully investigated and knowledge is partially lacking concerning how activities and programs are implemented. The relation between the local learning centre organisation and surrounding actors has also been pointed out as an area of interest due to lack of earlier research¹. Further knowledge of the practice may lead to a new 'identification' of the local learning centre organisation and produce a better understanding of how educational organisations work in the context of adult education.

Topics and research question in the studies

The topics of the four studies differ somewhat. In study one (1) and two (2), the interest concerns the LLC organisation. In the first study, the conditions for 'linking' between actors are scrutinised, including the 'reproduction' of relations. Study two focuses on the obstacles of networking among the strategies used by the network constructors to convince actors to join the network. The research interests of the two studies are similar and they view the local learning centre as an organisation surrounded by actor-networks. An organisation does not exist in a vacuum. Rather, it 'behaves' or acts in relation to other organisations and we may denote specific strategies used by the local learning organisation in order to take part in and reconstruct the relations of existing actor-networks. The starting point of the two studies is that strategies

¹ Based on several meetings with a nationwide research groups (the 3 M group/CFL)

are based on all the relations and interconnections that one organisation has to other organisations with organisations viewed as objects or actors. The idea is that the local learning centre organisation structures and arranges its conception of the world, taking all these interconnections in account. The organisation manoeuvres in a world of relations and has to relate itself to a complex of connections that is constantly changing. The process of the studies may therefore be described as the *movement* of the organisation through a spatial context or environment. The movement involves several components that can be outlined as strategies for establishment, expansion, stabilisation and integration of the organisation in the actor-network. The movement can also be described as the local learning centres organisation's ability to strategically construct interconnections in a nexus of possible relations and associations. The actor-networks are constantly reshaping the conditions of network construction due to different interests. The relations between actors – the LLC organisation and the surrounding actors of the organisation – become fluent and transient.

The first study focuses on a single relation in the network of the LLC organisation. The study investigates the link between the local learning centre and the users of the services provided. The study is guided by two main questions: what are the different perspectives on education, competency and learning between actors and how could different interest impact on the role of the adult learning centre as a 'broker' of higher education? The study scrutinises current conditions of relations as well as the possibilities of establishing links between the actors in the contingent. The study also measures the intensity and frequency of the activities of the linkage. The research questions have been formulated according to three aspects of the specific relation under investigation;

- a) What are the different perspectives between actors?
- b) What is the actual supply and demand of services within the network?
- c) What is the character and extent of link activities in the network?

In the second study, the focus is on the construction of an actor-network. The idea of the study is to outline the different interests of the LLC organisation and investigate the obstacles and strategies used in the process of constructing a competitive actor-network. The successful construction of an actor-network is based on similarities between the different interests of actors or the capability of one actor to force a common base of interest on the others. From the perspective of actor-network-theory, the translation of an actor-network can be described in four moments; *problematisation*, *interestment*, *enrolment* and *mobilisation*. The translation of an actor-network proceeds as

a result of the focal actor's ability to become indispensable; through the ability to convince and obtain the acceptance of other actors. The perspective of actor-network is useful in order to analyse the process of networking; to make visible the obstacles and strategies used by the LLC organisation.

In the study, it is important to 'shadow' the LLC organisation as a 'focal actor' in order to reduce the complexity of relations and to single out one perspective. The perspective of the study is that of the representatives of the LLC organisation. Questions in the second study concern the structure of the actor-network and the interconnections between actors. The study seeks to outline the obstacles and strategies used in the process of constructing a network of adult education.

The following questions are posed in the second study:

- a) What groups of actors are connected to the LLC organisation and in what ways are network relations developed and maintained between actors?
- b) What are the images produced by the LLC organisation that support the enrolment of actors in the actor-network?
- c) What are the obstacles to constructing an actor-network?
- d) What are the strategies used to manoeuvre actors into joining the network
- e) How do the network constructors proceed in their work on enrolling new actors?

Given the importance of space, we can see how the organisation of teaching and learning results in a spatial ordering of actors across the curriculum. For example, the timetable directs events and people to different localities at certain times and educational practices have people travelling to the local learning centres on fixed days and at fixed times. From this perspective, the local learning centre is a co-ordinator of people in space and time. We may also consider how distant objects such as actors, artefacts and concepts (ideas) are manifested *within* and *through* the educational practice. For instance, videoconferencing is located within a nexus of relations including technological, pedagogical, economic, cultural and political objects.

In studies three (3) and four (4), the focus is on videoconferencing as the core activity of the local learning centre. The third study examines the practice of videoconferencing and focuses the interrelations between the environment of the remote classroom, artefacts and people. It can be said that the electronic classroom of videoconferencing constitutes a socio-technical environment in which communications technologies are an inseparable part of the practice. Based on research, it would also seem that the impact of material components, such as classroom layouts and technical artefacts – components

regarded as actors with their own standards and rationales –have not been fully investigated in the context of videoconferencing. The third study seeks to describe how classroom design and technological artefacts impact the practice of the remote classroom. The question at stake is twofold:

- a) How is the learning space formed in terms of materiality?
- b) How do actors produce spatial relations within the practice of videoconferencing?

The videoconferencing facilities and the local learning centres are constructed environments and are designed to enhance certain forms of interaction and communication. The fourth study stresses the videoconferencing practice, similar to the previous study, as a learning space in which actors construct the practice. The study focuses on the structures of communication in class. Communication between students and different groups of students, students and teachers, and teachers and technicians has been investigated.

The fourth study is a classroom interaction study in which communication structures and interaction patterns are made visible. What makes the fourth study different from other studies of classroom interaction is that all communication is mediated via the videoconferencing systems. Holmberg (1995) argues that real communication as constituted by two-way communication. In contrast, simulated communication is one-way communication comprising printed and recorded material. Videoconferencing has been described as a hybrid, utilising conventional education face-to-face as well as distance education in the same contextual setting.

The fourth study stresses communication in the videoconferencing class. Communication is mainly verbal and consists of questions and statements posed alternately by the teacher and students. Interaction may also be non-verbal. This category contains physical gestures made by teachers and students. In contrast to conventional education, physical signs may be vague or even missing in videoconferencing. Nor can we ‘sense’ the atmosphere of the distant classroom, which makes interaction more difficult to actors. The absence of intentional communication occurs in videoconferencing when the teacher leaves the classroom, reads notes or engages in personal matters without involving the students.

The fourth study focuses on how actors communicate; the different forms of talk between the teacher, students and technicians in videoconference classrooms. The aim is to describe the practice of videoconferencing in terms of classroom interaction; to study the interplay among participants, technology and environment as an actor-network of communication.

The following questions are posed in the fourth study:

- a) How is communication distributed?
- b) How do actors communicate in a videoconference?

