THE CONTENTS AND ORGANIZATION
OF CROSS BOUNDARY LEARNING

MAIN FINDINGS

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Abstract

Boundary crossing in undergraduate and graduate learning environments is still a relatively unstudied phenomenon, at least in comparison with the attention given to studies of interdisciplinary research. The research reported here focuses on learning environments in the context of Swedish higher education and is based on interviews and fieldwork at two interdisciplinary programs at two universities. The main findings are summarized in twelve themes which represent different ways of understanding the complexity of boundary crossing in pedagogical practice. We identify the shifting conjunctures of higher education in which key notions such as boundary crossing can demonstrate a strong attraction as well as its opposites in the form of strong rejection.

Keywords: higher education, boundary work, boundary crossing, interdisciplinarity, Sweden.
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Overall Aim

The general aim of the project "The contents and organization of cross-boundary learning" is to describe, analyze and, primarily, to understand ideologies and practices of boundary crossing in higher education in Sweden. The key analytical concept is boundary crossing (or cross boundary; in Swedish “gränsöverskridande”). The notion of boundary crossing is broader and more inclusive than “interdisciplinarity” (cf. multi-, pluri- or transdisciplinary), “integration” or “cooperation”, in that it refers not only to the ways in which academic disciplines, traditions and knowledge paradigms are set in motion, contact and possibly convergence, but refers also to the ways in which professions, authorities, institutions and even nations or cultures are brought together, thus aiming at bridging the boundaries of academy and society at large. This choice is based on the observation that the notion of boundary crossing, when it is used, is often mobilized for purposes other than interdisciplinarity proper (contact between scientific disciplines), such as the aim of bridging academy and society, or the aim of bridging cultures. The notion of boundary crossing better captures this wider array of possible meanings of “interdisciplinarity”. The conditions, forms and pedagogical methods used for the purposes of boundary crossing in learning environments in higher education are highly variable. They are also insufficiently described and analyzed. This area in educational sciences has been given comparatively scant attention, especially when it comes to the concrete pedagogical practices in higher education. In contrast, wide attention have been given to interdisciplinary research and, in particular to the exploration of various forms of strategic knowledge production suitable for contemporary actors in knowledge society. Given the expansion of higher education at large and of boundary crossing in particular, it is thus important to focus on this pedagogical-didactical trend for the purposes of description, analysis and critical understanding.

Specific Research Questions

We argue that studies focusing on practices and ideologies of cross boundary learning more or less are an unchartered territory in educational sciences. By saying precisely this, we are actually applying one of the most common strategies in boundary crossing activities and in legitimating knowledge production more generally, namely to chart novel (so called “white”) territories in the realm of knowledge, often situated between disciplines (or, other more or less existing entities). This is a methodological and reflexive reminder

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1 This is the longer version of the final report for the project ""The contents and organization of cross boundary learning" funded by the Swedish Research Council (SRC) 2004-2007. This report follows the structure suggested by SRC. We have chosen to maintain the text as clean as possible, thus there are almost no references. At the end there is a list of references referring to work made within the project.
that the very topic we are studying is such an integrated part of the rhetoric of knowledge production in general and of boundary crossing in particular.

There are many questions concerning content and organization of boundary crossing, its ideologies, practices and rhetoric, which can be raised in this context. On a most general level these questions are divided into three broad categories. Based on our studies and on our interpretation of existing research, the following division into three categories represents a functional distinction of possible levels of inquiry: The first (1) concern questions related to the practices of cross boundary learning, i.e. organization and practical accomplishments. The second (2) level of inquiry is to study the representation of ideologies (content) concerning cross boundary learning that takes place inside and outside of these learning practices. The third (3) set of questions address cultural, political and social functions and conditions of cross boundary efforts. Obviously, these categories overlap with each other. In the presentation of results these three broad sets of questions will be embedded in twelve general themes.

1. Developing analytical tools
2. Two ideal types of boundary crossing
3. Boundary crossing: strong and weak
4. Boundary crossing as a multifaceted phenomenon
5. Aims, goals and motivations for boundary crossing
6. Boundary crossing in theory and practice
7. Examples of boundary crossing
8. Pedagogy and boundary crossing
9. The rhetoric of boundary crossing
10. Boundary crossing outside of research as a relatively unstudied phenomenon
11. The conjunctures of boundary crossing
12. The importance of the local learning environment

The aim with these three sets of broad questions and its operationalization inn twelve themes is not to create universal models which can represent a comprehensive inventory of understanding of all sorts of boundary crossing in higher education programs, but to constitute a steps toward such an inventory and toward an understanding of which models are currently operative in different programs. The aim is also to analyse some similarities or differences between these models. The study is exploratory rather than explanatory. Generally, this approach can contribute to increase our understanding of the specific challenges and possibilities that faces cross boundary learning, to develop a conceptual understanding of cross boundary learning, to provide tools for practitioner's
self understanding, and to contribute to the development of criteria for assessing and evaluating such learning activities.

**Material and Method**

The presentation of the results of the study will be related to the three broad sets of questions described above. We will give a generalized summary of our engagement with the questions that have been raised based on case studies (including interviews) emphasizing differences and contrasts. The project focuses on boundary crossing in higher education environments in Sweden during the period 2003-2007, both on the undergraduate and graduate level. Included is also material representing a more aggregated administrative level of higher education. In the project, two case studies encompassing approximately 12 months of fieldwork each were made. A case study of Northern University (North, NU) represents an example of “weak” (cf. below) boundary crossing between disciplines in Social Science and Humanities. Another case study of Southern University (South, SU) represents an example of “strong” (cf. below) boundary crossing between Science and Social Science. The other study included interviews with directors of seven graduate schools and two large financiers of graduate schools, as well as written documentations also constitute material for the project.

The presentation of the results of the project has been divided into three broad categories of texts (cf. List of references): (i) Studies dealing with undergraduate (the case studies cf. above); (ii) Studies dealing with graduate learning environments (the interviews and documents); (iii) Studies of a more comprehensive and general character (interviews, text analysis).

The main methods used in the project constitute ethnographic fieldwork in two learning environments (cf. above) and interviews with students, teachers and high level administrators such as deans and vice-chancellors. Analysis of text, images and documents that were used within the learning environments, universities and administrative bodies have been undertaken.

A couple of methodological reminders are in place. The first concerns the research focus which prioritizes boundary crossing in learning practices rather than in research and theory. This emphasis turns out to be much more complicated than intended. First of all, it is perilous to even try to distinguish between practice and theory, when theory is such an integrated part of practice and vice versa. Our research on boundary crossing shows that theories of boundary crossing are an ever present aspect of concrete learning activities, although the very notion of “boundary crossing” is not always that which is favored by the actors. Secondly, learning activities – what we also like to call learning activities

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2 Energy Systems and Forum Scientium (both at Linköping University), Urban Water (University of Gothenburg), Mathematics Education (Lund University), Arena Earth Resources and Arena Risk and Safety (both at Luleå University of Technology), and The Baltic and East European Graduate School (Södertörn University College).

3 SSF (Swedish Foundation for Strategic Research) and KK-stiftelsen (The Knowledge Foundation).
practices – often uses “research” as the favored concept describing the learning activities in question. The notion of “research” extends far beyond the formal contexts in which it takes place and functions also as a description of the pedagogical methods (“research”) used in teaching and learning activities. Both these observations make the initial distinction of the project problematic. To put it simpler, what we have in mind is to study activities involving boundary crossing at the level of student (graduate and undergraduate) education rather than in research laboratories which involves researchers. The group of graduate students is intermediary between students and researchers.

The second methodological reminder concerns the effects of our own preoccupation with boundary work and interest in (inter-)disciplinary border maintenance. Clearly, some of the activities we are studying are labeled with either one of the notions that are in use (e.g. boundary crossing, interdisciplinary, multidisciplinary, etc.) but yet others are not. Given our own analytical concerns in the project, there is a tendency for emphasizing or perhaps over-emphasizing the importance of boundaries, especially when these are not explicitly topicalized in the context of the case studies or interviews. On the other hand, this analytical concern might help to dismantle the tacit understanding of boundaries in these contexts, also when the actors themselves are not fully aware of their own orientation to boundaries.
Results – Contributions to the Scientific Field

The presentation of the results will be organized in twelve general themes.

