	RESEARCH PROGRAMME (appendix A)
GÖTEBORG UNIVERSITY	**Learning, Interaction, and Mediated communication in contemporary Society (LIMS)**

1. Specific Aims

This application describes a research program on human learning inside and outside formal institutions. In brief, the aims and ambitions of the activities can be summarized as follows:

1. A unifying feature of the LIMS research agenda is an interest in empirical research within a sociocultural perspective on learning in different settings such as schools, workplaces and other contexts. Central to this agenda is also an interest in theoretical and methodological development using modern technologies to contribute to further advance research on learning as an individual, interactive and collective process.

2. The focus is on an interest in studying the social organization of learning. This theme implies analysing what we will refer to as the study of the 'politics of learning', i.e. research on the distribution, monitoring and provision of resources for learning for different groups of citizens in late-modern society. Issues of marginalization and the challenges of the increasing heterogeneity of societies are important elements in the dynamics transforming the conditions of learning inside and outside formal education. Another facet of this set of issues is the interest in a critical analysis of international comparisons of educational achievement and systems of monitoring performance.

3. There is an emphasis on the role of changes in technologies and media for learning. This interest we pursue at two different, but related, levels of inquiry. The first one concerns how digital resources transform learning activities of individuals and the communicative fabric of groups and collectives. The second level refers to the manner in which access to information on a global level transforms the uses of libraries and similar resources for learning. Both levels of inquiry share an interest in analysing the development of media/information literacy in the digital age and in issues of how people can exert agency in activities characterized by the uses of digital media.

2. Significance

Knowledge and skills are central to society and its citizens. The more complex society becomes in terms of technologies and social organization, the more significant the role of learning will be. Learning is at the core of the creation of human capital, and, increasingly, it is a necessary prerequisite for active citizenship in a democratic society. Furthering our understanding of learning in contemporary society is a challenging research task. The focus of the research outlined is to contribute to the analysis of human learning inside and outside educational institutions, and to provide in-depth understanding of how learning can be improved and adapted to the needs of all groups of citizens. The work described has relevance for the general public debate about schooling and learning in other settings, for decision-making and for the evaluation of educational achievement, but it is also intended to be significant for teachers and many other professionals who nowadays are directly involved in facilitating learning throughout the life-span. The program described can also be seen as a direct realization of some of the central ambitions of Göteborg University to engage in

constructive and open dialogue and co-operation with society on issues of how to organize life-long learning in manners that facilitate access to education for all.

3. Value added

The Department of Education, Göteborg University, is a stronghold in Scandinavia for research on learning, classroom interaction and educational achievement. In addition, we have a well-documented interest in issues of life-long learning and in analysing the provision of training opportunities for people affected by the restructuring of the labour market. The department is clearly one of the biggest research units in this area in Scandinavia, and it has maintained this position over many decades. By playing a national role in research and research training, it will be possible to intensify our already very lively cooperation with other research departments on these very central issues. Networking with departments at other universities allows for a further specialization on our part at the same time as partner institutions, which are often relatively small, can profit from our expertise. It is our conviction that research and research training in the field of learning will improve in quality when national cooperation is systematically organized in this manner. This will also be to the benefit of university students at all Swedish institutions of higher education. The long-standing cooperation with the research group on learning, information seeking and use at The Swedish School of Library and information science at the University College of Borås adds interdisciplinarity and specialized skills that are relevant for our research agenda on life-long learning, information literacy and related issues (see below). Several of the members of our team are also connected to the IT-university, where they teach and do research. The IT-university is a faculty jointly run by Göteborg University and Chalmers for advanced teaching and research on the uses of information technology.

4. Overview of the Field

4.1 Introduction

During the past few decades, issues that relate to learning and the development of human competences have received increasing attention, to put it mildly. The role of knowledge and skills for society at large, as well as for its citizens, is recognized by all major actors. In the public debate, metaphors such as the 'knowledge' or 'information society', vague as they may be, testify to the perception of the centrality of such factors for social progress. One consequence of this development is that the educational systems have expanded at all levels. But the expansion of the educational system in terms of student numbers and years of schooling is only one sign of the significance of issues of human capital in society. The social organization of learning itself has been transformed. Education is no longer exclusively for a relatively homogeneous, young population preparing for work and adulthood. The educational systems now serve the needs of populations that are diverse in their cultural backgrounds, orientations, interests and needs. Concepts such as life-long and life-wide learning signal that learning is now a regular part of the life careers of most citizens. To accommodate to these developments, learning has to be a pervasive element of many activities outside the educational system as well.

Parallel to these transformations of society, research on learning has undergone rather dramatic changes, as we will attempt to show in what follows. There is an increasing demand for knowledge about how to organize learning that is relevant to the needs of practitioners in different sectors of a society with a high division of labour. But learning is also at the core of the development of a democratic society, and to an increasing extent citizens have to participate in learning in order to be able to exert their democratic rights. In the presentation

of the past achievements of the LIMS group, we will highlight some of the contributions to research on learning, teaching and education that the members of the team have made.

4.2 Learning and human development: A short note on background and challenges

The empirical study of human learning originated in experimental research in the 19th century. During the 20th century, two perspectives on research have been dominant; the behaviourist and the cognitivist, respectively. The cognitivist tradition, in turn, can be divided into two different traditions: mainstream cognitivism based on the information processing metaphor and Piagetian developmental psychology. These theoretical perspectives have exerted influence on two levels: as analytical frameworks in research, on the one hand, and, on the other, as sources of inspiration for developing new educational practices.

4.3 A sociocultural perspective on learning and knowing

The sociocultural approach to studying learning, thinking, and interaction, which can be seen as an alternative to cognitivism and behaviourism, originates from the work of Vygotsky (1987) and his colleagues. The general history of this tradition has been documented in depth (cf., for instance, Wertsch, 1985), and we will not elaborate further on this. This perspective is the shared platform of the group, although the research interests and priorities vary. Perhaps one of the most revolutionizing changes in the theoretical interpretation of learning is the recognition of the fundamental manner in which learning is situated in human practices (Lave & Wenger, 1991). This is not just a theoretical reorientation; it also has epistemological implications and affects the manner in which we assume people come to know the world and appropriate skills that make it possible for them to participate in human practices. At one level, recognizing the situated nature of human knowing and learning is nothing new. But, still, analysing learning from such a perspective has profound implications for empirical research and for theorizing. It implies, among other things, that the contents of learning, the contexts in which people act, and the cultural tools they have available, must be taken into account in the understanding of what characterizes productive learning.