The context of the studies

Nespor (URL 1) argues that the context of the study is not determined by the setting. Rather, the context is created or defined by the researcher. The contextualisation of the research field can be the topic of the study and may involve the process of contextualisation and framing. In my research, the context may be set as the representations of people, things and events within the framework of the local learning centres in a region. The context is determined by a collaboration project between five municipalities. The collaboration project is demarcated in several ways; by geographical proximity and by common project activities, strategies and procedures. In the project, the municipalities offer the same courses and negotiate co-operatively with university colleges in the region. Further, the collaboration project is managed by one chairman and has a common budget and shared subsidies. The project partners also share personnel to some extent (for instance, teachers at upper secondary level). The representatives of the local learning centres meet in order to discuss professional problems such as municipal strategies, financial problems, government policies and pedagogical concepts. The partnership of municipalities forms a community of interest based on common goals and strategies. The representation of actors within my research context is framed by the project organisation described above. All data originate from representatives of the local learning centres, students and teachers, officials, politicians, businessmen located in the five municipalities.

The outline of empirical studies

The four studies are homogenous in terms of the context of the studies. The disposition below shows how the first and the second study focus on an organisational level. The first study stresses a certain relation between the LLC organisation, business and municipal administration in the region. The study investigates the local learning centres as brokers of 'higher education'. The second study investigates the actor-networks in the context of the LLC organisation. The study scrutinises the issue of network construction from the perspective of the LLC organisation. The local learning centre is the focal actor of the actor-network in the study. The context of the first and second study is the five local learning centres in the region. The outline of empirical studies below shows that the focus in the third and fourth study is on the practice of videoconferencing. Videoconferencing is the core activity of the

LLC organisation. The context of the studies is primarily the remote classrooms located in the local learning centres. The third study investigates the relations between classroom design, artefacts and people. The study focuses the hierarchical order of actors, unequal interrelations between actors and the strategies human actors use to manoeuvre in a technical environment. The fourth study investigates the communication of participants in the videoconference class. The study stresses communication among actors and scrutinises the different character of utterances made by the teacher. The disposition of the thesis, finally, shows that actor-network theory has been used in one way or another in all four studies. The second study is based on the 'translation of sociology' as a key concept and in the third study, the concept of space and spatial relations has been seen as important when it comes to analysing the practice.

The outline of empirical studies

Studies	Context of the study	Focus of the study	Specific findings	Theoretical perspectives
Study 1 "The Local learning centres as brokers of higher education"	The local learning centre and surrounding networks	The actor-networks of LLC organisation The relations between LLC and business	The status and character of relations and links between LLC and surrounding networks	Actor network theory
Study 2 "Constructing Actor-networks for the practice of local learning centres in Sweden"	The local learning centre and surrounding networks	The actor-networks of the LLC organisation The construction of actor networks	Obstacles to actor networks construction. Strategies for overcoming resistance	Actor network theory Sociology of transition
Study 3 "Creating learning space? Videoconferencing at local learning centres in Sweden"	The remote videoconferencing classrooms located in the local learning centres	The actor-networks of VCS The construction of the learning space Interrelations between actors	The relations between design, artefacts and people The hierarchical order of actors and unequal interrelations Strategies of actors	A materialist interpretation of space and spatial relations
Study 4 "In the framework of videoconference classrooms at local learning centres in Sweden"	The remote videoconferencing classrooms located in the local learning centres	Communication structures The construction of a learning space	The distribution and the character of communication The different character of teachers' questions	Participants' actions in terms of communication (Learning space)

4. Methods

My research is based on fieldwork inspired by ethnographic approaches that regard participation in educational settings as central to acquiring data. The fieldwork was mainly conducted between 2003 and 2005 at five different local learning centres in southern Sweden. The local learning centres under investigation are located in five municipalities. Although data originate from all five municipalities, one of the local learning centres constitutes my case.

Data are derived from a heterogeneous group of people. Initially, contacts were established with key informants (door keepers) who introduced me to a group of stakeholders, managers and headmasters of the local learning centres in the region. Eventually, additional contacts were made with officials, politicians, students, teachers, technicians and study advisors as well as union representatives and private associations representing local business interests. The vast majority of data consist of interviews with representatives of the local learning centres and with students in videoconferencing classrooms.

The study is based on data from a variety of events and situations. I have participated in formal project meetings and in everyday discussions with representatives of the local learning centres as well as conferences and meetings outside the local learning centres and the videoconference classrooms. In order to expand my understanding of the practice, I have visited additional local learning centres for study purposes. I have also taking part in projects outside the actual context of my research project. The projects have all stressed adult education in one way or another.

Finally, the studies involve different research methods. Data consist of interviews with representatives of the local learning centres and students engaged in studies. I have also made participant observations in videoconference classes. In spring 2005, a questionnaire was launched addressing the users of the services provided by the local learning centres in the region.

Observational studies

Participant observation is a research strategy in which information is acquired by participating, observing and collecting whatever data are available in order to shed light on the issues that are the focus of the research (Bryman 2001; Hammersley and Atkinson 1983). Participant observations in videoconferencing classrooms were made periodically between 2003 and 2005 at five separate locations. The vast majority of observational data have been collected at one single location (my case). In the third and fourth studies, which focus on the practice of videoconferencing, observational data play an important part as the main source of information. All together observational data

were gathered on 37 different occasions in the videoconferencing class. Observational data also concern different forms of sessions. The first category concerns telecasted education provided by the municipality while the second involves distance education broadcasted by university colleges located at a distance in the region. The same research design has been used in both session forms.

Four out of 37 studies were conducted at the instructors' sites to elaborate the teacher's perspective and to examine the videoconferencing classroom at the origin site. Also, recordings of videoconferencing sessions available as streaming video were used to try to grasp the basics of interaction in videoconferencing. These recordings have facilitated the initial structures of the observational schedules. No data from the recordings are presented as part of the results.

The collection of observational data has been guided by moderate participation (De Walt and De Walt 2002) in which the researcher participates on the same premises as the rest of the students, but primarily as an observer, not as a full participant. In general, an observational occasion lasted for approximately one hour and participation was guided by the activities and the pace of the class. Verbal communication in the classroom has been recorded on tape, transcribed and analysed in a similar way to interviews. Further, field notes have been written openly in class describing the activities and the behaviour of students, instructors and technicians. Also photographs have been taken and sketches made to give a picture of the environment, technological equipment and the positions of people in the physical settings of videoconferencing.

The observational studies use different perspectives; the students, the teachers and the technicians. Research conducted in the classrooms located in the local learning centre usually focused on the interaction of students and technicians. In two cases, the focus was on the face-to-face interaction between the students and the teacher since the teacher was present in the classroom in person. On four occasions, the focus is on the teacher. The separation of actors in space resulted in a set of different observational foci. The focus of the observation studies was shifted from activities in the physical classroom to the virtual classrooms and from communication among actors online to interaction in the student group located in the local learning centre. Occasionally, the focus of observations was on formal discussions, on a certain communication pattern or informal interaction, or on certain behaviours of students, the teachers or support personnel.