1. Developing Analytical Tools

As indicated above, we use the notions of “boundary crossing” and ”boundary work” as analytical concepts in this study. In empirical contexts in Sweden, the notion of “boundary crossing” (Sw. “gränsöverskridande”) is sometimes used, although “boundary work” (Sw. “gränsarbete”) remains relatively unknown among practitioners. Our use of boundary crossing is motivated both by being an empirical notion and by being operative in the field of interdisciplinary studies. Boundary work is only motivated by being an analytical concept derived from science and technology studies, studies in interdisciplinarity and studies of boundary work in other related contexts. When the notion of “boundary crossing” is used, the units in question that are objects for bridging activities are not always academic disciplines. In contrast to similar notions such as “interdisciplinary” and “multidisciplinary”, “boundary crossing” is not only referring to academic disciplines as the object of bridging activities, but the unit can be referring also to professional spheres, nations and even cultures. Often, the unit remains unspecified with the effect that “boundary crossing” potentially can carry any sort of connotation to units that could be bridged and where artificial or otherwise unnecessary boundaries could be overcome. When used, the notion of “boundary crossing” carries a positive potential of bridging hitherto separate entities. More seldom, it is used to designate an activity with which one does not comply. The notion of “transdisciplinary” refers not only to academic disciplines, although it is constructed in analogy with the dominant notions of boundary crossing, i.e. interdisciplinary or multidisciplinary. The notion of “transdisciplinary” designate a form of activity taking place between, on the one hand, one or more academic disciplines and, on the other, any kind of actor or organizational units representing stakeholder’s knowledge in any area under question. For example, this notion is often used in contemporary environmental studies in which the role of stakeholders is emphasized.

The fields where different notions figure concerning how knowledge production should be conceptualized and organized, according to any or more of the notions mentioned above, are often contested and stratified. The contested character of these accounts and the technical terms that is functional, open up the need for finding analytical tools which can designate any of these positions without particularly favoring any one of them. We argue that “boundary work” is such a notion that can imply any stance in relation to the maintenance of boundaries, either in the form of welcoming transgress-
ions in “boundary crossing”, or in the form of a more restrictive maintenance in “boundary care”.

Applying the notion of “boundary work” to the field of “boundary crossing” opens up new analytical possibilities for this field of study. Although this notion is not our particular innovation, we are among the first to argue its usefulness in the context of higher education in Sweden and we are certainly among the pioneers in using it in concrete empirical studies of learning environments. In Swedish we use the notion of “gränsarbete” as the equivalent of “boundary work”.

Several implications follow from this analytical preference. “Boundary work” is a notion that fruitfully can describe any kind of stance in relation to “boundary crossing”, not only the stances which are favorable. “Boundary crossing” and “boundary work” concerns more than just dealing with scientific disciplines, and can potentially involve any kind of entity relevant to higher education. When the notion of “boundary crossing” is used instead of the more loaded terms such as “interdisciplinary”, there is often an intention among the actors to avoid being pulled into opinionated discussions about often polarized alternatives in the realm of organizing knowledge production. In practice, the more loaded terms such as “interdisciplinary” and “multidisciplinary” are the ones that are most often used by the actors. The choice of the term to use is often very deliberate and consequential. This choice is often part of an important ideological mission and marketing strategy of a particular university. Although minor differences in usage can occur among individuals, there is generally a great consensus favoring one term while explicitly rejecting others. It is interesting to think of the role that boundary work plays in fostering particular ideological stances in universities as a whole, and the specific loyalty to these greater ideological commitments that are shown by the employees. We often carry expectations of the universities as a collective of ungovernable individuals which carry their own ideological agendas. These expectations certainly have some relevance and truthfulness, but our research shows also that ideological conformity to university specific norms of boundary crossing is part of the repertoire of individual academics. In other terms, this is evidence of an ongoing corporatization of universities. We have observed, for instance, that the struggle against certain notions associated with other universities than one’s own, such as “interdisciplinarity”, can be part of a more collective attitude of ideological assertiveness. A final observation concerning the fruitfulness of developing analytical tools for this project, pertain to the way that “boundary crossing” can be associated with a general audaciousness in knowledge production. A virtue of knowledge seeking is the attitude of being undaunted and unafraid, both with respect to authorities and with respect to particular learning outcomes. Support for “boundary crossing” – or any other topographical term mentioned above – elicits a frame of bravery and audaciousness and functions thus as a reminder that this particular attitude is reiterating the general virtues of knowledge seeking.
2. Two Ideal Types of Boundary Crossing

For analytical purposes we can distinguish between two ideal types of boundary crossing learning environments. These ideal types do not exhaust the number of possibilities and varieties that can occur (see 7 below for concrete examples) concerning how to organize boundary crossing, but show the extreme opposites that might be useful for analysis and theorizing. As always when the Weberian notion of ideal types is brought up, these cannot easily be mapped on to concrete examples without doing injustice to the particular practice, and without violating the potential of the theoretical concept. The distinction between these ideal types is based on premise that there is a (dis-)continuity of knowledge production and on the possibilities of (non-)intervening in this process in order to foster particular outcomes. The first type we call *evolutionary boundary crossing* and the second type we call *designed boundary crossing*.

*Evolutionary boundary crossing* develops according to the conditions of an organic process where there is a more or less naturally occurring series of steps in knowledge development. The organic and natural character of this process is often derived from the subject area under study. The most typical example of this evolutionary process in which boundary work and sometimes also boundary crossing takes place is the scientific disciplines themselves. Obviously, boundary work is a crucial part of disciplinary processes in which the importance lies in being able to distinguish exactly which theories, methods, materials and questions do belong and do not belong to an emergent field of study with a specific (disciplinary) label. Disciplines might also be characterized by an eclectic inclusion of theories, methods, etc. from other disciplines and sub-disciplines, which exemplifies why boundary crossing also might be part of this organic process, although neither the very notion nor any of its equivalents might be used in order to account for this dynamics of “normal” knowledge production. An example taken from a field of study which includes an explicit element of theoretical boundary crossing might be environmental studies, for instance at Southern University, which concern a very broad spectrum of questions and perspectives which constitute a continuous resource for an organic development both within different disciplines and the emerging discipline of environmental science.

*Designed boundary crossing* is deliberately constructed to optimize certain criteria of knowledge development towards which one in principle adhere. Often, evolutionary boundary crossing can constitute such an ideal in respect to which designed boundary crossing should be emulated. Less commonly this is exemplified by the model of disciplinary development. There can also be other ideals behind the strategy of designing learning environments according to specific criteria, goals, and plans. This form of boundary crossing emphasizes the construction and design of learning resources (theories, methods, questions, etc.) in order to achieve the qualities of a more organic process. An example could be pedagogical work or educational science, where forces outside
academia through reforms have inspired universities to construct new subjects both within in research and education.

The distinction between these two ideal types is extremely useful and helps us to make a very fundamental observation concerning the nature of boundary crossing in higher education. If too much emphasis is put on curricular novelties, pedagogic innovation, and on the conjectural uses of more or less fashionable terms such as “interdisciplinary” or “boundary crossing”, this fundamental observation risks remaining unnoticed. Boundary work including boundary crossing is an integral part of the processes of knowledge production in higher education. Boundary crossing is a process which keeps going on in the minds and activities of students, teachers and administrators irrespective of the presence of fancy pedagogical notions. The fundamental character of this observation is exemplified by Teacher Training programs, by MSc-programs in Technology and Economy/Business Administration (Sw. “civilingenjörsutbildningar” and “civilekonomutbildningar”), and by programs in Medicine and Nursing. i.e. programs that include a strong element of professional development, practice orientation, and context sensitivity. Boundary crossing remains almost unnoticed also by the actors in these contexts who use more mundane educational notions such as “cooperation” and “practice-orientation” to refer to these activities. From the point of view of the analysis, we tend to acknowledge bridging attempts which carry high end buzzwords and novel pedagogic labels and we tend to disacknowledge the activities that do not carry these notions. For instance, we could compare Teacher Training and Nursing with innovative programs such as “biståndsingenjörer” (“Relief engineers”) and Urban Waters. Boundary crossing is acknowledged when this is part of a new curriculum and program, but not as readily accepted when this is already established. Boundary crossing is emphasized when this is a novel addition to the curriculum introducing this as something new, path-breaking and perhaps even unique. There may be many other reasons for such an explicit representation of boundary crossing, such as the increasing exposure and visibility in relation to financiers or politicians; to show to external parties that we are doing exactly what is being asked for. This is not to say that each and every legitimating move carries these opportunistic tendencies of wanting to please the powerful. This fundamental observation of the development and dynamics of knowledge production in higher education helps to account for boundary crossing as an integral part of knowledge seeking and acquisition. This observation stresses the need of accounting for and analyzing bridging activities in these kinds of programs.

