"Knowledge as a barrier to learning: a case study from medical R&D"

Academic track

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Abstract
Processes of new knowledge generation and sharing are crucial for organisational learning and innovation, and have been extensively debated in the literature. This debate has primarily been concerned with understanding and deploying organizational mechanisms to enhance such processes, e.g. how to transform tacit knowledge into an explicit form. In this paper we argue that this perspective on knowledge has a limited focus, and we would like to suggest a wider view. Building on the notion of ‘communities of practice’, where knowledge is seen as a socially created and shared resource, a wider view opens out to reflect on the “machineries of knowledge production” and on the influence of external factors. In particular, we want to argue that knowledge traditions, knowledge regimes, or epistemic cultures, as we prefer to call them, do present an important influence in any local context. Clinical work in hospitals properly illustrates this problem area, proposing a setting where several different professions with different methods, theories and ‘world views’ meet and collaborate. In such settings, learning processes need to be re-examined.

In this paper we present a case study of a Research and Development department in a Norwegian hospital that develops novel surgical image technologies and new medical procedures. This case is especially interesting for our purpose, because it involved creating new cross-disciplinary collaboration between different, well-established communities of practice, but also the intermingling of several different epistemic cultures.

1. Introduction

Worldwide, the health care sector is facing major challenges related to a demand for improved quality of care and increased efficiency of resource utilisation. Moreover, the changes in disease patterns, the incessant generation of new medical knowledge and the development of new technologies contribute to an increased need for organisational innovation and learning. In such context, achieving innovation is not unproblematic. Several studies have shown the difficulties related to change-processes in health care (for instance Rundall, Starkwetter an Norrish, 1998) and the complex organisational change processes related to the introduction of new technology in health care (e.g. Barley, 1986). This literature calls for new suitable theories to understand these challenges within health care.

Processes of generating and sharing new knowledge have been a central research topic. Much of the mainstream Knowledge Management literature on innovation has been criticised for treating knowledge as such (e.g. Nonaka and Takeuchi, 1995), and not focusing on the social processes surrounding its generation and sharing. Conceptualising knowledge as a commodity, as context-free pieces of information that can be captured, represented, stored and transferred, is insufficient (Brown and Duguid, 1991). A line of research on knowledge and learning with a different starting point has emphasised the social character of knowledge, the practical accomplishment of knowledge (“knowledge-in-action”) and the processes of “knowing” (Blackler, 1995). It has been shown how knowledge is created and shared in groups, and learning occurs inseparably from the participation in Communities-of-Practice (Lave and Wenger, 1991; Brown and Duguid, 1991; Wenger, McDermont and Snyder 2002). This literature has also emphasised the local and situated character of knowledge, and demonstrates that knowledge generation is socially and materially distributed (Engestrøm, 1995; Cicourel, 1990; Hutchins, 1995). Research within the field of Science and Technology Studies (STS) includes Karin Knorr-Cetina’s study of what she defines as ‘epistemic cultures’, which is used to explore ‘the machineries of knowledge production’ (Knorr-Cetina 1999).
Building on this theoretical background, we will study the local practices of knowledge generation related to new medical technologies. In particular we are interested in the issue of interdisciplinarity, and we ask how learning can be enabled or hindered by the bringing together of different (and potentially incompatible) communities of practices. In doing this, we have to expand the perspective from the local setting, and to address issues that relate to established professional roles and epistemic cultures. Our research question can thus be expressed such: *How can we understand the dynamics of interdisciplinary knowledge production?*

In chapter 2, we present relevant theories about knowledge, and emphasise particularly the contributions on ‘communities of practice’ and ‘epistemic cultures’ to discuss similarities and differences. In chapter 3, we outline the setting of our case, and present the research methodology. We then continue discussing challenges to knowledge production and learning that have emerged from the case. The analysis of these challenges is discussed against theory in chapter 5. Final remarks are presented in chapter 6.