Initially, observations were *open* (Hopkins 2002) using a blank sheet of paper to record all kinds of activities in class. The chronological sampling strategy (Patton 1990) generated a wide range of information embracing all the events and behaviour of people for a certain period of time. The unstruc-

tured strategy was gradually refined and replaced by an observation method that was guided by a *theoretical sampling* strategy (Bryman 2001) in which data are gathered parallel with the analysis. By means of *open coding* (Strauss and Corbin 1998), significant themes and categories were identified as: (a) the physical setting and (b) virtual settings, (c) the roles and (d) the activities and (e) behaviours of the participants in these settings.

The interviews

Participant observations in class have been complemented with interviews to enhance my understanding of the practice. Patton (1990) argues that the combination of observations and interviews is valuable in order to fully understand observational data. In my experience, interviews not only fill in the gaps but also improve the quality of observations made. Interviews with teachers and technicians, which were initially intended to clarify circumstances, resulted in new angles and perspectives useful for forthcoming observations. Interviews were also important as regards clarifying non-observational action situated beyond the actual situation. For instance, interviews were useful for revealing the teacher's preparations and the roles of the technicians and the study adviser.

The second study is based on 28 interviews with students, both women and men, attending courses in upper secondary school and undergraduate studies and having varying experience of videoconferencing. Out of 28 students, 16 were attending an education program provided by the municipality and 12 were attending an education program provided by the university college. A further three interviews with teachers and key informants, such as technicians and study advisors, were held to visualise the professional perspective of the videoconferencing practice and to (re)direct the progress of the research process.

Most interviews were carried out at the learning centre when the classes used lunchrooms, cafés, library and at the homes of the students. Typically, an interview lasted for one hour and was recorded and subsequently transcribed to facilitate further analysis. In the case of interviews with representatives of the local learning centres, some of them were conducted at my place of work. Finally, some of the documents shaping the practice of videoconferencing were used to capture additional perspectives – in this case, a handbook regulating the teaching practice and the collaboration between adult learning centres and universities in the region, that is, between the broadcasting facilities and the receivers of virtual education.

The questionnaire

In the spring of 2005, a survey was launched targeting organisations in the public and private sectors in the region. The population was defined as all employers in the region where the five municipalities were active. The questionnaire mailed to places of work with at least one employee. The response rate was 319 out of a total of 2,005 possible responses. The distribution of responses in the case of organisations was 72 percent (private employers), 22 percent (public services) and six percent (others such as voluntary organisations with at least one employee). The majority of the responses came from the manufacturing industry. This category is also the main target group indicated by the project organisation and even though the low response rate makes it impossible to further generalise to the total population, the survey nevertheless indicates attitudes towards adult education, competency and qualifications among respondents. Only a descriptive analysis of quantitative data was performed in an effort to uncover the relations between different actors.

Sampling and analysis

In the four studies informants have been asked to participate based on their experiences of the practices. The sampling of interviewees has been based on the 'principle of relevance' (Bryman, 2001) and the 'purposeful sampling strategy' (Patton, 1990). The observations made in videoconference concerns courses provided by the university college and the municipality. The distribution was balanced between undergraduate studies and secondary school level. A majority of observations were made at one single location (my case). Usually several observations occur with one group of students. The main reason why to study a single group of students was to avoid 'reactive effects'. Observations have been coded and categorised successively. Interviews and observations were structured in themes based on an 'open' analysis. Successively interpretations were inspired by theory. The results of the study may be described as a 'condensate' of the initial ideas (to study relations), theoretical standpoints and interpretations made during the time of the study.

The table below presents the different methods that have been used in the four studies. The table describe the relation between the studies, the methods and the distribution of informants. In the first study a questionnaire addresses all employers in the region. In the second study the representatives were asked to make drawings in order to define the networks of adult education. The third and fourth studies are observational studies. In all studies interviews played an important part as the main method to acquire information. Also documents have been used in order to receive background information. Most documents concerned the project organisation of the local learning cen-

tres, such as extended applications, handbooks in videoconferencing and project policy documents.

Methods and Informants across the studies

Studies	Methods	Informant distribution
Study 1	Interviews Questionnaire Documents	Population of 2,005 employer organisations 8 interviews with local learning centre representatives and 7 interviews with business representatives
Study 2	Interviews Drawings Documents	14 interviews with local learning centre representatives; project manager, headmasters, employers, educational officials, librarians, union representatives.
Study 3	Participant observations Interviews	37 observations occasions of which 4 studies were car- ried out at the site of the teacher In two (out of 37) the teacher was present in class 28 interviews (16 students in adult education provided by the municipality and 12 students in distance education provided by university college) 3 interviews with teachers Additional interviews with technicians and study advisors (informal)
Study 4	Participant observations Interviews	The same material was used in study 4 as in study 3

5. Summary of the papers

Study one

The local learning centres as brokers of higher education?

”Lärcentra som mäklare av högre utbildning” is published in Swedish in *Pedagogisk forskning i Sverige*. Årgång 13, Nummer 2. 2008.

This article examines the relation between five adult learning centres and the organisations in the public and private sectors in a region in southern Sweden. The starting point of the article is a case in which five municipalities collaborated in organising municipal adult learning centres in a region. The project began in 2001 and ended in 2006 and the idea was to develop a structure of educational facilities. The study is based on interviews conducted in 2005 and 2006 with eight project actors and seven representatives of business and politics. In addition to interviews, the project’s policy documents, comprehensive application forms and minutes of meetings have also been scrutinised for a better understanding of the activity of the project. Finally, a survey addressing all the organisations in the public and private sectors in the region was carried out. The response rate was 319 out of a total of 2,005 possible responses. The distribution of responses in the case of organisations was 72 percent (private employers), 22 percent (public services) and six percent (others²).

Assessments made by project stakeholders point out how the organisation of adult learning centres ran into difficulties in introducing adult education in the market and establishing ‘good’ relations with business. This may be an issue of the varying interests of actors on the market who adopts different standpoints on education and competency. Relations between these actors may also be weak due to diversity in the supply and demand of education or because of inadequate strategies aimed at establishing contact activities. The aim of this study is to examine these three aspects of the relationship between adult learning centres and the organisations in the public and private sectors. What are the different perspectives on education, competency and learning and how could different interests impact on the role of the adult learning centre as a ‘broker’ of higher education?

² This involves voluntary organisations with at least one employee.