4.3.1 Learning as an institutional activity

A shared background for the line of research that the LIMS team will pursue is the work carried out by Ference Marton, Roger Säljö and their colleagues in the 1970'ies on learning, initially in higher education (cf. Marton & Säljö, 1984). One prominent idea of this extensive work was to study learning from the learner's perspective and as a recognizably educational phenomenon. Thus, the point of departure was a critique of the dominant traditions which studied learning without considering features such as context, contents, institutional factors, and, in general, without paying any attention to the perspective of learners and what they were attempting to achieve *in situ*. The critique towards mainstream traditions was thus that the conceptualization of learning adopted in research was too abstract to be informative for the understanding of educational practices. It is, so we argued, impossible to incorporate context, contents and other factors into our understanding of learning afterwards; such features have to be constitutive of how we describe and theorize learning (Säljö, 1982, p. 29ff).

In hindsight, and in the parlance of present-day sociocultural theory, this implies taking a situated view on learning. Learning is always the learning *of* something, and it is a concrete achievement within a specific social setting in which it is embedded. Two of the first articles that presented this perspective to an international audience were published in the *British Journal of Educational Psychology* by Marton and Säljö in 1976 (Marton & Säljö, 1976a, 1976b). The first article, which became one of the most quoted articles in the history of this very established journal, introduced the idea of qualitative differences in learning, i.e. in

understanding the contents of learning. This variation in the outcomes of learning captures the 'depth of understanding' of a particular concept, argument or principle. Furthermore, the first article illustrated empirically that there is a correspondence between how people approach learning, and the kinds of learning outcomes that can be observed. The second article, a short version of Säljö's (1975) thesis, illustrated how learners' approaches to learning (described through the distinction between a deep and a surface approach, respectively) were very much a consequence of their expectations of what the test situation would be like.

This line of research became quite influential internationally, especially in the study of higher education, and it developed in different directions (cf. edited volumes by Ramsden, 1988; Richardson, Eysenck, & Warren-Piper, 1987 and several others). The study of approaches to learning became a research field in its own right, and in many of these studies the distinctions described by Marton and Säljö in the original work continue to play a central role (for recent work, see Caspi, Gorsky, & Privman, 2005; Vermunt, 2005). Another element of this work that has exerted a considerable influence is the study of what is now referred to as 'epistemological beliefs'. This is the idea that people hold subjective ideas about what concepts such as learning and knowledge mean (Säljö, 1979). These conceptions are rooted in their experiences of institutional practices. Thus, when viewed from the perspectives of learners, learning and knowledge are not homogeneous phenomena; they are interpreted differently, and these interpretations are consequential for how we act as learners.

To conclude, a generative interest in this work that is carried forward in the team is the focus on issues of what in Vygotskian theory is called sense-making, and what Kress (2003) refers to as meaning-making, i.e. how people through their actions transform information to knowing. This implies that the focus is geared towards analysing the actions of learners as they interact with cultural tools (media, computers, texts, visual information, etc.) and other people in processes of appropriating knowledge. This focus includes an interest in studying the support for learning as it is organized in classrooms and other settings.

4.3.2 The social organization of learning: Classroom interaction in relation to social inclusion/exclusion and the politics of learning

In its early days, classroom research in Sweden was linked to ambitions of producing prescriptions for teachers and curriculum designers. This was in line with the technological conception of teaching that dominated the 1960'ies. The wider social context was, in many cases, of little interest in this work. However, in the field that was later to be referred to as curriculum theory, studies of teaching and learning were put in the context of educational policy, and there was an attempt to establish a link between teaching and the performance by pupils. One important concept to emerge from this work was that of frame factors (Dahllöf, 1967; Lundgren, 1972). Such factors, e.g. school laws, national curricula, and systems for resource allocation, were regarded as constraining and regulating the teaching process. In these studies, the teacher was regarded as the main actor, and the predominant context for research was the (reformed) education system. The outcomes of teaching were explained by conceptualizing teaching as a process that took place within specific limits. This approach was later conceptually developed through inspiration from Basil Bernstein. In this latter work, notions of curriculum codes were regarded as vital, as were classical conceptions of social interaction developed by Durkheim (classification) and Goffman (framing). These developments implied that *context* turned out as a vital factor to consider when studying educational practices. Analytically, the social and cultural contexts were seen as producing the preconditions for a teaching process, which, in turn, was considered as a mechanism in the reproduction of culture and society.

These concepts have been taken further by members of the LIMS group, especially by focussing on the classroom, its practices and the implications for the wider issues of student careers and cultural reproduction. Lindblad and colleagues (cf. e. g., Lindblad & Pérez, 1997) have discussed various features of the social determinism of social reproduction theories, from the point of view of resistance theories and cultural theory. This resulted in a reconceptualization of notions of context as well as of the framing of classroom interaction. Thus, Sahlström (1999) used conversation analysis, and the concept of political economy of interaction, to analyse how inequalities in schooling were constituted in classrooms. Comparisons between recordings of interaction were carried out – showing major changes in framing of classroom interaction over the year, but also underlining the dynamic nature of frame factors. Thus, these are not given from the outside in a mechanical sense but created and recreated in the making of classroom interaction. Lindblad and Sahlström (2002) compared micro-ethnographic classroom interaction studies over four decades and pointed to the changing conceptions not only in conceptual frameworks but also in the approaches used for production and analysis of data. What is striking from the analytical point of view in these developments is: a) a shift towards what we call a constitutive understanding of classroom interaction – including the constitution of the classroom as a context for social interaction and learning – and, b) an increased understanding of the complexities of classroom interaction that has emerged during the last decades. Furthermore, Emanuelsson and Sahlström (2005) put these notions into the context of an international comparative analysis, where the Swedish progressive movement was scrutinized with respect to classroom practices.

These shifts in conceptual frameworks stress the significance of the idea of attending to the making of educational systems in interaction. Attention is focussed on the importance of interaction in the making of identities and on the role of asymmetries in interaction in the production of categorizations and diagnoses (Hjörne, 2004; Mäkitalo & Säljö, 2002) that have an impact on the organization of schooling and the making of social inclusion/exclusion. The shift means that our understanding of classroom interaction has become more differentiated, but also that the outcomes of classroom interaction are regarded as more complex compared to what was the case in the 1960's and 1970's, when test results were the main criteria of educational outcomes. Focussing on interaction in the making of educational systems, and on their outcomes in terms of social inclusion/exclusion, does not imply that policy issues are left unanswered. What we find during recent decades – when institutional restructuring has been on the agenda – are changing ways in the making of politics in, and of, education. The changes in governing from government to governance (Lindblad, Johannesson, & Simola, 2002) imply that increasing expectations as regards responsibility and accountability are put on teachers and students with respect to educational processes and outcomes. There is a need to reconceptualize learning as well as social inclusion/exclusion in political terms. We need to further develop conceptual frameworks of learning that connect to issues of interaction asymmetries, social inclusion/exclusion, and to the use of resources.