### 2. Theories of knowledge production

Processes of knowledge production have been recognised as the critical resource for innovation and productivity in organisation. Studies and analysis have been carried on with the primary aim of defining better organizational arrangements in order to maximise and enhance such processes. The work of Nonaka and Takeuchi (1995) is a classic reference in this literature. Their distinction between tacit and explicit knowledge has been much discussed and also criticised. Their theoretical thinking is based on the assumption that “we know more than we can tell” based on the tacit/explicit knowledge distinction originally built on Polanyi’s work (1966). The underlying idea is that of knowledge as a commodity that can easily be transferred, shared and stored. Knowledge is thus no context-dependent.

Among others, Walsham (2001) criticises Nonaka’s commodification of knowledge, arguing that the original thinking of Polany has been distorted, and calls for a more human-centred view of knowledge. Knowledge should be studied by contextual approaches. This implies to take seriously the processes of knowledge sharing between communities: “sense-giving, and sense-reading of the views of others will generally be more difficult due to the lack of shared symbols such as professional language, job purpose, and cultural norms of behaviour” (Walsham, 2001:603). In this view, approaches such as Communities of Practice become more sensible to the understanding of the dynamics of knowledge generation and share. Blackler (1995) as well point to the nature of knowing as “mediated, situated, provisional and pragmatic” highlighting in particular the dimension of knowledge with “connotations of abstraction, progress, permanency and mentalism” and calling for a deeper focus on the “systems through which knowing and doing are achieved”.

Little attention has been given in contrast on how ‘knowledge behaves’. In this regard, we suggest that the concept of an epistemic culture from the field of science studies may give important insights. In the next two paragraphs, we will outline the notions of communities of practice and epistemic cultures, and show how they relate to one another.
2.1 Communities of practice (cop(s))

The idea of Community of Practice originates from the theorizing of Lave and Wenger on “Situated learning and the process of legitimate peripheral participation” (1990). Lave and Wenger explains: “Learning viewed as situated activity has its central defining characteristic a process that we call legitimate peripheral participation. By this we mean to draw attention to the point that learners inevitably participate in communities of practitioners and that the mastery of knowledge and skills require newcomers to move toward full participation in the socio-cultural practices of a community” (Lave and Wenger, 1990:29).

By using five stories of different forms of apprenticeship (midwives, tailors etc.), they show how knowledge is passed on to newcomers through shared social practices. Thus, knowing becomes an activity by specific people in specific circumstances (Lave and Wenger, 1990:52). On this background they develop the concept of cop, which is defined as: “a set of relations among persons, activity, and world, over time and in relation with other tangential and overlapping communities of practice” (Lave and Wenger, 1990:98). The possibilities for learning are therefore formed by the social structure of the practice and the power relations surrounding it. Thus, “conflicts are experienced and worked out through a shared everyday practice in which differing viewpoints and common stakes are in interplay” (Lave and Wenger, 1990:116).

In 1991 Brown and Duguid published an often cited work about working, learning and innovations, using the concept of ‘cop’ and ‘legitimate peripheral participation’. They argue that learning is essentially about becoming an insider and practitioner, and not to gain individual knowledge. Learning is therefore fostered through membership in different cops, even though these communities seldom are recognised by the organisation. In these cops individuals and groups can be freer from ‘received wisdom’ and therefore more innovative (Brown and Duguid, 1991:53). This is due to the fact that knowledge is readily available for the members, and can be exchanged with others outside of the organisational borders (Brown and Duguid, 1991).

Nine years later (2000) Wenger wrote an article about cops as social learning systems. Through engagement (doing things together), imagination (constructing images) and alignment, we have belonging to different learning systems. The building blocks in these systems are cops, because they are the ‘containers’ of the competence, and based on our participation in these communities we define what constitutes competence in a given context. Members have a joint enterprise (shared understanding of what the community is about), established norms and relationships on mutuality and a shared repertoire (Wenger, 2000:229).

Another consequence of the shared practices is that it creates boundaries. It is therefore important to focus on these boundaries, since they both connect communities and offer learning at the same time. It is in the interaction in a boundary where experience and practice are exposed to foreign competence, and if these experiences are not to distant they will create an opportunity for learning (Wenger, 2000:233). According to Wenger boundaries can be bridged three ways: people acting as brokers (brokering), artefacts (boundary objects) and interactions among different communities of practice (Wenger, 2000).