The results from the study show how the occurrence of personnel training becomes a mediator of symbolic values to the public and private sectors in the region. Seventy-four per cent of business and 82 per cent of the public service organisations claim that opportunities for personnel training improve the status of the organisation. The legitimacy of one's own organisation is achieved by a correspondence of values between the organisation and surrounding actor networks such as public authorities, the mass media and trade unions. A similar attitude is displayed by representatives of the adult learning centre as well as by politicians, who see education as being valuable for the individual's freedom of action on the labour market and beneficial for the development of local business and the local economy. Both the survey and the interviews point to a shared 'progressive' perspective among the different actor networks in which access to services provided by the adult learning centres benefits individuals, business and municipalities.

The common standpoint presented above is less obvious when we refer to the practice of education. The business community seems more interested in the cost of production than in symbolic values gained from having personnel training. Sixty-six per cent of the businesses argue that personnel training must lead to increased productivity to compensate for the cost of training. The 'effectiveness' of educational investments and the value of personnel training are more important to business than for public authorities. The nature of knowledge and the place of learning are other issues that complicate the practice of adult learning centres. Industry asserts that learning is intimately connected to work and that knowledge is 'bound' to the context or the situation. Public service organisations tend to have a different opinion, seeing knowledge as obtainable in situations outside the direct place of work.

Turning to the question of supply and demand of education in the local market, the study uncovers significant differences between what is offered and what is asked for. The adult learning centres provide courses in higher education that have a common or a generalised character, such as computer knowledge, pedagogy, care/nursing and economy. This kind of general knowledge seems to be much more appealing to public service organisations than to trade and industry. In contrast to the actual supply of courses offered by the adult learning centres, the survey shows how the demand for competency by industrial enterprises, agriculture, restaurants and hotels is closely related to practice. This form of expert knowledge is not provided by the adult learning organisation. The results from the questionnaire also show how more than half the respondents feel that the supply of courses is not relevant to their own business. The survey points to a lack of balance, which also affects the relationship between the adult learning centres and the public and private sectors in the region.

As regards the question of what contacts have been made between the adult learning centre and the business community, the results of the survey show a low degree of activity. The questionnaire shows how less than sixteen per cent of the public and private sectors have come into contact with the adult learning centre in their municipality in the last four years. According to the survey, public services utilise adult learning centres to a greater extent than trade and industry. It is also the former category that is more interested in future cooperation with the local adult learning centre. Interviews with representatives of the adult learning centres give several reasons for a weak relationship. First, they claim that the business community is short-sighted in that it does not see the benefits of education in the long run. Second, personnel training is an issue of increased costs rather than the benefits to the individual and the enterprise itself. Finally, representatives of the adult learning centres argue that the business community ignores the change of generations and they experience a 'sluggishness' in marketing mainly due to the use of different language based on differing ideological standpoints.

The article sheds light on three aspects of a specific link between different actor-networks: the local learning centres' organisation and the public and private sectors. The composition of an actor-network can be explained in terms of a series of heterogeneous elements that are linked to one another for a certain period of time. The links that bind an actor-network require a two-way flow in order to maintain 'good' relations. A lack of similar interests may weaken the flow between existing links and result in obstacles to establishing new links. The study shows how the adult learning centre organisation fails to act as a broker due to the differing interests of the actor-networks involved. The business community claims that personnel training is a question of productivity and learning a process intimately connected to practice. Trade and industry organisations show little interest in courses offered by the educational actor-networks. The adult learning centres cannot redirect the supply of courses and are subject to the whims of the university colleges in the region. We can see how the adult learning centre encounters one-way flows from two directions and its attempts to create new links could be made practically impossible due to an inability to exert an influence on surrounding actor-networks. Another problem when trying to establish new links to business arises when a single uniform marketing strategy for different actor-networks is used. Courses that seem appealing to public service organisations make less sense to trade and industry and vice versa. The role of the adult learning centre is forced into becoming that of a mediator, which challenges the concept of being a broker of knowledge and competency.

Study two

Constructing actor-networks for the practice of local learning centres in Sweden

This study seeks to outline the different interests of the LLC organisation and investigate the obstacles as well as the strategies employed in the process of constructing a network of adult education in Sweden. In a number of interviews, the representatives of the LLC organisation describe the strains of networking: obstacles and strategies for involving new actors in the network. The construction of networks investigated in this study is described from the viewpoint of the representatives adopting the perspective of actor-network theory.

Actor-networks are created in the process of translation (Callon 1986). Four moments describe the process; 'problematismation', 'intressement', 'enrolment' and 'mobilisation'. In the moment of problematization, the network constructors strive to distinguish and define actors. Negotiations are necessary to convince actors of the status of the network and to create alliances and associations between the focal actor and surrounding actors. The 'obligatory passage point' is a mutual understanding which has to be transferred to desirable actors. Actors are enrolled in the network by means of negotiations and strategies. The goal of the network constructors is to become indispensable as the focal actor in an actor-network that is structured by fully established actors.

The study is based on interviews with representatives of the local learning centres in five municipalities. In the study, one project manager and four headmasters have been interviewed in their capacity as professionals. The study includes statements made by a broad range of interviewees; employers, educational officials, librarians and union representatives who have all contributed to a broad perspective on the local learning centre organisation. Furthermore, the headmasters in the municipalities were asked to illustrate the current status of the adult education network. The interviewees were invited to draw a picture of the network in which the LLC organisation is an actor among others. The interviewees were also encouraged to mark the strength of the links between the LLC organisation and other actors in the network. The drawings have been used in the interviews as a basis for further discussion and explanations.

The results from the study show that a large number of actors are connected to the network of local learning centres. The main groups are educational organisations, public administration and business. From the viewpoint

of the LLC organisation, actors are considered to be 'self-evident', 'interposed' or 'reluctant' to be involved in the network. The definition of the status of an actor is based on what the network constructors believe and expect of an actor, not the actual quality of interaction. From the perspective of the LLC organisation, there are several actors that may share a mutual understanding of adult education and thus become self-evident in the process of enrolment in the network. For instance, people living in the municipalities are seen as a self-evident group that have all the advantages of the local learning centre. An actor can also be 'interposed' in the network construction. For instance, educational arrangers have to co-operate with public administration, which makes the relationship inflicted rather than voluntary. An actor that does not play along or is believed to put up some kind of resistance to involvement in the network is viewed as a reluctant actor by the LLC organisation.

The results from the study show how the involvement of self-evident actors can be compromised. One factor that affects the actor's adoption into the network is geographical location. Another component is the autonomy of actors. Self-evident actors may resist involvement in the network despite a mutual understanding in significant areas of interest. Resistance is arises as a result of misunderstandings and difficulties in collaborating.

The study also shows how transferable images are produced by the LLC organisation. Images are interpreted as an obligatory passage point and involve education as a personal development project embracing the ideas of lifelong learning, flexible learning and municipal development. From the perspective of the network constructors, the individual will benefit from adult education in several ways. Education will, for instance, make you "develop a sense of self-confidence and "appreciate your work". It can be argued that the concept is adopted by the LLC organisation is part of the idea of lifelong learning. People should continue to learn throughout their lives and acquire multiple types of learning experiences based on their personal capacity. The obligatory passage point also embraces municipal development, seeing the provision of adult education as a question of social service. Finally, the images involve competency and in-service training are important to the business community.