The two ideal types of boundary crossing differs primarily with regard to how and in what sense boundary crossing is made explicit or not. Representatives of *evolutionary boundary crossing* do not bother to make this explicit or talk about this in terms that refer to bridging activities but without any other fuss. It is either self-evident, according to some other logic, such as the links to professional life, or not at all mentioned. Those who represent *designed boundary crossing*, on the other hand, make this very clear and explicit. For them boundary crossing is a big deal. It is often pitched as the most important
motivation for their curricular design. In marketing contexts, few opportunities are missed to point this out and to make this into selling points.

3. Boundary Crossing: Strong and Weak

Another useful conceptual development made in the project is to distinguish between two major kinds of boundary crossing. In the literature on interdisciplinarity it is often noted that there is an important difference between, on the one hand, a broader variety of interdisciplinarity, in which the aim is to bridge or attempting to bridge vastly distant disciplinary territories. On the other hand, there is a more narrow variety of interdisciplinarity in which the challenge is to merge or converse two or more adjacent disciplines, for instance those that belong within one and the same general paradigm like Chemistry or Social Science.

In our project we use, first of all, the notion of boundary crossing instead of interdisciplinarity. Secondly, we use the notions of strong and weak boundary crossing (rather than “broad” and “narrow”) to refer to the major types. This distinction is made within the realm of explicit boundary crossing activities, in contrast to what was indicated above (2) which pertained to a more fundamental distinction where boundary work was not always attended to.

There are several implications that derive from the distinction between strong and weak boundary crossing. Strong boundary crossing encounters more serious challenges than weak boundary crossing. One particular learning environment constitute an example of strong boundary crossing if it is, for instance, aiming to bridge (Natural) Science, e.g. Chemistry or Geology, with Political Science in questions concerning the environment. The number and the quality of the challenges facing this unit are greater, than if Political Science would collaborate or potentially co-habituate with either History or Sociology. In strong boundary crossing there are thus more foundational boundaries that are challenged, e.g. concerning questions in theory of science, epistemology, method, methodology, the role and place of theory, legitimating factors of the learning activity, etc. Differences pertain also to the very character of the content that is offered. Is this offered numerically and/or in words?

The different challenges of strong and weak boundary crossing can in practice be managed in a number of ways, in order for the actors to accommodate either to a stronger or a weaker selection of the potential barriers and problems. Somewhere along the line, there are one or more choices to be made with reference to the degree and depth of obstacles and potentialities that can and should be dealt with. Of importance for these choices are such factors as the sense of urgency and novelty relating to the problem, the pioneering spirit of the main actors, the previous experience of boundary work and boundary crossing activities, the institutional support system which favors either one of these sets of problems, etc. For instance, the practical accomplishment and organizational outcome of a learning environment with a character of strong boundary crossing
can be acted on in different ways. The milieu may undergo a process of disciplining, where a new heterogeneous field emerges out of the diverse point of departures. Another possible outcome is that the milieu struggles to cope with contradicting frameworks and is under attack from powerful actors who challenges the core idea of boundary crossing. A third possible outcome might be a mix of these, allowing some aspect of common boundary crossing knowledge to acquire a central position while the actors themselves never really leave their disciplinary homelands. In a similar way, weak boundary crossing learning environments face different options for coping with the potential challenges and pitfalls.

Weak and strong boundary crossing represents different paradigms within which each of them copes with the actual problems. Depending on the paradigm and the particular choices and attitudes in terms of organizational problem solving, a number of questions and issues can be dealt with in different ways. This finding shows that there is not one general way of coping with the challenges of boundary crossing, but several. There is not one general challenge characterizing boundary crossing, but many.

4. Boundary Crossing as a Multifaceted Phenomenon

Boundary crossing is a multifaceted and elusive educational phenomenon. There is not just one of its kinds, but many. Organizational dynamics tends to stabilize those phenomena that once were novel and anomalous, and this applies also to the prospects and trajectories of pedagogical innovations. Boundary crossing may be introduced as something innovative and daring where the old truths of the disciplines concerning theory, method and questions are challenged and replaced with new truths derived from the new fields of study. When these new truths are established and come to effect and perhaps even permeate the organization, a functional usurpation takes place and what once was new catches up with the old. The dynamics of organizations and their way of coping with change replaces “new” for “old” and one effect of this reversal is that boundary crossing, once associated with what was new, might no longer be understood as such.

Understanding the multifaceted character of boundary crossing requires awareness of its several dimensions. These dimensions can be divided in a number of ways. First of all, we have to distinguish between theory, rhetoric and practice. What actors say that they actually do is not always what they are up to, although saying is also a form of “doing”. The dimension of rhetoric is always pitched as an ideal version of how theory and practice should be combined and it is constitutive to the genre of academic rhetoric that such descriptions cannot be used as blueprints of reality. The rhetoric dimension is an activity in its own respect that is not only justified according to criteria relating this to concrete practices. The dimension of practice always contains elements of both rhetoric and theory. The implication of this first division of the dimensions of boundary crossing is to be able to distinguish between these different layers and also to realize that each one of them is part of distinctive discourses characteristic of the academic culture.
A second way of distinguishing the multifaceted character of boundary crossing is to separate it into the following four categories: *Visions and ideals; Organization: Content; Pedagogy*. This quartet somewhat overlaps with the previous division but aims to catch up with categories that is derived not from the organizationally motivated academic discourses of the previous categorization, but derived from educationally motivated categories. In the empirical studies, we faced the problem of looking for examples of boundary crossing as if they were neatly accessible in the contexts under study. Obviously, they can be found in such a way, but in order not to miss the multifaceted character of boundary crossing we designed a new partition. We believe it is important to generate categories that are based in educational practice and that carry the potential of capturing a multifaceted phenomenon. Therefore we have taken a step further in order to make an inventory of categories that can be used for the concrete examination of learning environments. These new categories in turn overlap with the previously mentioned distinctions. As an outcome of this analytic work, we suggest nine relevant categories for the comprehensive study of boundary crossing:

1. Identity
2. Conflict
3. Epistemology
4. Pedagogy
5. Cooperation
6. Rhetoric
7. Continuity/Change
8. Goals/Motivation
9. Frames

Let us make a further explanation with some examples (more examples and an attempt at making a grid based on these nine categories are made below in 7): Which knowledge perspectives (or local epistemologies) are represented? Which knowledge perspective is dominating and against which perspective(s) is this juxtaposed? Boundary crossing is certainly about epistemology and these questions are relevant to ask, but it is not only that; it is also about rhetoric and although both these are very important aspects, it is also about how students’ identity work is attended to and possibly supported in a context where identity work is of utmost importance for the successful establishment of boundary crossing environments. Which are the preferred and dispreferred identities of teachers and students? How are new members socialized? How is the common educational culture maintained? It is important to understand how conflicts concerning content and organization are coped with and how they are settled if we attempt to understand boundary crossing environments. What problems are addressed through the organization of
cross boundary learning and what answers are given? How are problems and controversies coped with and what are the consequences for the programs? What models are developed for use in situations where challenges and problems emerge? The boundaries that are challenged in boundary crossing are thus manifold and they actualize all of the nine dimensions mentioned above. It is not just a matter of content. But it is also a matter of identity and goals and frames, to name just a few of these nine categories.

This important outcome of our project is based in the observation that boundary crossing is a multifaceted phenomenon. Thus we have strived to distinguish variables that are important for a richer understanding of boundary crossing. For a fuller understanding of the character of boundary crossing it is important to design an instrument for interrogation that cover the most relevant aspects of education as an organizational activity. We believe that this observation is important for the way in which criteria for assessment of boundary crossing learning environments are accounted for and evaluated.

In our analysis of the Northern and Southern Universities we have identified how differently cross boundary learning is practically organized (see also 7 below). These differences can be explained first of all as an outcome of the very different challenges facing “weak” vs. “strong” boundary crossing (cf. above), and secondly as an outcome of the different ways of organizing the administrative unit in which learning takes place. At Southern University a new unit was created while at Northern they coordinated existing units in order to maintain and preserve their disciplinary integrity. These differences in organizations have implications for the practical accomplishment of cross boundary learning. The question of organization relates to the ways in which work is distributed within and between the units and the responsibility of the actors. We describe the following questions and how they adapt to the two main units in the study. How and according to what principles is work distributed and divided among the contributors to the cross boundary activities? Who (among the faculty) will be given the assignment and responsibility of making boundary crossing activities? How and by whom are the boundary crossing programs directed and who are in a position of power?