Identities are also an important aspect in social learning systems, since they combine competence and experience, and to deal with boundaries depends on our ability to suspend our identities and because “our identities are the living vessels in which communities and
boundaries become realised as an experience of the world” (Wenger, 2000:239). In line with some of these ideas, Brown and Duguid (2000) builds on the concept of cop, which is defined as: “a group of people with diverse viewpoints and roles engaged in joint work over a significant period of time in which they build things, solve problems, learn and evolve a way of talking and reading each other”.

They also introduce the concept of “networks of practice”, which can be occupational communities, professional communities, social worlds and so forth. Brown (2002) has also included epistemic cultures in this concept, but without explaining why this is included. In this speech he also emphasised the importance of boundary brokers and translators for the facilitation of learning. This is similar to Wenger (2000).

We will return to cops when we compare this concept with the concept of epistemic cultures, which will be outlined in the following paragraphs.

### 2.2 Epistemic cultures

Even though the book “Epistemic Cultures” (1999) is not a book about traditional sociology of science, it is very relevant both for knowledge management and knowledge societies. Knorr-Cetina says: “I am interested not in the construction of knowledge, but in the construction of machineries of knowledge construction” (Knorr Cetina, 1999:3). In her book Knorr-Cetina argues that different scientific fields exhibit different epistemic cultures. With her concept of epistemic cultures she puts focus on how different scientific disciplines rely on different objectives, methodologies, theories and concepts. Thus, the analysis is at the institutional level and not on a group (as communities of practice) level or the individual level (like earlier learning theories).

Epistemic cultures are thus defined as: “those amalgams of arrangements and mechanisms – bounded through the affinity, necessity and historical coincidence – which in a given field, make up how we know and what we know. Epistemic cultures are cultures that create and warrant knowledge (...)” (Knorr-Cetina, 1999:1).

The term ‘epistemic culture’ is in other words more oriented to practice: ‘knowledge-in-action’, as practiced in a setting. The focus on culture allows the analysis of aggregated patterns and dynamics, and the possibility to integrate symbolic-expressive elements into the analysis and it implies possible differences between sciences as well as within a science. This is well-illustrated through the ethnographic comparative study of two cases, high-energy physics and molecular biology.

This strategy of the study also enables Knorr-Cetina to enlarge the scope of the perspective on knowledge bodies, since she analyses knowledge as technical, symbolic and social dimensions interwoven into an expert system. Consequently, knowledge areas can be diversified and fragmented (Winroth, 2002:6). In a later work Knorr-Cetina says that the objects of knowledge can never be fully attained, they are never ‘quite themselves’, because of their changing and unfolding literature (Knorr-Cetina, 2001:184).

Knorr-Cetina also shows how there has been a change in contemporary society towards a knowledge society, where epistemic cultures and cultures become a structural feature. With her notion of culture she shows how knowledge fields can be fragmented and at how the processes of practice is context-dependent. The practitioners in a field will develop their knowledge base, and the everyday practice and use of models by scientists, will support
knowledge enlargement in the field (Winroth, 2002). Knowledge is then pursued through practices of *unfolding* (continuing unravelling of features), of *framing* (considering objects in light of others) and *convoluting* (folding together, mixing resources) (Knorr-Cetina, 1999).

The study of epistemic cultures is therefore an interesting perspective of knowledge production, and knowledge-in-action. With the focus on epistemic practice there is focus on the knowledge in different groups, but also on the circumstances surrounding this knowledge. Knorr-Cetina argues (1999:252) that her results can be used as: “templates against which to explore the distinctive features of other expert domains and as pointers to possible dimensions in other areas”.

As we have shown in our presentation of ‘communities of practice’ and ‘epistemic culture’, there are several issues that relate to one another. But at the same time the work from Knorr-Cetina puts focus on certain important topics that is missing in the literature about cops. In order to make these differences and similarities more visible for the reader, we will use a model:

Table 1: Comparison of literature on communities of practice and epistemic cultures

