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# LEARNING ACROSS PARADIGMS

Towards an understanding of the  
development of medical teaching practice

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## **ABSTRACT**

The purpose of this thesis was to investigate how educational developers can work strategically with change to develop quality in higher education institutions in general and in medical education in particular. The thesis addresses the challenges faced by educational developers when introducing concepts that may challenge not only individuals' but also the epistemological assumptions of different groups within different disciplines of how we learn, what constitutes knowledge and how we can explore reality. These challenges are discussed from a perspective where the research paradigms are seen as central features of the context in influencing epistemologies of knowledge and learning.

Four studies were undertaken within the framework of two projects. Study I aimed to understand medical teachers' conceptions of the development of expertise and how these conceptions relate to the core curriculum. Study II investigated how anatomy and surgery teachers conceptualise and act regarding the issue of transfer; the challenge students meet when shifting from university based medical education to clinical practice contexts.

Study III and IV were carried out as part of a collaborative project within a department that aimed for enhancing the quality of teaching. This collaborative project is an example of a way of working at the group level rather than with the individual teacher, as in studies I and II. Study III explores the relationship between teaching practice and teachers' conceptions of learning. Study IV is a qualitative analysis of how we can understand the development of teaching within a community of practice and how, through intervention, development of teaching can be enabled in a departmental context.

The thesis has theoretical as well as methodological implications. The results indicate a necessity for educational developers to work with teachers as communities of practice, and thereby acknowledge the different paradigms that influence their context and, hence, their conceptions of teaching and learning. The core curriculum is suggested to be an example of a boundary object, a document that can actualize participation and dialogue between different communities within the educational program. A shift from focusing on the application of educational research results to also include the engagement of educational developers suggests the involvement in action research and the growth of a scholarship of educational development.

## LIST OF PUBLICATIONS

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## INTRODUCTION

The challenge in Higher Education is to maintain quality in times of change from elite to mass education (Barnett, 2000; Trow, 1973). The increase in student numbers requires more universities - universities that can handle new groups of students who did not necessarily grow up in families with traditions in higher education. There is also pressure on researchers to finance their own positions through external funding, leaving less space for research, as well as for teaching. In several countries benchmarking systems have put institutions under pressure to deliver high quality research, but recent quality assurance programs conducted by governmental bodies also require higher education institutions to demonstrate the development of quality in education.

Following the changing conditions for teaching and learning, efforts have been made to emphasise the quality of higher education. A common approach worldwide has been to establish higher educational development units, to provide teacher training courses for academic staff (Gibbs & Coffey, 2004; Knapper, 2003). The consequence has been an increased employment of educationalists with backgrounds in different disciplines, who now work with the development of teachers in higher education. Hence, a community of practitioners with different disciplinary backgrounds, but with a similar purpose - to develop the quality in higher education has been established (Eggs & Macdonald, 2003). This has given rise to a new body of literature; that of academic and educational development, an area of research and practice that this thesis intends to contribute to.

Educational development is concerned with sustaining and enhancing the quality of learning and teaching within the institution (Hounsell, 1994). It is an area of practice (Wenger, 1998) that is in the process of negotiating a common ground of values and beliefs about how to go about the enhancement of learning and teaching in higher education. The educational development scene has been described as super-complex, which implies that it is an area of practice that is unpredictable, uncertain, and increasingly demanding (Barnett, 2000). In this context, it is my understanding that some educational developers, such as myself, take a socio-cultural position with regard to learning and knowledge, suggesting an epistemological view of knowledge and learning as linked to the context in which it arises (Trowler, 1998). This view may be different from the views held within other disciplines (and amongst some other educational developers) and may result in difficulties of communication between educational developers and the teachers that they collaborate with and/or educate to develop professional teaching practice. This difference in epistemological views may be illustrated by the following discussion between members of natural science disciplines that was overheard at a seminar on higher education:

- *So, does knowledge exist, or is it just something that is constructed by humans, as our teachers suggest?*
- *Of course it exists! Take the periodic table for instance, it surely exists without humans. Atoms are there whether we like it or not!*
- *Yes, the atoms are there, but it was us, scientists, who named them atoms, and therefore our understanding of them is formed by our own constructions, aren't they?*

- *What do you mean constructions? This is just objective knowledge, THEY ARE THERE! But of course it took us some time to find ways of discovering them.*

This discussion outlines the context from which the current thesis takes its point of departure. The issue under examination is 'learning across paradigms', the challenges faced by educational developers when introducing concepts that may challenge not only individuals', but also the epistemological assumptions of different groups within different disciplines' of how we learn, what constitutes knowledge, and how we can explore reality. The current thesis aims to inform the work of educational developers to support that effort.