Questions of organization and actors relate also to a discussion on which level the cross boundary learning takes place. At NU, there is a deliberate choice that the only level on which these activities takes place are the learning units themselves, i.e. particular courses. This is done in order to comply with the institution specific logic at which the integrity of the disciplines that participate in the course never should be challenged. At SU, on the other hand, we see examples of greater transparency and willingness to reshuffle the institution on several levels, from individual learning units to institutional levels and administration. These strategies are indeed very different but interestingly, the particular pedagogical practice might be almost indistinguishable. This analysis leads to a more general issue i.e. towards an understanding of the meaning and efficacy of the institutional support structure (cf. 12 below).
One conclusion drawn from our study of graduate schools is that the challenge to support boundary crossing primarily pertains to questions of content and not to questions of pedagogy. Boundary crossing is best understood as an extension of the disciplinary tradition of a particular department but can also include cooperation with other departments at other universities. The graduate students in these contexts are exposed to several possible identities. The most common seems to be that they graduate in the home department’s discipline while they have simultaneously belonged to a graduate school with a much more explicit boundary crossing profile. Boundary crossing in the sense of pedagogy have not been the primary concern, the identity for the graduate school have rather been constituted by its content.

5. Aims, Goals and Motivations for Boundary Crossing

The organization of cross boundary learning often ends up at creating new organizational units, in our data exemplified by Southern University. Such attempts are often based on an explicit critique of current and previous ways of knowledge production, typically associated with “old fashioned traditional universities” and with ”disciplines” in the derogatory senses of the word. Obviously, such criticism can be more or less relevant: “traditional old fashioned universities” are maybe not just “old and static”, and ”disciplines” are maybe not as rigid as they perhaps used to be. The evolution of disciplines and university dynamics is much more elusive that that. First of all, motivation for boundary crossing can be found in any of the nine dimensions described above or in any combination of them. For instance, this can be motivated by a blending of arguments concerning as diverse elements as epistemology and institutional frames. Except for that, we can identify another number of goals and aims of boundary crossing such as the following. The new units that cross boundary learning is aiming to accomplish often relate both to (1) the convergence/integration of content (i.e. boundary crossing of content) and (2) to something that is beyond the particular content of the learning activity and its associated theories and methods, something extra-curricular. We think here of side-effects and repercussions such as “emancipation” or, which is more fashionable today, “employability” which is accomplished through the merger of content. These new units often aims at realizing interorganizational goals such as ”integration”, ”cooperation” and precisely ”boundary crossing” in the sense of managing the organizational structure of the learning environment. These goals are often pitched way beyond the specific content towards a social and political sphere and thus become much larger, ideological and sometimes even utopian in character. Pedagogical policy and, in particular, a specific way of organizing pedagogy, becomes the place in which these larger goals should be realized. In this sense, some forms of cross boundary learning share with pedagogy at large these extra-curricular goals. This exemplifies that such goals often carry an ideological character aiming at changing or making an impact on social and political life. These are not, however, the only motives for cross boundary
Another strong motive (3) figuring among the informants and in other representations making up the data for the study, such as marketing, is derived from the changing face of higher education. The expansion and so called “deregulation” of higher education is based on the expectation that actors should be prepared to cope with challenges and competition. Higher education is situated on a market for learning where the forces of attraction, competition and bidding are operative. Yet for others, (4) a strong motive can be based in economical concerns and on an estimation of the limited volume of resources available at a small college, which enables as viable only cross boundary solutions motivated by an economy of scale and sharing of resources. Furthermore, (5) a strong motive might be the internalist critique of current epistemologies and their distinct separation which bring us back to the integration of content, although at a more basic epistemological level. Often, attempts at cross boundary learning are advocated by enthusiastic individuals whose role in the practical accomplishment is salient. Another motive for boundary crossing is when this way of organizing knowledge production is a mandatory trend, towards which one is “forced” to comply. This takes place when financial institutions in order to provide support for research, explicitly requires that the work should be accomplished in a specific (boundary crossing) way. In our material, this was the case for some financial institutions during the time period overlapping with the initial phase of the project, but not with the end of the project time.

Boundary crossing activities are often pitched as something new. As indicated above, when these activities are no longer new, their boundary crossing character also tends to diminish and fade away. Boundary crossing is thus intimately associated with the dynamics of pedagogical or organizational novelty which explains why boundary crossing initiatives are so easy to suggest and why they are so hard to maintain. Boundary crossing can be an organizational goal to achieve in itself, or it can be a temporary instrument operative in the aim for any other ulterior goals which is very common in research where problem-solving is often made with the help of boundary crossing joint efforts. In our research we have seen that the goals and motives for boundary crossing are highly variable. Sometimes the goal is to make an impact on a singular course, but sometimes the aims and stakes are much higher: creating integrated semesters in the beginning and/or end of a program (e.g. an exit through a Master’s program), or even to establish entirely new programs that are fully integrated.

Motives for boundary crossing are not always formulated in a positive way. Sometimes negative goals figure as active targets for what an institutional actor (a department or a program) do not want to accomplish. We have seen examples of how particularly one institution for higher education actively cultivated a negative target exemplified by another university. Repeatedly we heard assertions such as “We do not want to be like XXX University!”; “We must avoid doing “interdisciplinary” like XXX University, but will instead do “multidisciplinary””. 
6. Boundary Crossing in Theory and Practice

It is important to distinguish between boundary crossing in theory and in practice. Boundary crossing in undergraduate and graduate programs is sensitive to pedagogical conjunctures which, per definition, are continuously shifting. This leads to the observation that boundary crossing in these contexts increasingly takes the character of being designed rather than evolutionary developed (cf. 2 above). In contrast, we are able to note that boundary crossing in research contexts may often develop according to evolutionary patterns. When we initiated this project with a pilot study in 2003 we were overwhelmed with indications that boundary crossing belonged among the most fashionable catchwords in higher education pedagogy. Today, we can see that other pedagogical catchwords such as “excellence”, “quality” and “internationalization” have taken the place of boundary crossing. It is not that the concept is missing, but it is presented in a lower key and with much less emphasis. The more radical versions of boundary crossing such as “interdisciplinarity” are tuned down/watered down to more moderate versions such as “pluridisciplinarity”. This process is also in effect at the Swedish universities which historically have been mostly associated with “interdisciplinarity”, such as Linköping University (at Linköping and Norrköping), Luleå Technical University, Malmö University, and Södertörn University College.

This general and rapid shift in pedagogical conjunctures hits harder in undergraduate and graduate programs than in research. In research, actors are generally better prepared for relatively quick changes in the surrounding society and in the changes in the horizon of expectation characteristic of society, politics or of the fields of study. There is a basic expectation that research should cope with changes, but this is not entirely the case with study programs. In study programs there are other kinds of commitments such as all sorts of attempts to attract students and a commitment not to change basic conditions at least during the year while students pursue their degree. If this condition includes “interdisciplinarity” at one point in time there is an expectation that this should remain so for a foreseeable future, or at least until graduation of the specific cohort. According to the conjunctures, however, shifts in pedagogical policy may occur more rapidly. Degree programs are planned in another way than what is the case in research. One outcome of this disjunction of conjunctures is that there is a time lag between theory and practice. The practice might be totally separated from the pedagogical buzzwords, and the other way around. When the buzzwords include boundary crossing, the practice might look very different. When the practice adapt to the buzzwords, these words might no longer carry any value.

One important reason why degree programs are characterized by this sensitivity to conjunctures is due to a shifting climate in higher education in general including a move towards marketization; there is an increasing competition for attracting students. Pedagogical buzzwords, curricular innovation and attractive marketing slogans carry out important functions in the race to fill up the places at universities. Smaller units, perhaps
located in small cities or in regions suffering from a general decrease in employing opportunities, need to shout out even louder to reach a level which makes them comparable to the old and venerable institutions. This indicates a basic asymmetry in the politics of attraction. The unevenness of this competition creates a market for stressing qualities of uniqueness in extreme terms. Notions such as “excellence” and “world class” are commonplace today in the marketing efforts made also by smaller and less recognized units of higher education. This is not at all typical only for Sweden, but is a recurring phenomenon in all countries that are subjected to a process of so called “deregulation”. In this context, boundary crossing become one of the many available instruments for attracting students but all institutions who use this or any other fashionable notion runs the risk of suddenly finding it outdated and even contra-intuitive.