<table>
<thead>
<tr>
<th></th>
<th>Communities of practice</th>
<th>Epistemic cultures</th>
</tr>
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<tbody>
<tr>
<td><strong>Key concepts</strong></td>
<td>situatedness, communities, legitimate peripheral participation, boundary object, social learning systems</td>
<td>‘machineries of knowledge production’, epistemic cultures</td>
</tr>
<tr>
<td><strong>Major assumptions</strong></td>
<td>learning occurs within cops</td>
<td>knowledge is produced in heterogeneous ensembles</td>
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<tr>
<td><strong>Unit of analysis</strong></td>
<td>groups, organisations</td>
<td>knowledge production</td>
</tr>
<tr>
<td><strong>Problem areas</strong></td>
<td>how is learning facilitated/hindered</td>
<td>how is knowledge produced</td>
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On these theoretical premises, we want to build on the concept of communities of practice as well as the concept of epistemic cultures, and apply them on our case. We will study the local practices of knowledge generation related to new medical technologies in an innovative research centre of a Norwegian hospital. In particular, we are interested in the issue of interdisciplinarity, and in how learning develops when bringing together different and potentially incompatible epistemic cultures. In doing so, we will see how it is necessary to expand our perspective from the local setting, and address external issues.

3. **Case study: a medical R&D department**

New medical technologies may offer a huge potential for new and improved procedures. Some technological solutions might be designed and adopted in order to support, facilitate and rationalise existing activities and work practices, while other technologies are expected to enable ways of working which are radically different and more efficient than existing ones. These technologies demand novel skills as well as new ways of organising the work tasks, e.g. in interdisciplinary teams. The realisation of the potential benefits of the technology will therefore depend on the organisation’s capacity to innovate, learn and change. The users’ capacity to learn how they can improve their work practices by means of the technology (both on the individual and on the group level) is therefore crucial. Our empirical material comes
from a case study of a medical R&D department in a Norwegian public hospital, which is innovative both when it comes to new technology and organisational form.

The Interventional Centre was established in 1996 as a Research and Development department at Rikshospitalet (Oslo). The mandate for the Centre was to explore and develop new technologies and procedures, compare new and old treatments as well as study organisational consequences of introducing these technologies in hospitals. A central feature of the centre was to organise work in cross-disciplinary teams, where e.g. surgeons would cooperate directly with radiologists, and where technologists (engineers) were also part of the staff. This latter group has normally not been a part of the hospital organisation. Thus, the Centre is supposed to be “a common toolbox for other departments at the hospital as well as other hospitals” (Laerum and Stordahl, 1992).

Rikshospitalet moved into new facilities in the summer of 2000, and currently the hospital has approximately 4500 employees, and 600 beds. The Interventional Centre is an own department at this hospital with about 50 persons working for them every week. Currently there are 16 Ph.D programs linked to the Centre, where half is clinical and half is technological. Several new techniques and procedures have been developed, tested and exported to other departments where they have been taken into routine use. Consequently, the Centre has been a successful attempt to create a setting that facilitates cross-disciplinary work and innovations. However, in this paper we want to focus on some of the challenges related to knowledge and learning, and show how this is linked to external factors. To do this we will focus on debates and problematic issues, without making an analysis of power relations or by blaming someone for “resistance” to change.

3.1 Methodology

We found a qualitative design (see Yin, 1994; Eisenhardt, 1989) with participant observation, document analysis, informal discussions and semi-structured interviews most suitable. The main source of information has been the unstructured observations two of the authors did during a prolonged involvement in the day-to-day activities of the Centre from 1998 until February 2003. The first author, Margunn Aanestad, entered the Centre as a Ph.D student in 1998, and spent a considerable amount of her time for the next three years there. She was mainly involved with telemedicine activities, but she also took part in the daily life ate the Centre. The second author, Bjørn Erik Mørk, joined the Centre in June 2000 and worked with project administration as a project co-ordinator in several projects until the present time. Currently he is also a Ph.D student in organisational studies, with the Centre as his main case. We have thus been insiders, which have enabled easy access to data. Since we already know all the co-workers it was easy to arrange interviews and get discussions, but at the same time there was a danger of “going native” (Glaser and Strauss, 1967). After a while one takes things for granted, unless you keep a critical distance to what a do. To compensate for this we have discussed the material with several academic colleagues and non-academic located outside of the Centre.