This discussion concerns educational systems in transition and the contemporary settings for learning and interaction. We have tried to develop this line of research at different levels of inquiry and in terms of: a) policy analyses (Popkewitz & Lindblad, 2004), b) comparative ethnographies and in relation to international comparisons (Lindblad & Marton, 2004), and c) notions of categorizations and inclusion/exclusion of individuals and groups in late-modern contexts. Comparative studies are of special interest here, since they provide a basis for increasing our understanding of the social organization of learning as well as the governing of education systems (Rose, 1999). Of special interest in this case is the making of curricula "from behind" by means of international comparisons such as PISA and TIMSS.

We have also tried to improve classroom studies by focussing both on students and teachers instead of on the teacher only (Clarke, 2002). Classroom interaction, including the uses of artefacts, is analysed in terms of affordances and constraints for learning with foci on both the constitution of the content of learning, and on how this constitution takes place. The general aim with this approach is to contribute to our understanding of the dynamics of learning and sense-making as they are sequentially produced "in situ." One vehicle in this research process is the study of cross-cultural differences in the constitution of learning processes in classrooms and the relationship to inclusion/exclusion. Thus, one line of future research concerns learning as it is constituted and organized in the contemporary multicultural classroom in the comprehensive school.

Another feature of this line of work has been an interest in disambiguating students' performance on standardized, written tests of the kind that are used in national assessments and in international comparisons. Säljö, Schoultz and Wyndhamn (2001) studied some of the items used in one of the many international comparisons in science learning (TIMSS), and found that performance in an interview setting with identical items was markedly different from the results arrived at when students respond in writing.

4.3.3 Professional expertise and transformations to life long learning

Changes in working life imply changes in demands on professional expertise as well as in the expectations of the contributions of education and training to the labour market. Of special interest here is the introduction of concepts such as Life Long Learning and Knowledge Society (Askling & Foss-Fridlizius, 2000). Such concepts, when translated and implemented into action, will have significant impact on educational institutions and on the manners in which teaching and learning are organized. We have studied this in different ways – considering how teachers change their teaching to fit new circumstances and, recently, in relation to the operation of new incentives in education and working life generally, and the dynamics of accounting as well as evaluative artefacts in universities and schools (Foss-Fridlizius, 2004). We have also analysed in depth the relationship between adult education and working life in the context of the extensive Swedish programs of life long learning ('Kunskapslyftet' and others). What the results show is that in an international comparison Sweden appears quite advanced in the manners in which life long learning concepts are implemented in educational practices. It is also obvious that these strategies play a critical role in the attempts to master unemployment in productive manners by increasing 'flexibility' among people and by encouraging movements between sectors. At the policy level, these developments are important to follow from an analytical perspective, since they are decisive for learning and for the interplay between educational institutions and the labour market.

An additional, but related, interest in this context concerns how knowledge and skills acquired in education prepare citizens for participation, and further learning, in various, often highly specialized, work settings. Given the pace of changes in technology and work organizations, the relationship between institutionalized forms of learning and labour market skills becomes increasingly complex. This implies that the division of responsibilities for training between educational institutions and production will have to be reconsidered. To a considerable extent, the work place must offer learning opportunities that concern knowing specific to that activity. Problems of this kind are currently studied by members of the LIMS team in 'high-tech' environments in the project "Learning to support. Bridging educational knowledge traditions and situated knowing in technologically intensive work practices.", and in the context of rapidly changing work practices in health care using increasingly sophisticated technologies for co-ordinating work and delivering care.

Studying learning (and human reasoning and meaning-making more generally) as situated within practices implies paying attention not only to context but also to the cultural tools that people have available. Tools (discursive and technical/physical) mediate human action and appropriation of cultural tools can be described as the essence of learning in this tradition. The third strand of research by the members of the LIMS consortium that is relevant for this application concerns precisely the role of current, rather dramatic, changes in media and technologies for meaning-making and for the appropriation of knowledge and skills.

4.4 Learning, media and new literacies

It is obvious that digital technologies and the new media have transformed learning practices. These technologies change the manners in which information is codified, stored, and accessed, and they change our work practices, the way we entertain ourselves, pay our bills and even how our identities are shaped. Thus, their consequences must be studied at the level of society as a whole, at the level of organizations, and in the manners we learn, think, and remember as individuals. The new media have potentials for supporting learning, but they also introduce their own problems and dilemmas as do all technologies.

As we have alluded to, these issues have been ─ and will be ─ studied at two levels. The first one concerns learning and digital media as resources for interaction and meaning-making at the level of individuals and groups. The second level concerns the consequences for learning and schooling of the virtually unlimited access to information offered by digital technologies and the Internet. These two interests merge in a shared research focus on issues of digital/media literacy, or, perhaps even better, in what we refer to as new kinds of literacies.

4.4.1 Learning and digital media as resources for learning

Research on learning from new media and information and communication technologies within the LIMS group can traced back to the dissertations by Lindblad (1976) and Lindström (1980). Lindblad's and Lindström's works were rooted in a tradition of instructional design, especially in design of teaching-learning materials. Lindblad´s thesis on simulations situated the micro analytic questions of learning and problem solving in a macro-analytic framework. Lindström used a micro-analytic approach. In his thesis "Forms of representation, content and learning" he investigated differential effects of learning from pictorial and textual media. In his analysis, Lindström targeted students' understandings of the subject-matter or content of instruction, and how these understandings were affected by representational formats.

This strand of research on effects of media continued in the mid-eighties in a major project on "Interactive didactical learning environments" (Lindström, Marton, Ottosson, & Laurillard, 1993). In researching computer technologies as a means for learning, a dual strategy was used. One line of work studied effects of simulation technologies on student learning in science. The other approach was to design technologies from a theoretical understanding of learning and learning problems in a specific domain, and then empirically test these technologies in natural school settings. This methodology is in line with the current trend of conducting design experiments. The content domain in this work was mathematics, and more specifically children's learning of number concepts (Lindström, Ekeblad, & Neuman, 1987). In this research it was shown that it is possible under some circumstances to substantially promote children's learning through the "playing" of "math games."