7. Examples of Boundary Crossing

In our research we have encountered many different ways of doing boundary crossing. As indicated, boundary crossing is a multifaceted phenomenon and the boundaries that are either challenged or defended can be found on many levels of the organization and in many of its dimensions. We have introduced nine important categories, mentioned above; covering a number of dimensions that together will contribute to identify a boundary crossing profile of a learning unit. Thus it is not just one aspect that will qualify as examples of boundary crossing, but several of them will together sketch a comprehensive profile on the basis of which one might interpret the degree, level and relative depth of boundary crossing.

In the following table, we have summarized the boundary crossing profiles of the two major case studies in the project, a study of Northern University and Southern University.

<table>
<thead>
<tr>
<th>Categories</th>
<th>Northern University (weak)</th>
<th>Southern University (strong)</th>
</tr>
</thead>
<tbody>
<tr>
<td>identity</td>
<td>disciplinary</td>
<td>interdisciplinary</td>
</tr>
<tr>
<td>conflict</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>epistemology</td>
<td>weak</td>
<td>strong</td>
</tr>
<tr>
<td>pedagogy</td>
<td>no special</td>
<td>yes (PBL)?</td>
</tr>
<tr>
<td>cooperation</td>
<td>within university</td>
<td>within and outside university</td>
</tr>
<tr>
<td>rhetoric</td>
<td>multidisciplinary</td>
<td>pluridisciplinary</td>
</tr>
<tr>
<td>continuity/change</td>
<td>continuity</td>
<td>change</td>
</tr>
<tr>
<td>goals/motivation</td>
<td>reforming disciplines</td>
<td>forming new discipline</td>
</tr>
<tr>
<td>frames</td>
<td>non supportive</td>
<td>supportive</td>
</tr>
</tbody>
</table>

Table 1: Nine categories of boundary crossing applied to Northern and Southern Universities.

This table shows an application of the nine categories to the two main bodies of data in the project, the fieldworks done at NU and SU. By identifying the two schools according
to the nine variables a “profile” of each school emerges. This profile related to these categories, rather than just one of them, is a richer way of showing the complexity of boundary crossing. This is a step towards developing a sophisticated instrument for assessment and evaluations of boundary crossing programs.

Another way of presenting and understanding examples of boundary crossing is much more based on intuition and is the following. In our research oriented to the understanding of boundary crossing in graduate schools we found several varieties of boundary crossing. Often these varieties were embedded in the discourse of the interviewed persons. We termed these varieties “one-liners” because we found that these formulations pretty much covered their specific profile expressed in idiomatic language. It is not entirely certain that this was what the proponents intended, but this were rather, for better or worse, the outcome of our own interpretation of their boundary crossing stances.

- “We want to form a national team in research with the best players available”
- “Our area of study is situated in the margins for all of us”
- “It is all about twinning - promoting encounters with people from various disciplines who can work concretely together”
- “We must not be [interdisciplinary] like XXX University!”
- ”We suffered too much from the philosophy of 'Let thousand flowers bloom’”

These one-liners capture in retrospect our interpretation of the attitudes to interdisciplinarity specific for the graduate schools. Rather than being identity markers suggested by the interviewees, these expressions are the researchers labeling of their identities. This method is obviously not as sophisticated as the emergence of the “profiles” illustrated above, but may still work. Together, they show a variety of attitudes available under the common umbrella of interdisciplinarity and we find this diversity interesting. To some extent it also indicates an awareness by the actors of their own specific “profile”, although expressed in a different and more idiomatic way.

8. Pedagogy and Boundary Crossing

Is boundary crossing to be understood as a pedagogical method and/or is it better understood as a pedagogic principle that determines or inspires particular methods? As many variations that we have seen in the other categories studied, there is also diversity on this issue. It is important to note that some actors regard boundary crossing as a pedagogical method which can be used quiet instrumentally in exchange for other pedagogical methods such as Problem Based Learning. Obviously such actors, most typically found at Northern University with their strong commitment to multidisciplinarity, do not allow
the methods of boundary crossing to be part of their general pedagogical outlook. Boundary crossing is a method for use in teaching, nothing else. On the other hand, this issue was conceptualized in quite another fashion at Southern University. Although the teachers we talked to at SU cannot be regarded as extreme in the other direction, i.e. they were not promoting “interdisciplinarity” in a more radical sense; they allowed boundary crossing to permeate “upwards” both in the organization and in their pedagogical thinking. These two examples shows that there is no necessary connection between the uses of boundary crossing learning in teaching and other aspects of a more general pedagogical outfit. However, precisely that can also be the case and it can be argued with criteria of consistency, e.g. claims that shows a connection between concrete pedagogical practices and organizational and/or pedagogical principles at large. It is important to distinguish this diversity and to understand that the latter argument is not as binding as is often claimed.

We can note, however, that boundary crossing have functioned as a general gate opener for pedagogical development both in undergraduate and graduate learning contexts. This is probably no different from the way in which other prominent pedagogical buzzwords helps to stimulate pedagogical innovation at large. It can be regarded as a form of surplus effect that derives from a general recognition of the importance of pedagogical innovation, such as was the case when the large project at the end of the 1990s put forward boundary crossing and interdisciplinarity as the buzzwords leading the development of new university colleges in Norrköping, Malmö and Södertörn. In one sense, the institutions had to conform to these standards, but they did so in very different ways. And the general call for pedagogical innovation led to experiments with boundary crossing as well as to other pedagogical methods.

Another way of understanding the role of boundary crossing on different levels of pedagogy is to see how differently this looks in the two ideal types of boundary crossing (cf. 2 above). Boundary crossing as a distinctive pedagogy plays an important role in designed boundary crossing, but not in evolutionary boundary crossing. The latter form of learning environment develops according to the logic of borrowing and lending from other theories and methods, while the former lacks the “organic” impetus and “needs” an external motivator to accomplish the desired development. The role of pedagogy in the two ideal models fits within their respective framework and is in fact a good example of their internal differences.

Yet another angle on pedagogy and boundary crossing is that concrete methods either can or can not support boundary crossing. This means that a general orientation towards boundary crossing in the design of a particular course will be counteracted if the choice of methods for learning does not support this direction. We have seen examples from both contexts (NU and SU) where concrete methods used are “residuals” from the higher learning community, i.e. remnants of established everyday run of the mill way that we do things, and this might counteract the general strive for boundary crossing. That is why boundary crossing, as mentioned above, often drives pedagogical innovation.
On a general level, pedagogy plays an increasingly salient role in both undergraduate and graduate education. The element of education plays an ever more important role in contrast to a former situation characterized by a freer way of learning. In particular, graduate schools illustrate this trend towards what we could call the pedagogification of higher learning, i.e. they serve as examples of the systematic permeation of a pedagogical awareness on almost all levels in the system of higher education. The general increase in higher education as part of the expected life course or a growing number of people is another example. This development is accompanied by explicit measures for adapting people to education, through pedagogy. Boundary crossing is just one of many examples that serve to accomplish these encounters in a beneficial way.

9. The Rhetoric of Boundary Crossing

In several of the observations listed above we have repeatedly noted the common rhetorical uses of boundary crossing. This is not noted in order to disqualify rhetoric in this context as merely empty words wrapped up in fancy packages. We are aware that rhetoric is an important aspect of academic culture. Argumentation, persuasion, and seduction by words are integral to academic discourse at various levels, from teaching to research and high level administration. Academics are usually specialists in offering promotional discourses, whether these are grounded in exquisite language, in neat hierarchies of convincing arguments, or in powerful storytelling. It is thus no surprise that boundary crossing is part of this academic rhetoric together with many other notions with high stakes in knowledge production and pedagogy. Boundary crossing is no exception from the general rule that some concepts at one specific time or another can be identified as important and become administratively and rhetorically elevated to fulfill particular functions in academic discourse and promotional activities.