During the periods we have been linked to the Centre we have followed closely the emerging discussions and disputes, and participated and observed events of self-presentations of the Centre through several meetings, seminars, and presentations to the media. Another source of information was internal reports as well as published articles about the Centre’s activities. Since the Centre is a research and development department publications and presentations of the projects there are very important aspect of their activities.
In addition, we have gathered data through semi-structured interviews that focused on the experiences the informants at the Centre (Head of Department, engineers, radiologist, radiographer, surgeons, secretary and nurses) have with working in a highly interdisciplinary organisational setting, different from a traditional hospital department. The interviews lasted from 45 to 90 minutes, and were transcribed immediately after the interviews. After the transcription process we coded the data, and then put the data into matrices in order to get a better overview of the differences and similarities between the informants (Coffey and Atkinson, 1996). Generalisations from our case are therefore done theoretically and not statistically (see Andersen 1997). Still, we are aware of the fact that “medical practices varies enormously– within different domains, departments, hospitals and countries (Atkinson (1995), Strauss et al. (1985) and Berg (1999)” (Ellingsen and Monteiro, 2002:9).

4. Challenges to knowledge production and learning

This chapter reports from the empirical material, and discusses findings from the case study. It is organised in three sections, respectively on the issue of traditions, new work practices, and standardised approaches to research.

4.1 Leaving traditions behind

Hospital organisation and patient care is strongly organised around current medical specialties. At the Centre, this was challenged by recruiting doctors from different medical disciplines and also people from other professions, along with the support personnel. Nevertheless, the traditional organisational structure still posed a significant influence that appeared to undermine the Centre’s attempts.

“There is a difference between the different groups of people here. Myself, I don’t get to develop in my own area of specialisation. I have learnt a lot about a scientific approach and research methods, as well as administration. But the professional aspects are downplayed; I’m just doing very general things… I can’t specialise. … I also know that some of the others feel like me.”

Actually, quite a few of the informants mentioned that they learnt a lot that was not directly related to their profession, and which would not be immediately useful in another context. Some of the informants appeared to value this new knowledge nevertheless, while other struggled with feeling of being alienated and cut off. One surgeon claimed that professional identity is closely linked to individual values, but also to the existing organisation and the wider societal structures, as the following excerpt may illustrate:

“It is painful to let go of your professional identity. You invest quite a lot when you spend many years on your education. For some individuals it is impossible to let go of their identity, and they will work in their traditional way until they retire. […] When it comes to the professional roles, it is built into the whole structure of the health sector”. (Surgeon)

Another example we found interesting is the head of department’s recounting of a discussion in the National Physicians’ Association. The legal issues around the establishment of this Centre were questioned exactly because the Centre departed from traditional organisational structures. Usually, the leader of a department is an experienced physician within the actual field (the principle of medical responsibility overriding administrative responsibility). At the
Centre, a thoracic surgeon would be the leader for anaesthesiologists and radiologists, to mention a few. This was debated, but the Association did not rule against the structure.

4.2 Developing new cross-disciplinary work practices

Different professional groups will have different goals for their work practice. In ordinary settings the division of work and responsibilities are relatively settled, but when changes occur, conflicts may emerge. We saw one instance of this related to new demand on the cooperation between the operation nurses and radiographers (‘image technicians’). In conventional patient treatment these two professional groups seldom meet, and they have different agendas and priorities. In conventional radiological laboratories the radiographer takes care of e.g. positioning the patient on the table and programming the image acquisition so as to minimise the radiation the patient is exposed to, while maximising image quality. The operation theatre nurses’ primary focus is on sterility and patient care, including proper positioning on the operation table to avoid pressure sores and pain. In order to do this, they use gel cushions to support various body parts. The radiographers’ primary focus, achieving optimal image quality, conflict with the nurses’ use of mattresses, cushions and blankets, as these devices absorb, deflect and scatter radiation, which means that the patient will be exposed to a higher dosage of radiation in order to achieve a sufficiently good image.

Established work practices, which are linked to the fundamental identities, priorities and agendas of different professional group, may thus act as an important factor in facilitating or inhibiting change. In the above case, this was resolved by the nurses and radiographers together identifying a new product; a mattress that was not absorbing radiation. These dilemmas are not always easily resolved.