The use of simulations for educational purposes has been an area of research all along. We have targeted the use of system dynamic modelling and simulation for teaching and learning

mathematics, the design of system dynamic tools for modelling, the use of such tools for knowledge management in industry (Vavik & Myrtveit, 1997), and how high-fidelity simulations may be used as resources for the training of nurses (Rystedt & Lindström, 2002). The latter research targets how simulations can mediate between professional practices and training practices, thus functioning as "boundary objects."

An important part of the research agenda since the mid-nineties has been studies of pedagogical usage of digital technologies that are primarily intended for recreational activities, and the question of what and how children learn in such activities. Here we have worked in two areas; a) the pedagogical usage of digital music technologies; and b) children's learning from playing computer games. One project has concerned how music technologies can be used to overcome traditional gender differences in music education (Folkestad, Hargreaves, & Lindström, 1998). The theme of using games for pedagogical purposes is a continuation of the research started in the mid-eighties on math games. This is, and will continue to be, a central topic for the LIMS group. The recent work has targeted the meaning of game playing to children, and the consequences of this for the use of games in education. This area of research is important, and it is obvious that the new representational technologies bring about new possibilities for learning. At the same time, however, it is important to have a critical and analytical agenda, since many of the claims made regarding consequences for learning are unsubstantiated (Linderoth, Lantz-Andersson, & Lindström, 2002). One of the research interests within the LIMS group has been to study how computer games work as mediational means, and what kind of learning they promote. Linderoth (2004), using the Goffmanian concept of framing and the Gibsonian concept of affordance, in an in-depth study of gaming showed how the players were more focused on the logic of the game than on its contents. This is an important finding that to some extent can account for the fact that 'playing' and 'learning' imply very different 'framings' of social situations. What is relevant to attend to when 'learning' (contents) is not necessarily in focus when 'playing'. Ivarsson (2002), in a study of children using programmable digital toys (Lego-Dacta), illustrated how children learned to manipulate the toys without necessarily grasping the programming aspect.

4.4.2 Learning, literacies and infrastructures in digital environments

The previous work at this level is represented by research carried out by Alexandersson and Limberg (2003). The intellectual origin of this work is in the research by Marton and Säljö described earlier. In her doctoral dissertation, Limberg (1998) studied the interaction between students' information seeking and their learning. The interest was directed to students' ways of interacting with information systems and sources. The main conclusions were that variation in the quality of students' information seeking and use closely interacted with variation in the quality of learning results. She later expanded the theoretical understanding of information seeking by describing three major ways of engaging in information seeking and use, signalling that evaluation and use of information, rather than searching and finding, are critical features of the quality of information seeking in a learning context.

Libraries have a longstanding tradition as institutions for the support of learning, in formal education on all levels as well as in contexts of informal learning and in work life. Libraries are part of society's infrastructure for learning. The rapid development of information and communication technologies (ICT), including global access to information, has created possibilities for libraries to offer new services and for meeting user needs. At the same time, claims have been made that libraries are no longer needed, since access to information is provided via numerous other channels. So, questions are currently asked about the role of libraries in society from a learning perspective. Limberg & Alexandersson (2003) studied the

library as a space for learning. Conclusions drawn were that libraries offer possibilities for creative knowledge formation which are not fully utilized for a number of reasons that can only be understood if one considers the traditions and discursive practices of schooling.

Librarianship, as a profession, has undergone dramatic changes following the development digital technologies. In the wake of the ICT development, an issue of particular interest is information literacy education (Sundin, 2005). *Information literacy* is the generic ability of citizens to make well informed choices based on a critical evaluation of a wide range of information sources. Information literacy education is a matter of international interest, where national goals of education are involved and where citizens' abilities to act as independent and critical information users are seen as crucial for democratic societies in the information age. Many scholars stress the link between information literacy and learning. The literature on information literacy education, though, tends to be normative, recommending models and methods for teaching without much basis in research findings.

During the last decade we have conducted several research projects on the interaction between information literacy and knowledge formation in school contexts. The overall interests focus on *what* and *how* students learn through information seeking and use via various paths and sources of information, including libraries. In more concrete terms, our research has concerned issues like "How do children in pre- and elementary schools construe meaning through using different software – so called Educational Computer Programs (ECP)?"; "How does ICT contribute to the ways in which the student can orient him/herself in an increasingly complex world and develop the capacity to form a personal standpoint on questions concerning ethics, morals, equal opportunity, and equality and democracy?"

Findings indicate tendencies towards a gradual development of three different categories of students related to learning through information seeking and use; one group that does not manage information seeking, problem-solving or learning factual knowledge. Another large group learns the procedures of seeking and gathering information but does not develop critical approaches or a problem-solving ability. This group tends to gain in factual knowledge, but they do not develop the ability to construe meaning from information ─ they have difficulties converting information into relevant knowledge. There is a third small group that manages all of the above, i.e. to construct both quantitative and qualitative knowledge through a research-based work process. An interesting finding is that the vulnerable students, with fewer resources at hand and whom the school is obliged to support, may well turn out to be 'losers'. How will these students be able to make well-informed choices based on the critical evaluation of a wide range of information sources? This is an important question to explore.

To summarize some of the findings of this work, we have clear evidence that the new technology changes conditions for learning in schools, but the ways in which the students learn have hardly been affected. To a certain extent, the students can choose themselves what they want to learn – either through books or through the Web. But as regards the matter of *what* the students have the possibility to learn, i.e. the contents of learning, we find little evidence that ICT conclusively supports the development of new knowledge. Major conclusions are that students' interaction with artefacts, and their communication with fellow students or adults, are determined by the school context, where students define their task according to traditional work practices. In other words, and put somewhat bluntly, the school usually is a non-research environment, and it does no base its mode of working on genuine research questions but on the assumption that there are ready-made answers to be found,

information to compile and reproduce. Findings from our projects indicate that the approaches to teaching information literacy are guided by the same traditional school practices.

4.5 Research agenda of the LIMS group

As we have already indicated, our ambition is to carry forward our theoretically informed empirical research on learning, interaction and the reproduction of knowledge and skills in various settings in the complex society. This section contains a short presentation of the research projects/activities that we consider most urgent for the team.

4.5.1 Learning in a sociocultural and dialogical perspective: Developing theory and method through empirical research

A shared interest of the LIMS group is theoretical and methodological development of our field. Through the emergence of digital technology, the resources for documenting and analysing learning and interaction in classrooms and other settings have increased dramatically. It is now possible to do detailed microanalyses of learning activities and follow how individuals in interaction with others appropriate, or fail to appropriate, knowledge and skills. Through such studies, a range of questions that concern how contexts of learning are organized, and how individuals profit from various activities, can now be addressed in detail. It is possible to critically scrutinize the role of interactive formats (for instance the heavy focus on group work characterizing modern pedagogy) in the classroom for children with different social and linguistic backgrounds. Furthermore, it is possible to do longitudinal studies by following classes and individuals in their learning careers over time. Comparative studies of classroom practices are also possible and will be an important element of LIMS.