We have previously noted that there is no immediate match between rhetoric and other levels of practice, i.e. there are no direct commitments between what is said and what is done in an organization, which means, that if boundary crossing is used in the rhetoric of a university (a program or a department), no obvious counterpart in concrete practices could be expected (and, as noted above, the other way around). Obviously, in rhetoric the actor wants to produce precisely certain truth effects which states the opposite, namely a declaration of description and intention; that what we say we do is also what we do. This modus operandi of rhetorical argumentation is also operative in this case. Another aspect of rhetoric or any other kind of discourse, well known from speech act theory and other pragmatic orientations, is that saying something is also an activity in itself, i.e. saying something is a “doing” irrespective of its relation to its possible practice based outcomes (cf. above). Thus, rhetoric cannot only be assessed from the perspective of its potential matches with organizational reality, but also with respect to the expectations of the specific genres or discourses to which it belongs.
We have noted that boundary crossing or its equivalents often is used in academic discourse on undergraduate and graduate learning, especially in the beginning and middle of the research period. This reflects the high value that boundary crossing and similar concepts had during this particular period in time. There were general expectations and sometimes even explicit demands that boundary crossing activities should be attended to, whether or not one liked them. Towards the end of the period we noted that boundary crossing notions were replaced with other buzzwords such as “excellence”, “internationalization” and “employability”, reflecting a shift in the frame of expectations towards which academic actors should orient themselves. There is a strong sense of adaptability and perhaps even opportunism in academic discourse. The actors want to attract money for funding graduate schools and financing graduate students or they want to attract even more students or acquire the allowance from the state to secure funding for more students. Academic discourse is vulnerable to these expectations in the same way that any other actor/discourse with a market orientation is malleable to the expectations and demands of the market. When we note that many actors in higher education are part of this game we are not intending to discredit their individual appearances. We are simply saying that they competently and loyally conform to the expectations provided by the market of higher education.

We think of one aspect of boundary crossing in terms of a rhetorical “lip service”. By paying tribute to boundary crossing or any other equivalent concept (or, in another time period, any other fancy concept) institutional actors prove to be competently performing the necessary adaptation to the current demands. When the pedagogical currents are changing, they are quick to note this and to subsequently change their vocabulary in a proper way. Those representing undergraduate and graduate programs are skilled in the art of embedding the “old good” in new fancy packaging. We are not intending to say that actors are totally devoid of any kind of truthfulness or authenticity in what they are doing; certainly we have seen example of individuals and representative who really believe in what they are doing and keep believing this despite the changing vogues of the university. In order to survive they also have to modify they way of presenting themselves and their activities, however in a milder and less opportunistic way.

We think of rhetorical “lip service” or of “pedagogical opportunism” (or perhaps: “pedagogical political correctness”) as referring to this activity in which actors are prepared to use trendy pedagogical notions in a dynamic way in order for them to look exactly like that which is being asked for. This is done in order to reach an advantageous position in a system for distribution of resources and in a culture of attraction and optimization. It is done also to show that one is updated with the shifting landscape of pedagogy and that one is aware of the trends making up a market of knowledge production. This “opportunism” can be regarded as a form of administrative skill, oriented to match one’s own practice with those rules and frames that are favorable for gaining this advantage. When boundary crossing is invoked, people do all sorts of different things. They do not interpret boundary crossing in the same way and when they adapt this
notion to what they are doing – or to what they claim they are doing – the resulting descriptions differ from each other. This shows both that boundary crossing can constitute many kinds of activities and that it is object to the creativity and dynamics of language.

If one is critically minded and really keen to observe the specific qualities of boundary crossing in the face of the conditions of academic discourse, including “lip service” and “pedagogical opportunism”, one might feel disturbed by this cynical observation. One might say that boundary crossing constitutes one of those notions that have suffered from the watering down effects of a once venerable imperative.

10. Boundary Crossing Outside of Research as a Relatively Unstudied Phenomenon

We have mentioned that there is plenty of research on interdisciplinarity in research contexts, but much less so in the context of teaching and learning. This can be explained by many factors; not the least that education so far has been mainly developed within disciplinary contexts, while research across boundaries have been hailed by certain advocates as a more effective and interesting way of coping with problems. What we have witnessed recently, is a shift towards conceiving of education as a form of research, i.e. the activity of learning is understood as a research activity on a par with conventional research. This shift has opened the door for boundary crossing more generally in undergraduate teaching contexts. Another structural explanation is the general increase in the sector of higher education and the stronger emphasis on competition and innovativeness, something that could lead in all sorts of directions for designing programs and for equipping these with pedagogical methods, among them boundary crossing. Boundary crossing in higher education remains a relatively understudied phenomenon because it is of a quite recent date. We have noted, however, that boundary crossing in a more evolutionary sense (cf. 2 above) is characterized by precisely doing this but it is seldom conceived as such.

11. The Conjunctures of Boundary crossing. The Emergence and Disappearance of an Organizational Norm in the Changing Topography of Higher Education

Why was boundary crossing a taboo twenty years ago and why is it hailed today (or at least yesterday? Roughly four decades back, in the early 1970s, boundary crossing was a controversial phenomenon in higher education. The ways that disciplines meet, blend, and re-emerge from their interdisciplinary encounter is not new, but at the time radical pedagogical thinking liked to operationalize this trend in educational innovation into the design of new degree programs, both on undergraduate and graduate levels. This took place in the USA, in UK, Germany, Denmark, among a number of countries, as well as in Sweden. Different attempts have been made during the post-war era. Well known
examples are the Social studies-concentration at Harvard, the History of Consciousness program at UC Santa Cruz and Roskilde Universitetscenter (RUC) in Denmark. Enthusiasts and advocates for this innovation, some of which belong to the US based organization Association for Integrative Studies (AIS), claimed that the received forms of organizing knowledge into academic disciplines did not constitute a productive point of departure for the need to cope with contemporary complex problems such as the environment, the climate and public health. Critics, on the other hand, argued that these new ways of designing higher education pedagogy and curriculum was an effective way of leveling knowledge and of reducing the importance of research traditions within the disciplines. Today, well into the 21st Century, the phenomena of boundary crossing at various levels in higher education is totally accepted as a normal procedure of arranging undergraduate and graduate programs, research, outreach programs, partnerships as well as various other forms of cooperating with the society outside of academia. We would even dare to say that boundary crossing today constitutes a norm for organizing knowledge production and learning – at least it did so only a couple of years ago. New programs and initiatives should, almost by default, aim towards the breaking or crossing of boundaries. Without boundary crossing, the reasoning goes, new initiatives seems to lack the necessary inertia for the development of knowledge and learning. "Boundary crossing", "integration" and "cooperation" are defined as core pedagogical principles. "Breaking new ground" is a boundary crossing notion which reflects but also emphasizes a received notion of knowledge production and learning as activities focused on investigation, innovation and conquest. This shift in the historical role of boundary crossing constitute the context for the present study.

The expansion of the sector of higher education worldwide have given this process due momentum. At the beginning of the new Millennium, the Swedish government made incentives available for new programs – even new universities – that were devoted to pedagogical innovation and the concern of boundary crossing was part of this. In reaching new groups of students and cultivating new markets for higher education, strategies for boundary crossing have been used as tools for proliferation and the establishment of competitive edge. New boundary crossing programs is motivated by notions such as "integration" (between disciplines), "synergy" (with partners outside of academia) and "projects" (reflecting the dominating way of organizing work processes in the labour market). This trend is visible, in the context of Sweden, in new professional M Sc-programs (Sw. “civilingenjörsprogram”) as well as in the Teacher Training program. Linked to the latter, the new discipline "Pedagogic work" have been formed as a convergence between academic and professional needs, aiming to cross the boundaries both between disciplines (pedagogy, didactics, etc.) and between theory and practice, between teacher training and teacher work. Other examples taken from the Humanities and Social science in the same national context are new programs aiming to bridge so called "wet" and "dry" disciplines, for instance various environmental programs.
In Sweden, the notion of "The Open Higher Education" (Sw. “Den öppna högskolan”) have been a national buzzword for coping with the challenges brought about by the encounters of cultures, professions, sectors and disciplines. Certain institutions in the national geography of higher education, such as the universities in Linköping, Umeå and Luleå, have acquired distinction through their aims towards embracing this pedagogical trend for boundary crossing and for the particular emphasis that they have put into being part of a pan-European network of (pedagogically) "progressive" universities where "integration", "cooperation" and "boundary crossing" are key notions. As noted, these universities hardly use the notion of “interdisciplinary” any longer but prefer the more moderate term “pluridisciplinary” (Sw. “flervetenskaplig”) or boundary crossing.