4.3 Standardised research practices

Most of our informants focused on research as one of the fundamental activities of the Centre, and many of the doctors and engineers associated with the Centre were working on their Ph. D. degrees. Most research projects were designed and run by medical doctors or engineers, and were usually fairly much defined before they were presented to the staff at the Centre. For example nurses were very seldom part of the team that designed the project in the first place. This also seemed to be the case with radiographers, who have crucial technical knowledge and who argued that they should have been involved at an earlier stage.

Within the medical world there are well-established and widespread standards for the production of knowledge, both as concerns research design, research methodology and the reporting of the results. In general, the medical academic community’s scientific ideals correspond to the natural sciences’ positivist ideals of objective, repeatable, and falsifiable research. Medical academia is a rather competitive arena, where much emphasis are laid on academic publishing in highly ranked international journals, where methodological rigour serve as an important ‘touchstone’. In most cases, the doctors’ and the engineers’ ideas about research were compatible, as both relied on the natural science models. However, some dilemmas arose also here. When writing joint papers, the engineers would refer to engineering studies, of which some were published in conference proceedings. These were full papers that had been through a blind peer-review process. However, these references were not readily accepted by the journal editors, who check all references with PUBMED, a database of published medical research from the ranked journals. They would question all references that were not found here.
Some of the Centre’s activities were exploratory development of equipment and procedures, which by its nature cannot be pre-defined. Other activities are part of formal research projects, with a pre-defined “protocol” and a clear research agenda. Many of the research projects at the Centre involved lengthy and large studies in order to generate enough data for statistical analysis of outcomes. This fact, together with the above-mentioned highly standardised research practices constructed “research” in a particular way. It seemed to scare away or inhibit some of the nurses from defining their work as research, even though they did a lot of “new knowledge generation”. This could be identifying new surgical tools, or even designing and organising the manufacture of them. Another example of such knowledge was on what seemed to be the most appropriate medication regime for post-operative pain killing for specific new procedures. The nurses’ main focus of change and learning was seen to be on improving their work practice and procedures. They were aware of the high status allocated to “doing research”, but they usually said that they had no training or culture for it, as there was no emphasis on this during their education.

The shared perception of what “doing research” meant did have significant consequences for learning and innovation, as it set the premises for which knowledge that was valued and recognised. What we think is important to notice here, is that the Centre was not free to redefine what “research” should mean. The perception of “research” was intimately linked to professional, organisational and social structures beyond this particular setting.

5. Understanding the challenges

5.1 Communities of practice lenses

In this case we immediately recognise well-described phenomena from the research on communities of practice. One issue relates to the bringing together of people coming from different communities-of-practice. Different medical specialists, other health care personnel and non-medical personnel are brought together and expected to build up a new community-of-practice. Research tends to emphasise the importance of a sense of joint enterprise as a success factor, together with mutual engagement and shared repertoire (see Wenger, 2000). Here there certainly was such a shared goal, related to researching and developing novel minimal-invasive therapies and tools. The Centre was established outside existing organisational and physical structures of the hospital, in order for the employees to share a mutual engagement, rather than continue previous turf battles.

Moreover, as employees were mostly coming from a hospital environment (with the exception of the engineers), they arrived with a sense of each others particular knowledge base/expertise and potential contribution. This means that they already commanded a shared repertoire of cooperating practices. True, this had been cooperation at a distance, according to well established sharing of roles and responsibilities in hospitals, which now might have to be rearranged. However, the employees also would bring with them work practices which were particular to their own cops. As the crucial constituting matter for a cop is exactly the shared practice, these different work practices might have to be modified, and a new shared practice designed and developed.

These debates bring in issues of boundary debates. In Wenger’s discussion on social learning systems (Wenger, 2000) he emphasises that competence is historically and socially defined: “Knowing, therefore is a matter of displaying competence defined in social communities.”
(ibid, : 226). And he explicitly discusses the role of brokers that are able to live in-between different cops and translate between them. Boundary interactions are seen as an exposure to foreign competence, i.e. as learning opportunities. But they are not unproblematic and harmonious. Wenger also discusses the challenges such brokers meet: “Uprootedness, homelessness, marginalization and organizational invisibility are all occupational hazards of brokering” (Wenger, 2000:236). This resembles some of our respondents/informants’ statements concerning their own professional identity, and the need they perceive to stay linked with the previous/external cop.