All members of the LIMS group will be involved in this theoretical and methodological work. Through this shared research interest we will be able to contribute to the field both with respect to understanding processes of learning, and to shedding light on the link between what happens in the classroom and social and cultural factors, such as social origin, gender, ethnic background and linguistic skills of students. Strengthening the platform for this kind of research is our long-term ambition with this application. Within this general theme there are two studies that we wish to carry out in the immediate future.

- One urgent set of questions to further explore concerns *marginalization and how school success and school failure are interactively produced in the classroom*. In spite of the political vision in Sweden of having 'a school for all children', a considerable proportion fail in their school careers. These problems occur in spite of increasing use of special needs teachers. This is a question with many dimensions, and it involves issues of the constitution of identities and processes of social exclusion. For instance, we see a growing number of children classified by means of various neuropsychiatric diagnoses and, as a consequence, they are taken out of the regular stream and put in special classes. The success of this strategy for the individual, for the school and for society is unclear. There are obvious signs that gender plays an increasing role in adaptation to school in many respects such as performance and choice of educational career. The increasing multiculturality of classrooms is of course also a central area to explore as is social inequality in general. Our research into these issues focus on the classroom level, and on how success and failure are produced in context.
- The second issue concerns continuing to explore *the nature of appropriation* (i.e. learning) as conceived in a sociocultural perspective. In such a perspective, learning is understood as the ability to use the intellectual and physical tools of institutional practices (for instance, of science, legal discourse etc.), and to participate in productive manners in activities by solving problems, arguing, writing and so on in

educational settings but also in working life. Within this theme we want to continue our research on two issues. The first one concerns how young people, *qua* students, learn to actively use disciplinary knowledge when reasoning in the context of so-called socioscientific problems (Mäkitalo, Jakobsson, & Säljö, in press). The interesting points here concern how students learn to identify, relate to and use various types of disciplinary discourses, and how they learn to reason and argue *within* and *between* them. Learning in interdisciplinary contexts of this kind, often making use of Internet resources, is very different from the traditional type, where the disciplinary genre is given. Socioscientific problems (for instance when learning about issues such as global warming, causes of poverty etc.) require the development of meta-communicative skills and an awareness of what are the relevant modes of understanding problems. Research of this kind implies following project work over time scrutinizing the process and the outcomes of learning by groups and individuals. The second issue we want to continue researching with respect to appropriation concerns how knowledge and skills acquired in education prepare citizens for participation, and further learning, in various, often highly specialized, work settings. Such analyses focus on the relevance of institutionally organized learning activities for various kinds of work practices. In this area we will focus on studying how contexts that undergo rapid change in terms of uses of technologies organize learning among their staff so as to cope with developments in the field. Currently we have three projects that relate to these issues: one that concerns health care and the introduction of electronic patient records (EPR), a second one that concerns learning and working in 'high-tech' environments (cf. above), and a third one which follows the introduction of digital technologies in what was previously largely a manual work process (a factory producing concrete structures for the building industry).

4.5.2 Comparative studies of learning and interaction in the classroom

In the field of education, comparative studies are vital, as we have argued. Here we will focus on classroom interaction and the possibilities to make historical and international comparisons. We have a starting point in two current research projects. The first is an international study of classroom interaction from the learners' perspective (Clarke, Lindblad, below) which is a ten country study on interaction in maths education (algebra) containing detailed micro-ethnographic recordings. This, in turn, can be related to the TIMSS-R studies where the focus was on the teacher.

The second project is a development of a platform for micro-ethnographic studies financed by VR, where we organized a number of studies coordinated by Lindblad. We now have opportunities to complement these studies with exceptional materials spanning a 50-year period (cf. table below). This material on classroom interaction is a unique source for research. A first task is then to organize such a material and to make it available to researchers and research students (given that the research ethics can be handled). This will be given high priority in the current consortium. Initially we will develop two kinds of comparative studies:
 – *Historical comparisons of classroom learning and interaction* from the 1960's to the 2010's. In focus will be patterns of classroom participation, the production of identities and social inclusion/exclusion as well as opportunities for learning.
 – International comparisons of classrooms. These will be carried out with the same focus but here we have an interest to compare the impact of different systems and contexts for interaction. This will be related to data produced by PISA, TIMSS and other comparative studies.

Tid för insamling/Date of Collection	Forsknings-ledare/respon-sible researcher	Årskurs Grade(s)	Antal timmar inspelning/Hours of recording			Forskningsprojekt/Research project
			ljud sound	video video		
1967-1968	Karl-Gustaf Stukat	6	≈ 600	≈ 150		Didaktiska Process-Analyser, DPA-projektet/Didactic Process-Analyses (Skolöverstyrelsen/National Agency of Education)
1972-1973	Joachim Israel	8	20	-		Skolklassen som ett socialt system/The school class as a social system (National Agency of Education)
1993-1995	Sverker Lindblad	7-9	148	152		Longitudinella Studier av Mikropolitiska Strategier och Ungdomars Skolkarriärer/Longitudinal Studies of Micropolitical Strategies and the School Careers of Youth (HSFR/Council for Research in the Humanities and Social Sciences)
1998	Sverker Lindblad	6	35	35		Klassrumsinteraktion och lärande i ett mångkulturellt samhälle/Classroom interaction and learning in a multicultural society
2000-2004	Sverker Lindblad	F-2	-	200		Förskola och skola I samverkan http://www.ped.uu.se/fisk Preschool and school in co-operation (Skolverket/National Agency of Education)
2002-2003	Sverker Lindblad	8	-	100		Svensk skolkultur i ett komparativt perspektiv/ Swedish school culture in a comparative perspective http://www.ped.uu.se/kult (Riksbanken)
2003-	Björn Andersson	5-9	30	50		Lärare och forskare som kunskapsbyggare för atter NO-undervisning/Learners and researchers as knowledge builders for better science teaching http:/na-serv.did.gu.se/nudu/nudu.html
1999-	David Clarke	8	-	> 500		ICCR database http://www.edfac.unimelb.edu.au/DSME/ICCR/

Table 1. Film/video materials of classroom interaction available from 1960'ies and onwards.