The results of the study point to some main obstacles perceived by the network constructors. The implementation of the network is constrained by formal requirements in the educational systems. Second, the LLC organisation faces problem of financing the activities of the local learning centre. Third, the network constructors experience constraints to successfully attracting the users of the services offered. The LLC organisation has formed an image of education as beneficial to the individual, municipal development and business. The concept is believed to be strong and has to be transferred to

the network. The study shows how the network constructors discover that the concept is not convincing to everybody. Business in particular is regarded as a reluctant actor that is hard to approach.

The results from the study stress different strategies for overcoming resistance. The network constructors make personal visits to businesses in the region as they regard face-to-face meetings as important for improving relations. A second strategy concerns the direct involvement of actors in the activities of the local learning centre. The network constructors invite a large number of actors to join a 'management group' and a 'reference group', which will give the actors an opportunity to influence the activities. The results from the study stress the imperfections of strategies employed.

The moments of translation presented by Callon (1986) are related to network construction and the article discusses the attempts of the LLC organisation to attain a strong position as an indispensable actor in the network. It can be argued that the interest of the networkers involves two directions. One reason is to secure a future financial position by implementing an interest in education and by recruiting a large number of enterprises to the network. Another reason is to 'legitimise' the activity of the LLC organisation. The network constructors define the role of the LLC organisation as a focal point of diverse interest as regards education, growth and social development. Failure to involve the actors defined will jeopardise the foundation of the LLC organisation. The moment of translations aims to integrate and 'root' actors in the network. It can be argued that the network constructors have not reached the moment when enrolment has finally succeeded. The actor-network is still under construction. The main obstacle to involvement is convincing actors of the obligatory passage point.

Study three

Creating learning space? Videoconferencing at local learning centres in Sweden

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Videoconferencing is a technology that is said to invalidate the constraints of space and time and create new learning environments (Wilcox 2000). This article concerns the practice of videoconferencing in the context of local

learning centres in Sweden. The classroom, located in the local learning centres, can be described as a socio-technical environment in which communications technology is made a significant and inseparable part of the practice. The aim of this article is to expand our understanding of videoconferencing as a learning practice constituted by spatial relations. The electronic classrooms cannot be seen as containers of social activities. In fact, they are designed places in which communications technology is made a significant and inseparable part of practice. This study seeks to describe how classroom design and technological artefacts impact the practice of the remote classroom. The question here is twofold: How is the learning space formed in terms of materiality and how do actors produce spatial relations within the practice of videoconferencing?

The result of the study shows how the practice of videoconferencing takes place in built environments, materially constructed and designed for specific purposes. The environment of the remote classroom involves concrete things such as the lighting appliances, audio equipment and the sound-absorbing arrangements. Also furniture, desks and chairs, as well as technical artefacts, monitors, cameras and microphones are integral and inseparable parts of the texture. It appears that the remote classroom is fundamentally a material space in which components are organised based on the ideas of technical functionality and rational handling of equipment. The remote classroom constitutes a *designed material space* organised to facilitate the practice of videoconferencing.

Drawing on the results of the study, it seems as if the layout of the remote classroom *either* has to satisfy communication and interaction among students physically present *or* realise the full potential of technical capacities. What is functional from a technical point of view seems less applicable to participants and the other way around. The results also depict the classroom layout as a matter of surveillance and control. It has been argued that the theatre setting is an organisation strategy where the teacher's desk dominates the class, symbolising authority (Jackson 1976), and letting students, like the inmates of Bentham's panopticon, be on display all the time (Comber and Wall 2001). In videoconferencing, the teacher is replaced by a television screen and the authority that comes with the teacher's position in the classroom seems to be transferred to material design and technical artefacts.

The classroom layout and the way students place themselves may seem spontaneous, but my data show that this is a well-calculated act to avoid attention or interaction. From the participant's perspective, the relation between the materials and people is characterised by compromises and adaptation as well as by different strategies for handling awkward and unpleasant situations. Students, teachers, technicians and other support personnel have to 'manoeuvre' in a material and technical setting and adopt different strategies.

The strategies, which are evident in a series of situations, can be described as clashes between the concept of technical design and the students' behaviour.

Material design and technical artefacts are not passive objects. Waltz (2004, 1998) argues that artefacts interact with people as co-creators of any educational environment. My data show that technical artefacts record events visually and verbally and bounce places and events back and forth beyond the immediate control of participants. We can view the *technical artefacts as actors* that act as if they were animated and by doing so produce a relation based on technical standards and technical design. As a consequence, we have to rethink the material setting and technical equipment, that is, from neutral mediators to *actors* that impact the social construction of the learning space.

The actor-network constitutes a configuration of relations between actors that are characterised by cohesiveness and impartiality. The actor-network is the process confronting surrounding actor-networks in a struggle for dominance and superiority. The results of my study reshape the internal relations of the actor-network and point to the imbalance of actors' relations in terms of inequality. What is interesting in the data is that the network has an internal hierarchy of power. The results of the study show a hierarchical status and an imbalance between actors in the network. Humans receive a subordinate position in the network and the interrelation is transformed from a neutral link between two equal actors to a relation based on power. The character of the relation between participants and technology is signified by technical superiority in which technical artefacts, technical design and technicians uphold the rules of engagement. Students and teachers have to comply with the intentions of design and by doing so subordinate themselves to technical design. This is a matter of material superiority over cognitive space or, in other words, the dominance of material actors over human actors.

Finally, videoconferencing is presented as a medium for enhanced communication (Wilcox 2000) and interaction between peers is seen as a valuable component in the process of learning (MacKinnon *et al* 1994). The passivity emanating from the tension between technical design and participants is inconsistent with such ideas of learning by interactivity. Hence, a notion of teaching as conveying knowledge is maintained despite the intention of creating an interactive dialogue. Inter-action and dialogue have always been claimed to be central to learning (Knowles 1989; Boud and Felletti 1997; Boud and Garrick 1999) and it is debatable whether the conditions for learning in such spaces are favourable for learning.

Study four

In the framework of videoconference classrooms at local learning centres in Sweden

In the Framework of Videoconference Classroom at Local Learning Centres in Sweden, Accepted. Subject to minor revisions in *European Journal for Research on the Education and Learning of Adults* in October 2010.

In recent years, videoconferencing has been established in the context of local learning centres in Sweden to promote adult and distance education in rural districts. This study aims to investigate interactions between participants in videoconferencing classes and the article focuses on how actors communicate; the different forms of talk between the teacher, students and technicians in the classroom.