From this perspective we can also see the standardised research practices as pre-established practices imported into this new setting through the communities of practice.

5.2 Epistemic culture lenses

The concept of “epistemic cultures” emphasises that knowledge emerges from a historical, local and material context; it requires work of production as well as a network of heterogeneous elements to allow it to emerge and exist (Knorr-Cetina, 1999; Fujimora, 1987). What we have studied here could be analysed as an epistemic culture in a process of change. The well-established and widespread epistemic culture of medical knowledge production is being transported into a setting which is different. The main differences in this new setting are related to the technologies that are used in the medical practice. These technologies are changing fast, are complex and demand other, specialised skills. Most important, however, is it that these technologies are not unproblematic “tools”, in the sense that they can be used how the staff decides. The technologies are more demanding, they place demands on reorganising entire work practices and organisations. These technologies are both the reason for the dept to exist, and they constitute an important part of the machinery of knowledge production.

Another perspective on our case could be to focus on the issue of inter-disciplinarily, and analyse the case as an example of what happens when different and potentially incompatible epistemic cultures meet. We see for instance that established research practices and conventions are transported and utilised (see chapter 4).

We have also discussed the standardised research practices. These research practices seem to work well, but we argue that some knowledge production is being marginalised and wasted. The main reason for the research practices success and continued life in this new setting is that they are linked to external entities. Research practices are taught in institutions of training and education, and are being demanded by the research community (publications and research institutions). There are laws and regulations surrounding these practices, and they are embedded in organisational structures. The Centre is thus not free to change how it conducts research at its own will.

Another point is the fact that several of the informants told us that some of the knowledge created in the Centre was not valued outside, which can be explained by saying that new knowledge does not fit with the old epistemic culture. We did also see how the organisational structure of the Interventional Centre was questioned by external organisations, which reflected the old epistemic cultures. A long and strong epistemic culture (as health care organisations have) has shaped well-known and well-established professional structures, which people link their and others identities to.
The fact that some professions’ epistemic cultures dominate the organisations’ self-perception can have significant consequences for learning and innovation. The particular construction of what research “is”, and “should be”, sets premises for which knowledge are valued and recognised. What research “is”, is of course not a matter that can be redefined by the centre itself, but is intimately linked to professional, organisational and social structures beyond this particular setting.

As we have seen both the concept of communities of practice and epistemic culture are useful analytical tools for understanding some of the challenges that the Centre faces. Whereas the concept of cop is valuable for understanding the importance of practices, brokering and boundaries within groups, the concept of epistemic cultures helps us address external issues like laws, regulations and structures.

6. Final remarks

Several studies (Lave and Wenger, 1990; Brown and Duguid, 1991; 2000 etc.) have convincingly shown that knowledge is not just discrete chunks of information as described in early Knowledge Management. With the concept of communities of practice and the emphasis on local and situated practices within or between communities-of-practice, one has been able to get a better understanding of learning and knowledge production. In this paper we argue that it is necessary to expand this analysis, and critically study how ‘machineries of knowledge production’ and knowledge traditions may be an obstacle for learning. We pointed to the impact of professional identities, existing work practices and research traditions as examples of some of these challenges.

Our main point is that we need to expand our unit of analysis beyond the single organisation or group in order to account for these factors. Knowledge is not in individuals heads, in the practices of a group or in organisational routines. It is related to larger institutions, and to get a grasp of this the concept of communities of practice is not enough. Instead we are interested in the aspects that epistemic cultures emphasise, and we believe that they are under-researched. This is our motivation for bringing this concept into this setting.

Consequently, the implications of our argument will be that the existing theory on learning, change and innovation should recognise the network character of knowledge, and the way that this influences learning, change and innovation processes. Thus, we believe it can be fruitful to bring in concepts and ideas from for example new institutional theory (Meyer and Rowan, 1977; DiMaggio and Powell, 1983; Scott, 1995). DiMaggio and Powell (1983) argue that regulative and normative ‘isomorphism’ is characteristic for organisations today, and that organisations and different professional groups will continue to collaborate across organisational boundaries through networks, and thus make organisations more similar. This will also have implications for learning, and what is considered as valuable knowledge, but a deeper of analysis of this remains to be done in another paper.
References


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