4.5.3 Reorganizing the social organization of learning

The social organization of learning is part and parcel of the making of social and cultural (re)production. A point of departure is the transition from government to governance as outlined above as the hallmark of contemporary settings of education. Important elements here are the restructuring of educational systems and the implications for the social constructions of students and teachers. We will focus on the politics of professional expertise in an audit society and on the technologies of governance, including self-technologies. The main ambition is to scrutinize current developments in education organization, and how these are related to the making of citizens and professionals. Here we have access to two European Union studies focussing on political aspects of this transition in different contexts – one on educational governance and social inclusion/exclusion (Popkewitz & Lindblad, 2001), and one on professional knowledge under restructuring (Lindblad & Popkewitz, 2004). Of special interest is the 'system of reason' (Lindblad & Popkewitz, 2004) in the making of educational change in practice. Here we outline two research projects:

– *The politics of expertise in the welfare state professions*: The focus is on new management strategies and technologies, and how these affect notions of expertise, responsibility and professional identity. We will engage in two international projects: First a 10-year follow up on Education Governance and Social Inclusion/Exclusion in Europe. Second, we will conduct in-depth studies on expanded learning in the work of welfare state professionals in interaction with citizens in restructuring institutions.

– *The politics of international rankings*. This is in line with the interest in comparative studies on education. We focus on the production and reception of international rankings (such as the Shanghai world list of universities and the Times Higher Education Supplement world list). This is of strategic interest in an ambition to understand the work of restructuring institutions and new technologies of governing.

To summarize: in these studies we will produce insights into the social organization of learning of importance to capture the working of educational systems and their restructuring in practice. We regard this as necessary for understanding education and learning in what might be called a network society.

4.5.4 Learning and digital media as resources for learning

A basic knowledge interest in this part of our research is to understand how information and communication technologies change the conditions for learning on different levels: the learning environment; the teaching and learning practices; and the learning of individuals and groups. The *learning environment* can be viewed as an *infrastructure for learning*. This infrastructure is constituted by the technological, institutional and social tools, methods and arrangements that are nested on to each other.

In our approach to *teaching and learning practices*, a main focus is on how these practices are organized discursively and constituted in *interactions* between people and technological tools. How do new technological tools alter the patterns of interaction? How can new technological tools scaffold learning processes? How can new technological tools, and arrangements based on such tools, support teaching? The "digital competences" and literacies needed to master the new technologies are important to understand both in the perspective of life-long learning and in order to be able to use new technologies in pedagogical settings in productive ways. Another important aspect is what can be called the "digital epistemologies", i. e. the meaning of learning and knowledge building, promoted by the new media practices, e.g. related to Internet. This interest connects to our previous work on epistemological beliefs.

The research to be carried out has, and will have, two complementary foci. On the one hand, the work we are doing is deeply rooted in an *analytic* tradition with a focus on describing and understanding basic conditions and patterns of learning. We argue that it is of vital importance to enhance this kind of knowledge in order to value the pros and cons of certain arrangements for learning and in order to be able to guide practice. Another approach is to include the *design* of technological tools, learning environments and practices in the research process. This is done in a cyclic process of "design experiments."

An important issue when studying new technologies is what we can describe as the *perspective of change*. The introduction of modern ICT is to a large extent motivated by changing demands on education to meet new challenges. The inclusion of new technological tools in a learning environment is sometimes a part of a redesign and redefinition of both content and method. In a curricular perspective, people must learn to master the new technologies, and the new technologies are introduced to enhance the learning in already existing domains. Often, however, these two perspectives are mixed, and the learners have the double problem of both learning to master a new learning environment and learning practice, *and* learning the specific curricular content. Especially in the perspective of informing design, it is important to take this problem into account. Among the range of issues that need exploration and research in these areas, we intend to extend our inquiries in two directions: *Learning and ICT in specific subject domains*, and *ICT in classrooms: User perspectives*.

- As we commented on above, one of the generic interests of our joint research concerns *how new (and 'old') technologies can be designed and used in order to enhance learning in specific domains of knowledge*. We will continue the work in the domains of mathematics and science (especially physics), where we already have extensive experience of the potentials of modern technologies. We will focus both on "epistemic" technologies, where domain knowledge is explicitly represented in the tools, and more generic technologies for collaboration and argumentation.
- The second question concerns *user perspectives on ICT in the classroom.* While information technologies transform many social activities, the integration of such tools into classrooms and other contexts is still problematic. The point of this project is to analyse the uses of digital tools from *user perspectives*. The questions to be raised concern when and why such resources are used, and how they support/interfere with educational processes as understood by teachers and students.

4.5.5 Learning, literacies and infrastructures in digital environments

Questions concerning globalization, identities, global flow of information, migration and the multicultural society attract growing attention and appear as challenging items on the political agenda in most societies. At the same time, new patterns of foreign investments and transnational production result in a new division of labour that puts a premium on the capacities of people to address complex problems, to work collaboratively, and to think synthetically in ways that are informed by multiple disciplines. In addition, information and communication technologies enable daily contacts among people without reference to borders or distances. Taken together these developments imply that competences that relate to the ability to use various kinds of media and to manage vast amounts of information are significant for the development of both the economy and a democratic society. In this process, information (or media) literacy is of vital importance.

In relation to this development, there are two main research themes we wish to address in the coming years. This work implies strengthening activities that we already have going.

- One research theme concerns issues about the *consequences of globalization and global flow of information, and new school practices for children of immigrants*. In this theme there are two projects that we will pursue. One is a part of an international research project named The Children of Immigrants in Schools (financed by National Science Foundation, USA). The focus is on how upper secondary schools in Sweden and the USA use new technologies to support collaboration between students with ethnically diverse backgrounds and their potential to deepen engagement in learning and the understanding of fundamental social values. In a related project within this theme – Cultural differences and complex knowledge in a global era – the *focus is on how innovative schools respond to the educational needs of culturally diverse youth of immigrant origin*. The project (funded through the Research Council) seeks to shed light on the difficulties, opportunities and solutions that teachers, students and administrators encounter as they respond to the educational demands of modernity.
- The second theme focuses on issues that relate to *professions, information literacy* and *knowledge formation*. Information seeking for learning purposes is one of the specific research interests of the LIMS group. As pointed out above, learning is no longer limited to the educational system but is part of the life careers of most citizens. Information seeking practices are of constantly growing in importance in many professions with changing work practices, such as nurses, lawyers, engineers to mention just a few. In all these contexts, the organization of, access to, and use of information are key elements. Information seeking practices should not only be seen as tools for work performance, but also as means for the forming of professional

identities. The importance of information seeking for keeping up to date with the development of various professional fields is constantly emphasized. The issue of information literacy should be viewed in this perspective.