My own context of educational development work is that of a medical university, Karolinska Institutet. I work within the Department of Learning, Informatics, Management and Ethics (LIME) with colleagues with backgrounds in sociology, philosophy, literature, biology, physiotherapy and rheumatology. One of our responsibilities is the training of university teachers who teach undergraduates in all different health related areas: from medicine and dentistry, to physiotherapy and midwifery. Our Centre has a support function for the implementations of new policy and regulations, such as those following on the Bologna process (1999), and for working with staff in the development and implementation of new and existing curricula.

## **PARADIGMS**

According to Thomas Kuhn (1970), scientific knowledge develops according to a pattern that he called 'paradigms'. A paradigm can be described as a "set of basic beliefs" about the world, the role the individual plays in it, and the relationship between the individuals or communities and different aspects of the world. These beliefs colour the way the world is perceived, as well as how truth and knowledge are understood, and investigated. A number of distinguishable paradigms can be defined. Guba & Lincoln (1994), for example make a distinction between positivism, post-positivism, critical theory and constructivism.

Paradigms are 'self sealing' in that one paradigm excludes the understanding that another paradigmatic perspective has of the same phenomenon; so within one paradigm the world is understood in a particular way and acted upon according to these theoretical and methodological assumptions. Typically, other ways of seeing the world do not make sense. To better describe the use I will make here of the concept of paradigms, I offer an example on the basis of two significantly different paradigms, that in their pure form can be seen as exclusive: positivism and interpretivism.

Think about a piece of music - for instance the aria at the beginning of the Goldberg variations by JS Bach. One way of describing this aria would be to state that it follows a certain chord progression, where the bass line is built as a chaconne in two sections of sixteen bars, each repeated. This description is clearly measurable and from a positivistic view point would probably count as one way of describing the piece. However, from an interpretivist standpoint this information is of limited value. Rather, the interpretations and meanings listeners make out of the music, is what matters. In

this case, one interpretation could be that the slow, contemplative mood gives rise to feelings of distance and longing, but also of acceptance of how things are. In this way, the paradigms focus on different aspects of the object, the piece of music. Where the positivist perspective strives for knowledge of facts, which can be broken into smaller parts and measured, the interpretivist position aims for an understanding of what the totality means for people.

In educational research a number of perspectives are taken on learning and teaching. Research from a cognitive psychology view aims for the understanding of how individuals learn by methodologies that try to measure, through different validated tests, the relationship between different aspects of learning such as motivation, self efficacy beliefs, and self regulation. The cognitive perspective is basically de-contextualised and characterized by a dualistic world view.

The socio-cultural research tradition on the other hand lies within the interpretivist paradigm and emphasises the world as built up on social interactions. Knowledge and learning is understood as constituted through the language and interactions between human beings and the culture in which they act. Besides, the socio-cultural perspective also emphasises the context dependent nature of human knowledge.

Critical theory and postmodernism focus on the power relations between learners and learner – teacher. It tries to establish the reasons for current conditions with the purpose of suggesting how they could be changed and transformed into something better. Critical theory may be positioned in-between positivism and interpretivism. The emphasis is on change, and hence methodologies such as applied and action research are used. The emancipatory knowledge interest of critical theory is an aspect that fits well with the mission of an intervention of the kind that is the core of the second project of this thesis.