We find it both interesting and surprising that what was a pedagogic taboo later became a norm, and then almost disappeared again. Until recently we could identify a boundary crossing imperative in higher education in Sweden. Showing commitment to this imperative was relatively free from risk since the boundaries in question could be so different and open for interpretation, as well as the ways of coping with them. Also those university teachers and researchers who basically felt critical against this trend, for reasons of disciplinary affiliation or any other, could identify with the basic dynamics of boundaries relevant to science and higher education, but not only this. Increasingly one could hear proponents of disciplines argue that they actually were the true advocates of boundary crossing, since disciplines are the fundamental basis for any transgressing activity. Boundaries at large have become a more central concern in contemporary higher education and it is generally regraded as something that should be overcome rather than defended. Simultaneously, it is increasingly unclear which boundaries we really are talking about.

12. The Importance of the Local Learning Environment

The final observation concerns the strategic importance of the local infrastructure for the implementation of boundary crossing in undergraduate and graduate programs. For any form of sustainability and/or success, boundary crossing requires support from various levels of the organization. This is not an exclusive observation for boundary crossing, but for most activities within or outside public administration that are vulnerable to market like forces. An organization cannot be too heterogeneous in order to survive in a climate of competition, but need institutional cross promotion as well as explicit ideological and practical support form the administrative levels of the organization.

This observation leads the argument in two ways. One the hand, it describes the conditions for institutions for higher learning in contemporary society. Due to the process of so called “deregulation”, the universities have become increasingly accountable for their own actions. The market like or quasi-market conditions of higher education requires some sort of ideological convergence or commonality in order for it to work
effectively. Such an organization cannot include too many divergent opinions. Especially when it concerns pedagogical innovation, which initially may be easy to advocate but may be more challenging to defend in later stages of development, actors need the support of the organization. When these ideas somewhat breaks the norms of the academy, which sometime is the case with boundary crossing, the need for this institutional support system is even greater.

The other observation concerns the possible effects that this market like orientation of contemporary institutions for higher education has for academic culture as we know it. Academics might cultivate an identity as truth tellers, as frank and cynical analysts in the service of science who do not fear the perils of integrity or the possible fear of power. Our understanding of contemporary academics, at least those who lead programs is that they need to conform to the organization as well as to the market. Whether or not they cultivate the classical academic attitude of free minded spirit, they have to combine this with loyalty to an organization.

**General Conclusion**

As a general conclusion at the end of these twelve themes we would like to concentrate on the shifting trends and qualities of boundary crossing. Initially boundary crossing (in the name of interdisciplinarity) was linked to a radical critique of the limited relevance and potentialities of the disciplines. In our time this has undergone quite dramatic changes. The keyword is still boundary crossing, but today it is more instrumental and have come to serve the research and innovation policies. Interdisciplinarity and boundary crossing has developed from radical critique to mainstream adaptation to markets and businesses. This development may lead us to speculate what functions, despite its conformity to current politics and to academic discourse, it is aiming to fulfill. In our work we are developing a third position between the radicalism of critique and the conformity of the market. We position the debate on boundary crossing in between what Gibbons et al (1994) call mode 1 (the traditional disciplinary organized academy) and mode 2 (interdisciplinary cooperation based on the model of R&d in businesses). Our contribution is to preserve the best elements of the critical attitude in both mode 1 and mode 2 while both avoiding the ivory tower of academia and the most spectacular forms of marketized opportunism characteristic of mode 2. This includes developing a critical understanding of Enlightenment projects without ending up in a defense for the continuous exploitation of scientific disciplines for the benefit of society and enterprise. Following our argumentation, we devise an analysis that goes beyond contemporary examples of boundary crossing and sketches the implications for future research and education policies.
Results – Contributions to the Field of Practice

It is important to approach an understanding of cross boundary learning activities in context because so much have been written about interdisciplinarity and boundary work in principle, or in theory. Obviously, such reasoning based in principles or in theories are central to our understanding of this phenomenon, but so are also the often overlooked practices of learning. This is particularly overlooked when it comes to boundary crossing. We follow a practice oriented approach, focusing on the concrete organization of learning activities as the main unit of analysis. Such perspective have theoretical and methodological consequences for the understanding of the relationship between practice, ideology and its contexts (cf. 1-3 above). Practice and ideology are not discrete empirical units, but are understood as parallel dimensions of practices that can only be distinguished analytically. By focusing on a limited number of graduate and undergraduate learning environments (for particulars, see below) we have made concrete empirical studies of the content and organization of cross boundary learning. In terms of methodology, this means that we have worked with qualitative methods that are possible and relevant to use in field studies (interviews, discourse analysis, document analysis, participant observation, etc.). We study the practices, ideologies and power structures in which cross boundary learning takes place, its operationalizations and implementations.

In our studies of cross boundary learning, we have strived to situate these within concrete pedagogical practices. We have also based our studies on interviews with faculty representing various programs in which such practices plays a role. In both these respects we speak to and out of the experiences of the field, which should count as a legitimate contribution to the field of practice but also to practice oriented science. We have primarily addressed our studies to the concerns of those who represent the field.

Although the study is based on concrete pedagogical experiences, our own as well as those of others, we argue for the importance of critical distance and an analysis of the sometimes veiled dimensions of the practices, ideologies and social and cultural contexts. When theorizing (cf. above), we have done this primarily with the practitioners in mind. Partly based on our own attempts at organizing curriculum according to these lines, we argue that such informed inside views are important for an understanding of the prospects, possibilities and problems associated with this way of organizing learning. In this sense it is important to note that we do not strive to be uncritical advocates of cross boundary learning, on the contrary, we try to stay out of overly normative discussions and instead make these debates into an object of study.

There are a number of observations that we want to identify to be made from these experiences, our own as well as those of others. These observations will be anchored in the twelve themes mentioned above and in summarizing these they can potentially contribute to our understanding of cross boundary learning as well as contribute to new
initiatives in cross boundary learning that are made today. Here is what we saw and what we learned:

1. It is important to be aware of the analytical concepts used when we talk about boundary crossing because it tends to be a such a sensitive and contested topic. The topic is contested for many reasons and we need to more fully understand these, e.g. boundary crossing may in some contexts be the main carrier of institutional conflicts, while in other contexts boundary crossing is important for ideological and epistemological reasons.

2. Boundary crossing activities are not always conceptualized as such, but may be part of an ethos of development in higher education where borrowing theories and methods between disciplines is quite natural and uncontested. We distinguish between evolutionary and designed boundary crossing where the latter are planned activities in which the specific method/attitude (boundary crossing) plays an important role.

3. We find it very important to distinguish between the disciplinary units that participate in boundary crossing. We name “weak” boundary crossing those bridging attempts that take place between disciplines within a relative disciplinary proximity. We name “strong” boundary crossing those attempts that take place between units that are far removed from each other on a disciplinary scale. It is important to recognize that there are quite different challenges that characterizes these approaches.

4. Repeatedly we have noted that boundary crossing is a multi-faceted phenomenon, addressing issues at many different levels such as ideology, institutions, pedagogy, etc.

5. There are a number of aims and goals operative for the uses of boundary crossing in higher education. These goals may differ from one person or context to another and also within a person and context. Boundary crossing is surrounded with flexible resources that may be adapted to the issues at hand that are deemed most important for the moment, and may then shift.

6. What actors say they are doing and what they are actually doing are not always the same. We have stressed that saying is a also a “doing” and yet noted that evaluations of pedagogical phenomena often seeks the matches between these two realms of activity.

7. The nine categories can be used in order to create boundary crossing profiles of particular programs and institutions. Such examples are thus presented in a much more vivid and richer way than superficial stereotypes. However, we have also illustrated the strengths of a more intuitive perspective in which one-liners were applied to particular programs.
8. Boundary crossing can be understood instrumentally as pedagogy, but it can also be given a more salient role in the ideology and practice of an institution with impacts all through an organization.

9. We have witnessed a process in which the rhetoric of boundary crossing have different functions. More pertinently, we have noted that boundary crossing sometimes fulfill the function of lip-service. This lip-service, i.e. saying what you are expected to say although you actually don’t believe in it, can be explained by other structural factors.

10. Boundary crossing is a quite recent phenomenon at least when this specific label is used. Increasingly, learning activities are understood as a form of research. These are two reasons why boundary crossing still is relatively unstudied in comparison to studies of interdisciplinarity in research.

11. We have witnessed the shifting conjunctures in higher education where the pedagogy and ideology of boundary crossing rise and falls like other key notions.

12. The importance of the local learning environment (e.g. department, university) cannot be over stressed. This reflects a sort of corporatization of institutions for higher learning in our times where the importance of compliance and loyalty to a coherent organizational culture is regarded as important.