Summarising research done in the field of videoconferencing shows that a large part concerns technology. Studies focus on technical equipment as an obstacle to unhindered communication. For instance, Knipe and Lee (2002) state that the quality of teaching in videoconferencing is not the same as in traditional classrooms since teaching using a monitor, camera and microphones always reduces the quality of learning. Waltz (1998) claims that the equipment in videoconferencing has usurped the pedagogical choices of the teacher and transferred control of the virtual classroom to technicians, manufacturers and engineers. The actual handling of equipment and the fact that communication is mediated among dispersed groups of students are seen as intriguing problems by scholars. For instance, the physical distance between students in the remote settings and the role of the distant teacher are topics observed in studies focusing on videoconferencing (McHenry and Bozik 1995; Unander 1999).

My study is based on participant observations guided by an overt research strategy in which the researcher is identifiable (Hammersley and Atkinson 2000) and by moderate participation in which the researcher does not actively participate in the classroom activities (De Walt and De Walt 2002). The study comprises 37 different occasions between 2003 and 2005 at five different local learning centres. Data used in the study concern two different forms of educational sites; the remote classroom and the origin site. The remote classroom is the physical locality of the local learning centre. The origin site is the place where the teacher (and occasionally students) is located during broadcasts.

The data cover the activities in the classroom, focusing the spoken language, gestures and the behaviour of the actors involved, e.g. the students, the teacher and supporting technicians.

The analysis concerns different educational contexts; courses provided by the university college as well as adult education provided by the municipality at upper secondary school level. The process of analysing qualitative data involves structuring observations and interpreting findings. The results of the study can be described as a 'condensate' of analyses in which observations were successively interpreted and categorised.

The results of the study show that a significant part of the teachers' communication is based on questions. My data show that questions asked in the videoconferencing class have different functions. Questions may have a rhetorical function, an expanding function, a provocative function or a management function.

My analysis shows that rhetorical questions in videoconferences may have different purposes. The teacher may pose rhetorical questions in order to mark the structure of the lecture or to conclude or initiate a section. Rhetorical questions can also be used as 'pacemakers' to maintain a certain speed of the broadcast. I found questions posed by the teacher that aimed to expand the dialogue. Such questions seek to encourage an individual or a group of students to express their perspectives; to create another angle or insert tension into the discussion. Some of the teacher's questions take on a provocative form. My studies show how the teacher exhorts the students by trying to provoke them to interact. The provocative questions may purposely lead to new questions and further discussions related to the subject matter. Other forms of questions likely to occur in the videoconferencing class concern the management of the class and involve supervising, routines and administrative issues. It can be argued that the 'expanding' questions and the 'provocative' questions may be conformable to videoconferencing in order to overcome distance and break through the barriers of technology.

Regarding the nature of questions, it seems that a large number of utterances have a certain open or closed character. It can be argued that questions and statements take on a 'productive' or 'counterproductive' character. Productive questions or statements encourage the receiver to elaborate his or her answer and they become 'open' to feedback. In contrast, counterproductive questions may not encourage further elaboration since a factual answer, or a short yes or no, will do and questions and statements become 'closed' to further feedback. Productive questions seem to be encouraged by the attitude of the teacher and the climate in the group rather than by individual achievements. Students are more willing to elaborate replies and initiate discussions depending on the specific group in the remote classroom. New groups are more cautious about giving feedback, as are inexperienced students. Besides

asking questions and making statements in class, the teacher may tell stories or anecdotes. The subject of anecdotes usually concerns the task, but takes on a personal dimension, revealing the interests and the experiences of the teacher. It seems that the teacher tells private stories in order to encourage others to do the same. The main function of telling private stories is to break the ice and get the students to start talking.

Another form of interaction that takes place in videoconferencing classrooms is 'non-verbal'. Non-verbal communication consists of physical gestures made by the teacher and the students. Gestures may, for instance, signal interest or indifference and body language may indicate (consciously or not) such as fatigue or excitement. My interpretations of the data show that non-verbal communication occurs parallel with verbal communication, mainly to reinforce or modulate messages given verbally. The teacher may nod approval or make an inviting gesture with his hand that means: please go ahead. Larger movements, for instance, waving one's arm, are rare. Gestures may also be used as a communication strategy with some teachers exaggerating gestures, looks and smiles intentionally. The study shows evidence of a scarcity of traditional physical signs in the videoconferencing class. For instance, turn-taking cues such as raising one's arm or waving one's hand to draw the teacher's attention occur rarely if at all.

My study shows that communication follows a 'triadic pattern' based on adjacency pairs. Typically, the teacher initiates a discussion by asking a question or making a statement to students and subsequently concludes the interaction sequence by giving feedback on the students' responses. The communication follows the predicted structure of adjacency pairs of questions and replies linked in a chain.

Communication structures may fail to complete the triadic interaction pattern; for instance, if the teacher chooses to ignore the student or he or she actually does not hear the student. It can be argued that communication failure occur due to shortcoming in the communication system. The speaker needs to know whether his message has been received and understood, which is based on the recipient's abilities to acknowledge the accuracy of the message sent. Feedback in the form of 'back-channel' cues, such as facial gestures, is needed to know whether we have succeeded or failed to get our message across. It can be argued that videoconferencing lacks proper back-channel cues in many respects, which may 'delay' the messages sent and result in misunderstandings. As a consequence of delayed communication substituting conversations emerge. It seems that a large amount of talk is needed to clarify misunderstandings and that 'overacting' replaces the lack of body language and facial expressions. This form of small talk seems important when it comes to verifying what has been said and clarifying misunderstandings.

Finally, the results of the study focus on the distribution of communication. When adding up utterances given on seventeen different occasions at the university college's courses, only a small proportion (3%) of the total sum are made by the students. As regards the setting of the origin site, where the teacher is present, the activity of the students was slightly higher (8%). The distribution of utterances between the teacher and students was 92 and 8 percent, respectively, of the total sum.

In education provided by the municipality, the degree of interaction between actors in class is generally higher compared to courses held by university colleges. Based on observations on twenty different occasions in the remote classroom, the students were likely to account for almost one third of the communication (28%). The number of utterances made by students in class at the origin site was even higher (37%). The dispersion of communication between the teacher and students come up to 75 respective 25 percent in favour of the teacher.

The teacher is the main character, but is not the only factor that affects the degree of interaction in videoconferencing. My interpretations of data indicate a number of additional factors that may impact interaction. First, my interviews with students show that those who are experienced in handling the technology or those who are used to the methods of teaching in videoconferencing are in general more active in class than students who lack experience.

Second, if students and the teacher have met face-to-face before, or if they know each other from other situations outside the videoconference classroom (for instance, in other courses), interaction will increase.

Third, my studies show that the expectations of the students are important for how the interaction in videoconferencing developed.