The concept of paradigms may be criticized by social constructivist researchers who suggest that people construct their beliefs within a dynamic and evolving interaction (Rogoff, 1990; Rogoff et al., 1996; Tynjälä et al., 2001). For example, regarding the music example above, it would be odd to claim that an understanding of music in terms of its notation and structure would oppose the idea of music as interpretation. Most people would agree that you can hold multiple perspectives at the same time, in an integrated way (Labouvie-Vief, 1990). Likewise, in medicine, for instance, there are domains that rely more (general practice, rehabilitation, nursing) or less (biomedical studies) on interpretation; and in clinical work the understanding of human communication is central. However, when it comes to the adjudication of the publication of research results, the positivist paradigm is dominant in my view, and this may influence the epistemological belief systems, and hence, values of what counts as 'proper' research and 'real' knowledge. For instance, medical students have been shown to hold different epistemological views from psychology students who are more constructivist and relativistic in their ideas of knowledge (Lonka & Lindblom-Ylänne, 1996). This is not a matter of better or worse, but a matter of different perspectives.

One of the main tasks for educational developers has been defined as supporting the development of reflective practice among teachers (Land, 2001). The concept of reflection stems from an interpretivist tradition (see p.7). This means that an educational developer who takes this position seriously, must embrace the challenge of

how to support reflective practice (Schön, 1983) within the different paradigms that operate in different disciplinary contexts. This requires taking time to understand teachers' learning and teaching epistemologies. With regard to the discussion quoted above it is necessary to be aware of the different 'worlds' educational developers and teachers are active in.

A way of understanding these different worlds with respect to the values and norms that are nurtured within such a system, is Wenger's (1998) idea of participation in communities of practice. The concept of communities of practice is similar to the concept of paradigms, in that they each describe a belief system of interconnected thinking. However, the theory of communities of practice emphasises participation, and the dynamic relationship between change and development in members' identities, and change and development in the community of practice as a whole. Members of a community of practice are members of other communities of practice and can transfer knowledge gained in one community to another and hence act as so called 'brokers', which influence the evolution of the beliefs and practices of the community. However, the concept of paradigms seems to me to be more profound than that of communities of practice as it focuses specifically on the underlying assumptions made within different research traditions, which might contribute to different ways of thinking and acting within different communities of practice. Hence I have decided to use the concept of 'paradigms' as a way interpreting and discussing my research.

I will define a paradigm here as a set of beliefs about how reality and knowledge are constituted (ontology and epistemology) and how we as humans can go about getting access to knowledge (methodology).

The current thesis sets out to gain an understanding of teacher thinking and the paradigms that influence their thinking, to better work strategically on educational development projects in contexts that necessarily involve communication and learning across those paradigms. This has meant an investigation of current research on medical education as well as research that informs educational development practice.

The current thesis stems from the authors' experience of working within at least three different areas of practice. That of *educational development*, which draws on socio-cultural research, and cognitive psychology; that of *educational research including medical educational research*, which draws on cognitive psychology research and socio-cultural research; and that of *medical education as practice*, which mainly concerns a positivist view which is dominant within the natural sciences. These three areas will be discussed in the theoretical background as a basis for the objectives of the current thesis.

A motivating overarching context for my investigation of this area is not only my interest in teachers' thinking and its development, but also the issue of strategic work with change at another level than the individual, and how this relates to our role as educational developers. However, it is also my story of how to become an academic. Universities are the workplace of academics. For me one way of learning to communicate with academics is of course to become one myself.



## OUTLINE OF THE THESIS

There are two main foci for the thesis: the medical education and educational development, and the theories that these areas of practice draw on. The aim of the introduction was to indicate where the overarching questions stem from, and how I use the concept of paradigms as a way of framing the educational development problem: how educational developers can work strategically with change in contexts that involve communication and learning across paradigms.

The aim of Chapter II is to provide the theoretical background to the research questions posed in this thesis. The chapter is divided into three sections. Section 1 presents significant concepts informing educational development practice. These include the kind of teaching competence educational developers try to support and how this is modelled in teacher training courses.

The second section describes the changing context of medical education, how the core curriculum has become an important asset in the response to new demands on medical graduates. In Chapter II an effort is made to highlight the different paradigms that inform the research that underpins educational development and medical education in order to argue for the need for a theory of learning that could serve as a bridge between the different paradigms. The theory of communities of practice is described as providing such an alternative in the third section of chapter II.

Chapter II ends with a summary of the issues raised by this theoretical discussion and which form the focus of the research presented in this thesis. Chapter III presents the research questions addressed, and describes why these are examined in two projects, Project I and Project II.