Based on the accounts related to practice and ideology, we would like finally to address what criteria can be used for analysis and assessment of boundary crossing learning. According to what principles can such programs, for instance in connections with teaching evaluations and research applications, be analyzed and assessed? How can our study better inform such assessments? First of all it is important to recognize that the problems described and analyzed are of different kinds. A general model for assessment might therefore not be the preferred method. Some problems are particular and some more general and of a comparative nature. Thus it is important, when forming criteria for assessment and plans for policy and action, to regard these different problems. Our criteria for assessment summarized in the nine categories above can be used to develop profiles of boundary crossing programs and might assist in assessments.

**Writing.** We have not yet written a popular introduction to this field of study and this remains certainly one of our high priorities (cf. below). Writing so far, both in the context of conferences and academic journals, and in the context of academic reports, have aimed, however, to be accessible in particular for the practitioner in the field of cross boundary learning.

**Courses.** One outcome of the project is a graduate course ”Interdisciplinarity: Practice, Rhetoric, Theory” given at Linköping university during the Spring of 2008 and which will be given again in the Spring of 2011. The course drew attendance from 12 number of graduate students representing many disciplines and interdisciplines at Linköping. Course
evaluations were extremely favourable. We are planning to give this course more times and are currently trying to advertise this on a national level.

**Other activities.** One way of furthering our findings in this study is to create a national or perhaps Nordic forum for the exchange of experiences between those who are engaged in this kind of learning matters. From our contacts and interviews with representatives in the field, we have learned that many actors feel extremely lonely in their roles as representatives for cross boundary learning, especially when the tide turns in other directions. In fact, they often treated us as researchers in a counselling manner, expecting us to come up with answers and support to all sorts of questions and problems facing them in their teaching practice and in their roles as directors of programs. Although counselling was not our primary role, we never hesitated to give such support in case we could contribute. Such a forum focusing on cross boundary learning does not yet exist in Sweden, neither in Europe at large, but can favourably be linked to AIS (The Association for Integrative Studies). In early 2009, we responded positively to an initiative from the University of Amsterdam which invited us to participate in such activities, but the network has not yet been organized.
Comments on Changes in Research Plan

When writing our initial research proposal, we were not yet sure exactly which learning environments we wanted to study. We cultivated several ideas as to how the strategic choice between fields could be motivated in a ways. This prepared us more generally and importantly to make an inventory of the possible fields of study. At focus were certainly various forms of academic learning activities that claimed to be boundary crossing. As indicated above, using the label “boundary crossing” to signify specific learning activities is not a sufficient criterion for actually claiming to accomplish this. On the contrary, there are many learning activities that do not use this label. Yet such activities might very well qualify for actually doing boundary crossing learning according to specific criteria. These reflections actualize the problems associated with using self-selected criteria on boundary crossing as criteria for selecting fields of study.

Initially, we conceived of three possible fields of study: (1) Undergraduate degree programs or comprehensive disciplines; (2) Graduate programs; (3) Other forms of “cooperation with society”. Let us introduce how we thought about our selection initially and then compare this with the concrete outcome.

(1) We wanted to look more closely at undergraduate degree programs where boundary crossing was used as a general characteristic. For instance, we thought about looking more closely at the new (at that time) Teachers Training program, interdisciplinary MSc-programs (Sw. civilingenjörsprogram), or interdisciplinary undergraduate programs. In the Teachers Training program boundary crossing is actualized in many ways, for instance through the establishment of a new field of study called a “the core of educational sciences” (Sw. ”den utbildningsvetenskapliga kärnan”) and through various means of supporting the professional role of the teacher pitched as the programs most important scientific aim. In particular we wanted to look at Teacher Training programs that focused on Science and or Mathematics. Several new MSc-programs also carry the aim of bridging Technology/Science with Humanities and Social science. Also in this case it is a professional degree, like the Teachers Training program. As a third alternative, we wanted to look at programs that were what we wanted to call “weak boundary crossing”, i.e. crossing boundaries that are not radically opposed to each other, as for instance various boundaries within Social science like Political science and Cultural geography. A central issue in these contexts concern how progress is accomplished when the learning activities are based on boundary crossing. Another central issue is to understand what happens with the links to research in education when progress is defined as progress in a new boundary crossing problem area.

Apart from undergraduate programs, we also discussed the possibility of focusing on some comprehensive disciplines that have undergone interesting changes in content,
such as Pedagogic work, Social work and Social pedagogy. A motive for study such units would be to learn how the notion of boundary crossing has changed over time. For Pedagogic work the prime motive for change lies perhaps in the expectations from the Teachers Training program to help to solve their identity problems in the realm of research. For Social work it was a matter of creating/finding a scientific field that could accommodate the needs of a social practice and of thus helping to legitimize this practice. We noted the general trend in professional degrees programs to try to be more connected to precise and strictly defined professions.

(2) Another field of study was boundary crossing graduate programs. The existence of such programs is a fairly recent phenomenon in the Swedish academic landscape. Some of these so called graduate schools are organized thematically (like Linköping University’s Institute of Tema Research). Others carry the label of "multidisciplinary" graduate schools (e.g. Södertörn University College, Örebro University, etc.). Yet other examples of graduate schools legitimate their claim to boundary crossing in the interfaces of academy and industry. We expected to make comparisons between these major types of graduate schools in order to make an inventory and an analysis of various ways of coping with the challenges and problems of boundary crossing. This is particularly important given that the notion of graduate schools is of recent date and the conception of “course packages” is relatively new and almost not at all attended to by educational research. Also in the context of graduate schools we wanted to choose examples of both "weak" and "strong" boundary crossing.

(3) A third field of study would be more loosely organized examples of learning activities at the interface of academy and society (business, industry, organization, authorities, NGOs, etc.). This increasingly common form of learning/teaching is not always packaged in the form of undergraduate or graduate programs but contains a shorter life cycle and is recognized in other formats.

Apart from thinking about possible fields of study we thought that some problems and challenges encountered would be typical for the institutional form and format of the learning activities. For instance, some of the problems facing undergraduate programs would be general problems and not linked particularly to the challenges of boundary crossing. Although, in a context of boundary crossing this pedagogy might be understood to carry the main volume of blame for a specific outcome. Some problems in the domain of boundary crossing might be typical for an institutional form or level, while other problems might be of a more general character as problems facing boundary crossing wherever it is adhered to. We found it important in our research to be able to identify such differences.

Other initial thoughts concerning our decision of preferred fields of study concerned finding a match between different kinds of higher learning environments: new large col-
Looking back on our initial ideas, we have pretty much been faithful to the design consisting of two parts, one focusing on undergraduate degree programs and the other on graduate schools (the third possible field of study was never mentioned in the proposed research design). The performance of the two separate studies would be given a similar character in terms of choosing examples of learning environments that represent both “weak” and “strong” forms of interdisciplinarity; more specifically we wanted to focus on one MSc-program and one Teacher Training program. We deviated from this particular specification, however, and found interesting examples of ”weak” and ”strong” boundary crossing at two universities, Northern and Southern. One program is “strong” and covers several areas within Environmental studies. The other is “weak” and lies at the convergence between disciplines within Social science and the Humanities.

Methodologically, we did fieldwork at both these sites for a period of two semesters. Concerning the graduate schools we initially wanted to contrast one Tema at Linköping University with one of the graduate schools financed by the public research foundations SFF or MISTRA. In our study of the graduate schools, we ended up studying seven examples rather than two. In terms of methodology we did extensive interviews and document analysis rather than fieldwork.

An unexpected outcome of the project was our involvement with the boundaries of science deriving from the debate between the skeptical movement and advocates of non-traditional scientific perspectives. Although not part of the project per se, this engagement with the debate proved fruitful for recognizing the importance of debates about boundaries and science in general.

International Contacts

During the project we have participated in several conferences both in Sweden and abroad. Often we have organized panels, for instance at The World Institute of Sociology Conference in Stockholm (2005), The European Conference for Cultural Studies at Linköping university (2005, 2007) and at Society for Social Studies of Science in Montreal, Canada (2007). At other conferences we have participated with papers but not with panels, for instance the Association of Integrative Studies conference in Atlanta, Georgia (2006) and Utvecklingskonferensen för högre utbildning in Karlstad (2005). We are also part of a slowly configuring network of for teachers who work with integrative and interdisciplinary programs, directed by the University of Amsterdam.
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