8. International and National Cooperation

The members of the LIMS consortium are involved in national and international cooperation of many kinds, and it is not possible to list all of this within the space given. Some examples:

- at the most general level, it can be noted that Säljö is the current president of European Association of Learning and Instruction (EARLI). Lindblad has served as the president of European Educational Researcher Association (EERA) between 1999 and 2001. These are the two main scientific organizations in our field outside the US. Linblad and Säljö are also members of editorial boards of many scientific journals.
- Through Lindström, Säljö and others in LIMS, we act as partner in Kaleidoscope, an EU Network of excellence in the area of technology enhanced learning. In Kaleidoscope (budget €10 Mill.), 23 countries cooperate in research/research training.
- All the professors and many of the post-docs have been, and are, involved in multinational EU-funded research as is evident from the CV:s attached.
- Through Lindblad and Emanuelsson, the LIMS group is part of the international project: The Learners Perspective Study. The project examines the patterns of participation in eighth grade mathematics classrooms in 15 countries in a comprehensive fashion (see: http://extranet.edfac.unimelb.edu.au/DSME/lps/)
- Alexandersson and Limberg are engaged in an ICT-project, funded by the NSF in the US and the Nuffield foundation in the UK, on the uses of computers for supporting learning in underprivileged communities.
- Together we maintain long-standing work relationships with many international universities including the University of Wisconsin (T. Popkewitz), The Open University in England (Mercer et al.), The University of Helsinki (Engeström, Miettinen et al.), The Universities of Bergen and Oslo (Wasson and Ludvigsen), Washington University (Wertsch), University of California at San Diego (Mehan, Cole et al.), Griffith University, Brisbane (Renshaw et al.) and many others.
- In Sweden, we have organized the Network for Sociocultural Studies (NSKS), involving Ph. D.-students and researchers from 9 universities and university colleges. This network meets three times a year (starting 2001) to discuss work in progress. Additional funding for three years has just been received from the Research Council.
- The national research school/program LearnIT, funded by the Knowledge foundation, has been in operation since 2000 (work began in 1997). 15 Ph. D.s have passed their degrees, and many Ph. D. courses on the net have been given.

6. Organisational Plan
6.1 Infrastructure available for research activities
LIMS is a living organization of research contexts in which the group members co-operate (see Figure in Appendix). At the top level there are four Seminars (the Swedish term is Kollegium). The following seminars form the core of LIMS activities:

- Seminar for sociocultural studies (SKS) (chair Säljö)
- Seminar for learning and IT (LIT) (chair Lindström)
- Seminar for multimodal and interactive learning environments (MIL) (chairs Alexandersson & Linderoth)
- Seminar for pedagogy and politics (chair Lindblad)

The Seminars are public fora where research results are communicated and where visiting scholars lecture. The invitations to participate are circulated widely within the faculty and university, and they also reach the teacher training. At the next level, there are specialized research groups (of about 6-10 members each) that address specific research topics, and where original research, dissertations, and new applications are produced. These include

- The network for analysis of interaction and learning (NAIL) (chaired by Lindström)
- SocioCultural Studies (SCS) (chaired by Säljö)
- Learning At Work (LAW) (chaired by Mäkitalo)
- Libraries, ICT and learning (BIKT) (chaired by Limberg)
- Classroom research (chaired by Lindblad)
- Life-long learning and professional expertise (chaired by Foss-Fridlizius)

Of special significance here is the NAIL seminar, which has been going on for several years. NAIL is a context for addressing issues of method and for developing analytical tools for studying learning and interaction. This research area has profited, and will continue to profit, from the use of modern technology (video documentation) by means of which micro-interactional phenomena can be attended to in detail. In the context of NAIL, considerable experiences of these kinds of analytical approaches have been built up, and NAIL is an effective context for socializing Ph. D.-students and for developing methods. NAIL is also connected to our video laboratory facility that we wish to expand and professionalize as a part of this Linné application.

7. Leadership in the Research Environment

Dr. Roger Säljö, coordinator of this application, has been professor since 1983. As a professor of behavioural science at the Department of Communication Studies, he was involved in building up and establishing the interdisciplinary research training at the Faculty of Tema Studies at Linköping University. In 1997, when he returned to Göteborg University, Dr. Säljö initiated the research and research training program LearnIT of the Knowledge Foundation and he is still the scientific leader. Within this program, national research training in the area of learning and ICT was established. This program, which now involves international cooperation, has been implemented by using web-based courses for Ph. D.-students, and we thus have experiences of this kind of research training courses since 1997. In the program, 15 students have passed their Ph. D.s so far. Dr. Säljö has supervised 28 Ph. D. students to their degree (in three cases as assistant supervisor) in different faculties. Dr. Säljö has had numerous appointments that concern research training, including chair of the NorFA (The Nordic Academy for Research Training) during five years, vice-chair of the Committee for Educational Science of the Research Council, and he has served as faculty opponent (or in a similar function) on about 35 occasions in Sweden, Finland, Norway, Denmark, The Netherlands, and the UK. Dr. Säljö has also served as Head of Department, Dean, and Vice-Rector and has in-depth knowledge of the organization of research training.

LIMS is organized so as to ensure succession and continuation of the research. There are several young researchers who soon will be ready to take over leadership roles. Dr. Åsa Mäkitalo (b. 1966) has just been promoted to docent (associate professor), and in next generation there are several young scholars who have been successful in being awarded post-doc positions and research funding: Dr. Jonas Emanuelsson (b. 1962, post-doc from Research Council), Dr. Jonas Ivarsson (b. 1976, post-doc from Research Council), Dr. Göran Larsson (b. 1970, post-doc from Knowledge Foundation), Dr. Jonas Linderoth (b. 1970, post-doc from Knowledge Foundation), Dr. Karin Wass (b. 1969, research funding from Research Council).

All of these scholars belong to the core of LIMS and will be excellent in future leadership roles.

7.1 Board and International Advisory Board

During the first few years, LIMS will be run by a board consisting of the core group behind this application, i.e. the five professors and the associate professor. In addition, a representative of the faculty/department, notably the Dean/Head, and a Ph. D. student will serve on the board. Later we intend to make successive shifts in this board in a manner that ensures continuity and at the same time provides opportunities for the younger researchers to share responsibilities for running the program.