Fourth, it seems that all the actors, both students and teachers, need to first learn how to communicate by means of videoconferencing systems. Knowledge acquired in courses on how videoconferencing really works in practice seems to be an important factor when it comes to increasing interaction.

Fifth, the knowledge and experience of the teacher affects how he or she acts in class.

Several scholars place the responsibility for interaction on the teacher (e.g. Dupin-Bryant 2004; Unander 1999). Videoconferencing is a complex teaching situation to which we must add the complexity of mediating technology. Waltz (1998) sees the teacher as an actor left powerless in the hands of engineers. My results show that technology constitutes an important part of the learning space of videoconferencing. Massey (2005) imagines space as a product of interrelations constantly in the process of being formed. The learning space of videoconferencing can be described as a web of interrelations

between people, environment and technical artefacts that are processed through learning activities.

Finally, one might question whether the communication pattern accounted for in this study is typical of videoconferencing or whether it is dependent on certain conditions or specific teachers? The value of data is mainly to make visible the direction, extent and character of communication in videoconferencing.

The varying conditions in the classroom make my results difficult to generalise to other situations than my specific sample. For instance, the number of students in class has varied between different observations and the teachers used varying approaches during the duration of the study. This study is not a final statement, but an example of how actors talk in videoconferencing.

6. Discussion

This thesis investigates the practice of local learning centres (LLC). The aim is to describe and establish an understanding of the links and relations that surround the practice. The four studies in the thesis seek to increase knowledge in two areas. The first area covers the links between organisations in a municipal and regional context. The second area involves the inter-relations between humans, technology and design creating learning spaces in the practice of videoconference. The two areas are connected in so far as videoconference is the core activity of the local learning centre's organisation. In the following, the main results from the four studies will be connected to the theoretical framework.

The first study investigates the LLC organisation as an actor situated in an educational market. The main problem raised in the study concerns the conditions of local learning centres as 'brokers' of higher education. The results of the study show how the LLC organisation fails as a broker in an educational market. Being a broker requires having a strong position in the actor-network. There are several reasons why the local learning centre is restricted as an actor. One is connected to the conceptions of education among actors. The study shows that three distinct perspectives on education and competency exist simultaneously in the actor-network. The public organisations connect symbolic values to education and competency. From this perspective, opportunities for personnel training become important in order to maintain a positive image of the organisation. Enterprises promote the logic of production since that acquiring competency is also a question of productivity. The LLC organisation, on the other hand, relates education and competency to policy concepts such as life-long learning and stresses local access to competency as a way of promoting municipal and regional development. It can be argued that differences in perspectives between actors negatively affect the opportunities to establish relations between the LLC organisation and surrounding actors. The occurrence of different attitudes towards education and learning among actors could break up the actor-network.

Reasons for weak relations can also be found in the reproduction of the link. As regards the question of co-operation between actors, the results show a discrepancy between courses provided by the local learning centre and the inquiries of surrounding actors. The main problem is that courses provided by the local learning centre are too universal to meet the requirements. The generic nature of courses seems to suit public administration

while enterprises are mainly interested in acquiring competency that can directly be put to use in the practice of work.

A second problem when reproducing the link concerns weak relations between actors. In particular the LLC organisation seems to have difficulties making stable contacts with business in the region. The study shows that the relation between actors is weak in spite of business being depicted as the main target group by the LLC organisation and despite the fact that many attempts to improve relations have been made.

Different attitudes towards education and competency, an irrelevant supply of courses and difficulties in creating relations severely curtail the opportunities for the LLC organisation to be a broker. Grepperud and Thomsen (2001) among others stress the role of a broker as a key concept of the local learning centre's practice. The LLC organisation should replace traditional educational arrangers and re-direct the supply of courses to satisfy the needs of the market. In my case, the position of the local learning centres is not strong enough to initiate and transfer their interests to surrounding actors in the actor-network. It can be argued that the LLC organisation has been transformed from a broker into a mediator standing more or less powerless between the university colleges and the municipal administration and business. It can also be argued that sharing a mutual understanding is a basic requirement for linking actors in the network.

The second study focuses on network construction. The results of the study show how the LLC organisation strives to convince surrounding actors that they should fit into an 'obligatory passage point'. The network constructors have to produce a 'contingent of interest', which has to be adopted by new participants in order to encourage them to join the actor-network (Callon 1986, Nesper 1994). The results of the study show that the LLC organisation seeks to implement the idea of adult education as a key element in the network. The concept can be described as a mix between education as a 'personal development project', the concept of lifelong learning, flexible learning and municipal development. The definition is believed to function as a 'transferable concept' or as an obligatory passage point into the actor-network.

The results of the study show how factors may constrain the enrolment of actors in the actor-network. The LLC organisation cannot change formal requirements for studies or influence future government subsidies. One additional obstacle concerns the attempts to convince business of the importance of education and in-service training. It can be argued that the main problem is the rationale, which differs between the concept of the LLC organisation and business. The LLC organisation claims that the business community is shortsighted and far too cost-oriented. From the viewpoint of the network constructors, business focuses on cost effectiveness rather than "making

investments in competency that will secure future requirements in the workforce". The business community claims that personnel training is a question of productivity and shows little interest in courses presented by the local learning centre. Different strategies used by the local learning centres, such as personal visits, inviting central actors to meetings at the local learning centre and advertising in local newspapers all seem futile. Business is still not interested.

The second study looks into the structure of actors that surround the everyday practice of the local learning centre. Three main groups of actors are defined as part of the actor-network; educational organisation, public administration and business. The results of the study show how involvement in the actor-network is based on expectations and beliefs of the network constructors. An actor is regarded as self-evident, interposed or reluctant towards involvement in the actor-network. Self-evident actors are mainly actors who themselves are involved in education or connected in one way or another to the provision of adult education. The public administration is regarded as a self-evident actor, but also being interposed by virtue of the requirements of co-operation between authorities. Reluctant actors are mainly actors connected to the business sector. Reluctant actors hold an exceptional position in the mind of the networkers and much effort is made to persuade and attract business to enrol in the network.

The actor-network exists as a structure of interrelated actors (Mulcahy 2007) attached to adult education and the local learning centre's organisation. Latour (2005) defines the actor-network as a structure of heterogeneous objects that are linked to one another for a certain period of time. The perspective of actor-network theory focuses on the interrelation between actors. The LLC organisation is influenced by a wide range of surrounding actors and interrelations have to be maintained in order to reproduce actor-networks. The first and second studies show how the LLC organisation fails as a broker for a number of reasons. In order to construct links in an actor-network a strong program is required in order to be able to exercise power on actors in network structures. It can be argued that the concept of bringing 'higher education' into a local context is not sufficiently strong to convince important actors. An irrelevant supply of courses and inadequate efforts to create links to business do not explain the failure. The main problem is the concept itself.