Chapter IV introduces the methodology that informs the design of the different studies. I make the case for the qualitative research design adopted, and the shift from an applied research approach in project I to the action research approach of project II. Issues of validity and credibility are discussed.

Chapter V provides an overview of the ways data was collected and how it was analysed in the studies. This section ends with a discussion of the ethical issues involved in these studies. Chapter VI presents and discusses the findings from each project.

Finally Chapter VII is my effort of trying to tie the threads together. I start with a discussion of the conclusions from each of the studies, and revisit the concept of paradigms. The two projects are discussed from a meta-perspective to describe how they may inform educational development practice. This discussion focuses on the theory of communities of practice and the scholarship of teaching and learning, and makes a case for approaching educational development from these two perspectives. Finally some methodological considerations are discussed in terms of limitations as well as what was learnt from doing the studies.

In the concluding section, I return to the overarching questions framing this thesis of how communication and learning across paradigms can be facilitated and how educational developers can work with teachers in their contexts of practice. Furthermore the purpose is to consider them in the light of the previous discussion. I argue for a necessary shift in focus in educational development practice from an individual to a community perspective and the possibility of using the knowledge-creation metaphor to link these views. However, to do this we need to problematise the paradigms that influence teachers' and educational developers' epistemological beliefs.

# **THEORETICAL BACKGROUND**

## **EDUCATIONAL DEVELOPMENT PRACTICE**

Existing literature on educational development has shown that there is considerable variation between the development agendas and contexts of different higher education institutions, particularly between research-intensive institutions and those more concerned with widening participation agendas (Ryan et al., 2004). Nevertheless, some agreement on the purpose of educational development, or academic development as it is also referred to, has been defined. Areas emphasized are the development of teaching skills and competences, conceptual change, and a shift of focus from a teacher-centred to a student-centred approach, where conceptual development appears to be the most robust area of development and have the most lasting effect (Gibbs & Coffey, 2004). These purposes are all aimed at the support enhancement of learning within higher education. Educational development is carried out through five specific activities: interpretation between different university cultures; acting as change agent by taking a leadership role to facilitate change of identified areas of development; provision of academic practice development; counseling of individual and groups of staff; and institutional evaluation, review and critique (Blackmore et al., 2004). In the current thesis, it is suggested that the practice of interpretation creates a crucial, overarching practice that underpins all the other activities. Since universities consist of such a wide diversity of groups, each with their own language, culture, values and tradition there is a huge need for communication across these boundaries (Becher & Trowler, 2001). Educational developers can play a vital role in helping to translate the language of one culture or discipline into the language of another to enable change and development.

In undertaking the mission of developing educational quality (Barnett, 2000), for example in Sweden and the UK, training of university teachers is becoming common practice in higher education institutions (Trowler & Bamber, 2005). This development means that higher education teachers are not only presented with research on student learning, but are engaged in processes of learning that are often significantly different from the teaching and learning processes they are used to (Andersen, 1995).

## **CURRENT TRENDS IN EDUCATIONAL DEVELOPMENT**

Traditionally within higher education research, the focus has been on how students learn and what influences their learning (Entwistle & Ramsden, 1983; Marton & Säljo, 1976). This has been of immense importance for the development of teaching and learning in higher education and hence forms the core syllabus of most teacher training courses in higher education run by educational developers. However, this body of literature does not in itself have any immediate effect on student learning. Without interpretation and discussion of the literature, what is 'known' about student learning will remain as only research results. Educational developers have therefore seen it as their role to provide (Ashworth et al., 2004; Land, 2001) and interpret (Lind, 2005) this research, so that it becomes accessible for teachers in academic practice.

During the last 20 years, however, a focus on teachers' conceptions and practice, as well as how teaching relates to student learning, has been emphasized (Gibbs & Coffey, 2001; Kember, 1997; Prosser & Trigwell, 1997; Ramsden, 1992; Trigwell & Prosser, 1996; Trigwell et al., 1994). The results of this body of literature show a relationship between the quality of student learning and teachers' conceptions of teaching and learning.

Not only does this field of research provide a basis for policy making at a management level to achieve high quality in higher education, it targets educational developers more directly than the research on student learning by suggesting designs of teaching contexts and goals for teaching quality that facilitate a desirable approach to learning from students. However, I suggest this body of research still does not directly inform educational developers how to go about the strategic development of educational quality. The current thesis is intended as a contribution to the educational development literature and specifically how to engage in the development of teaching practice through influencing the way academic staff conceive of and approach learning and teaching.