We consider it essential to have an international advisory board to assist and monitor the activities of the program. For the board, we have secured the co-operation of distinguished international scholars with outstanding qualifications: Professor Diana Laurillard, London Knowledge Lab, Institute of Education, University of London, Professor Sten Ludvigsen, Intermedia, Oslo University, Professor Neil Mercer, currently moving from the Open University, Milton Keynes, to the Department of Education, University of Cambridge, Professor Tom Popkewitz, University of Wisconsin-Madison School of Education, USA, and Professor Lauren Resnick, Learning, Research and Development Center (LRDC), University of Pittsburgh, USA. The international advisory board will meet once a year for the first two years when the program is set in motion. Later we foresee a meeting every other year. The meetings will be carefully prepared. All research activities will be presented to be commented on by the members. In addition, we will present our strategic plans for the periods to come, and have them scrutinized in detail. We will also be able to make use of this board in other ways. For instance, their research centres are excellent contexts for our post-docs to visit.

8.0 The Size of the Proposed Environment during The First Year

As we have already pointed out, LIMS builds on an extensive range of activities in teaching, supervision of Ph. D. students, research and a range of commitments that deal with the so-called third task (external activities with applied projects, extra-mural teaching etc.) (cf. Appendix U for a detailed account). In the group there are five full professors (Alexandersson, Limberg, Lindblad, Lindström and Säljö) and one newly promoted associate professor (Mäkitalo). The members of this core group devote their time to research, supervision of Ph. D. students, teaching, administration and third task activities. There are 11 post-docs and senior lecturers. Some of these are post-docs or do full-time research (Ivarsson, Larsson, Linderoth, Wass), while the rest have a mix of responsibilities involving research, teaching and administrative duties. At present (2006), the team includes 29 Ph. D. students. About 15 of these will be engaged in full-time studies, and the rest will combine their studies with teaching duties as junior lecturers (in most cases on a 50-50 basis). The total budget for this unit is considerably higher than the sums asked for in this application for Linné support.

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GÖTEBORG UNIVERSITY

University

Faculty

Board

Seminar

Joint network & working group

Research groups/ thesis work

Faculty of Education

International advisory board

Steering board
Säljö, chair
Alexandersson, Limberg, Lindblad, Lindström, Mäkitalo, Repr. of Faculty & PhD students

Seminar for
Sociocultural studies
Chair: Säljö

Seminar for
Learning and IT
Chair: Lindström

Seminar for
Multimodal and interactive
learning environments
Chair:
Alexandersson & Linderoth

Seminar for
Pedagogy and politics
Chair: Lindblad

NAIL: Network for Analysis of Interactional Learning
Chair: Lindström

SCS
Chair: Säljö

LAW
Chair: Mäkitalo

BIKT
Chair: Limberg

Classroom
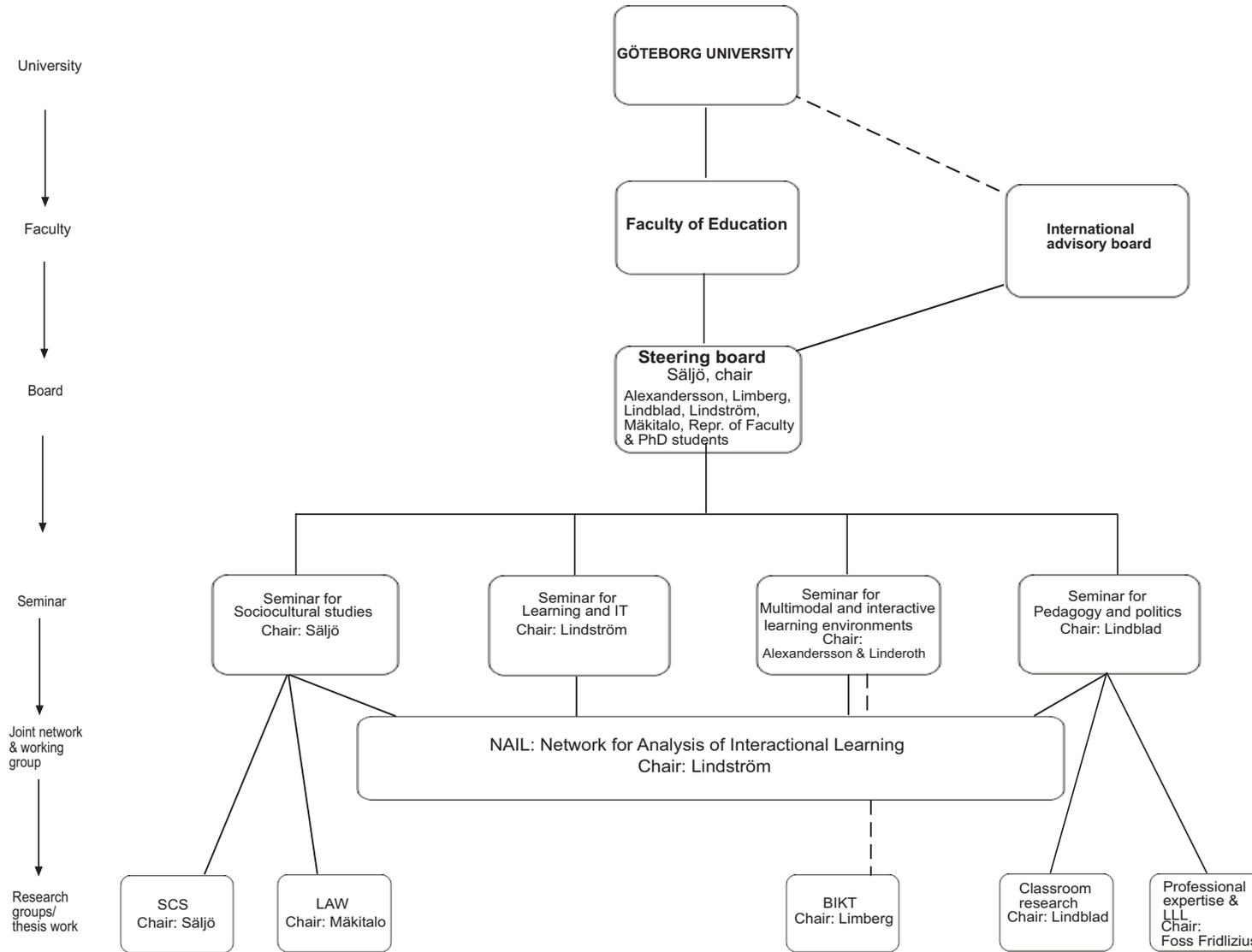research
Chair: Lindblad

Professional
expertise &
LLL
Chair:
Foss Fridlizius

Figure: Schematic presentation of research organization