In the second study, the network has been described as a flow of interactions between the LLC organisation and surrounding actors. How, then, can we visualise actor-networks? Latour (2005) argues that we need to identify actors to find out which ones are acting and which are acted upon. The 'actants' identified should then be followed through a trajectory until they become actors, that is, acquire a distinct and relatively stable character.

Actants with successful programs, or anti-programs, may establish themselves as actors. The first and the second studies use the perspective of the LLC organisation in order to shed light on the actor-networks. The LLC organisation is defined as the focal actor. The trajectory of the LLC organisation has been described in the studies by means of a number of network activities. The practice is the sum of existing relations between actors as well as the attempts to create new links to surrounding actors. It has been argued that the practice of videoconferencing can be captured in the metaphor of actor-networks.

The third and fourth studies concern the practice of videoconferencing. The studies describe a socio-technical environment in which technology plays an important part as an actor that affects interaction and communication in class. From the perspective of actor-network theory, videoconferencing becomes a complex of relations and interconnections (Mulcahy 2007; Massey 2005) that involves human actors as well as material objects (Edwards and Usher 2003).

The third study focuses on how actors produce spatial relations. A materialist interpretation involves both material and virtual dimensions of spaces (Soja 1985). The results of the study show that the remote classroom is a material space designed to facilitate the practice of videoconferencing. The conclusion made is that material design and technical artefacts are not passive objects. It can be argued that artefacts interact with people as co-creators of the space. Artefacts become actors (Waltz 2004). As a consequence, we must consider the material setting and technical equipment as actors, not neutral mediators that impact the social dimension of the learning space.

The study shows how participants have to adapt to handle awkward situations. Students, teachers, technicians and other support personnel have to 'manoeuvre' in a material and technical setting by using different strategies. The strategies can be described as 'compromises' between the requirements of technical design and the behaviour of the students'. The study shows how students are uncomfortable performing in front of cameras and how they see videoconferencing as remote, inaccessible and uninteresting. A conclusion is that the students try to stay out of interaction and communication, which contradicts the basic ideas of the practice. This passivity is inconsistent with ideas about interactive learning. Interaction and dialogue have always been claimed to be central to learning (Knowles 1989; Boud and Felletti 1997; Boud and Garrick 1999) and it is debatable whether the conditions for learning in such spaces that lack these features are favourable for learning.

In the fourth study, the learning space of videoconferencing is further investigated. The study seeks to describe how participants talk during videoconferencing. The main results of the study show that utterances made by the

teacher have different functions. Questions and statements may have a rhetorical function, expanding function, provocative function or a management function. Especially the expanding and the provocative questions are of interest for the practice of videoconferencing. The study shows that expanding questions may be used to initiate and encourage further discussions among students located in the remote classrooms. Provocative questions are used to deliberately trigger new questions and discussions. Both expanding and provocative questions as well as statements are designed to break through the barriers of technology and provoke students to communicate. The teacher seeks to influence the students and create interaction even though they are located physically distant. It can be argued that argumentative questions are designed to receive feedback and are used in order to capture the interest of the students. Kumpulainen (2001) argues that argumentative discussions are more effective in fostering the student's critical thinking. It has also been said that discussions that serve to stimulate and support 'higher-order thinking' throughout the curriculum are preferable (Cazden 2001). The study shows that a large number of questions have a closed character that does not support discussions.

In the case of non-verbal communication, it can be argued that the main distinction between videoconferencing and face-to-face teaching is the occurrence of technological shortcomings that make gestures and body language less comprehensible to actors. The study shows that there is a scarcity of 'traditional physical signs' in videoconferencing such as turn-taking cues. For instance, the students seldom raise their hands or wave them to attract the teacher's attention

In conclusion, videoconferencing seems to lack proper back-channel cues, which may 'delay' the messages sent and result in misunderstandings. The lack of cues conveys what we may interpret as 'substituting' conversations. It seems that a large amount of talk is needed and that 'overacting' replaces the lack of body language and facial expressions. This way of substituting small talk seems to be important for verifying what has been said and for clarifying misunderstandings. What can be achieved in class is a 'working agreement' in which the actors accept the shortcomings of communication.

All four studies taken together involve the practice of local learning centres. The practice has been described as the production of relations, links and associations between different forms of actors. Interrelations between actors have been analysed both in the context of the municipalities as well as in the videoconference classrooms. It can be argued that the perspective of actor-network theory is a practicable method for shed light on the practice of local learning centres. Law (2000) argues that the network is an effect of an array of relations and that the network holds together as long as those relations do not change their shape. Drawing on results from my studies, it

seems impossible to describe a configuration that adequately describes the actual actor-network of the LLC organisation. The borders of the network are blurred and the enrolment of actors is still an on-going process. The actor-network cannot be captured in an on-the-spot account since it flows, constantly re-constructs itself and changes content. The actor-network includes heterogeneous objects ranging from material objects, such as school buildings, to conceptual thinking such as lifelong- and flexible learning. The network is especially constructed and contains a powerful concept that is successfully transferred by the network constructors to some actors, while other remains unaffected. The network grows in one part and simultaneously collapses and starts to fall to pieces in another. It can be argued that the actor-network depicted by the network constructors is based on wishful thinking and that the construction process is a way of achieving an ideal network status. The actor-network does not exist in reality.

Returning to the field of research some years later shows that three out of five local learning centres have been closed down. However, municipal adult education and university colleges are still actors on the educational market in the region. What happened to the LLC organisation and the project collaboration between municipalities? The thesis shows some of the obstacles an actor may confront trying to influence existing actor-networks. It can only be speculated the strength of surrounding actor-networks and the force of the concept of the local learning centres.

Research can be developed in the context of municipal and adult education. The ideas of distance education and flexible learning are powerful actors and the requirements of adult education and competency are still significant to the development strategies of the municipalities. One conclusion made is the one that adult education prevailed due to a strong position in the actor-networks of education. A researcher can focus on the municipal adult education as an actor and develop knowledge concerning the importance of education and competency in rural districts from the perspective of actor-network theory.

The actor-network theory provides a different perspective on the practice of local learning centres. Previous research has focused the situation of students engaged in studies at the local learning centre (e.g. Roos 2002) and the practice of distance education (e.g. Svensson 2002). Previous research also stresses the networks in the context of local learning centres (Jakobsson 2007) and the collaboration in network constellations between small enterprises (Holzhausen 1993). The perspective of actor-network theory elaborates the actor-networks and shed light on the relations of actors. It can be argued that the practice of the local learning centre organisation and videoconferencing is based on interrelations. The perspective of actor-network theory emphasises the power relations between actors. In videoconference human ac-

tors are subordinated material objects and the LLC organisation lack power to enrol surrounding actors. The links, relations and associations between different forms of actors create practice. To investigate and develop knowledge concerning the interrelations is not only to adopt a different perspective but to increase our understanding of adult education practices.

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