I summarize below some of the central areas of the literature that has informed educational development practice up to now. I look first at research on learning and teaching in higher education and second at theories on how to promote high quality teaching and learning.

## **Learning and Teaching in Higher Education**

### *Approaches to learning*

Since the 1970s an extensive research literature focusing on how students approach their learning has emerged. Three approaches - deep and surface (Marton & Säljö, 1976), and strategic or achievement orientations (Entwistle, 1997) have been identified. When students adopt a deep approach, also called meaning orientation, their attention is directed toward the meaning of a text, and thus increasing the possibility of understanding the phenomenon dealt with in the text. Students adopting a surface approach, or a reproducing orientation, on the other hand attend to the surface features of a text usually to be able to reproduce it for assessment. The strategic approach or the achievement approach is characterized by students who organize their studying so that they manage time well and adapt their approach so that they will pass the requirements of the assessment, and may be superficial or deep in their approach depending on the requirements anticipated.

These approaches to learning have been found to change according to teaching and learning contexts (Richardsson, 2004). So for example it seems that medical schools with a traditional curriculum promote surface approaches (Lonka & Lindblom-Ylänne, 1996), whilst deep approaches develop earlier within problem-based curricula (Norman & Schmidt, 2000).

Numerous studies have linked learning orientations with the outcome of how well students with different orientations perform, showing that students applying a meaning oriented/ deep approach perform far better than students applying a reproduction

oriented/ surface approach (Marton & Booth, 1997; Marton et al., 1996; Trigwell & Prosser, 1991). It has therefore become a central concern for educational developers to support teachers in organizing learning to facilitate a meaning orientation.

Another area of research has linked learning approach to the degree students and teachers can regulate and control the learning process. In a phenomenographic study of both on-campus and distance students in Cultural Sciences and students from a Foundational Law course with a natural science or a technical focus, four qualitatively different 'learning styles' were found. (Vermunt, 1996). These are: 1) *The undirected*, which was characterized by an experience of lack of control and where learning was viewed as something provided by teacher or peers; 2) *The reproduction-oriented* learning style where learners were dependent on external regulation, and where learning was regarded as some kind of adding or intake of knowledge; 3) *The meaning-oriented* learning style, which was characterized by the student being in control of their own learning process, aiming for a deep understanding of subject matter, and understanding learning as something you have to construct for yourself; 4) *The application-oriented* learning style, stressing the vocational aspects of learning, where the use of knowledge is seen as essential. Hence, the fostering of student autonomy with regard to their own learning is seen as desirable, and adds to the teacher's task to the facilitation of meaning orientation amongst students. Research within higher education has tried to inform practice on how such facilitation is best undertaken by studying approaches to teaching in relation to student learning.

#### *Approaches to teaching and conceptions of learning*

Teachers' approaches to teaching have been categorized as ranging from highly teacher-centred, where teaching is seen as the organisation and transmission of content, to student-centred, where teachers concentrate on the facilitation of student learning. In the context of medicine and science, teachers have been found to be more likely to approach teaching with a teacher-centred approach than in disciplines such as social sciences and humanities (Lueddeke, 2003; Trigwell, 2002). This is thought to be influenced by the disciplinary context. There is evidence that teachers' approaches to teaching influence students' approaches to learning (Trigwell et al., 1999). Research on university teachers' approaches to teaching seems to show that these approaches are linked to teachers' conceptions of teaching and learning (Kember, 1997; Kember & Kwan, 2000; Prosser et al., 1994).

Roger Säljö (1979), from the Gothenburg group, was one of the pioneers in classifying students' conceptions of learning. His five categorizations have later been confirmed and somewhat modified. There are indications that teachers' conceptions of teaching and students' conceptions of learning may mirror each other (Vermunt & Verloop, 1999). Desirable conceptions of learning would then be fostered by teachers' attempts to activate meaning in their students' thinking. When learning is seen as *storing or adding on existing knowledge*, teaching is often categorised by the intention to provide knowledge, as if teaching was about filling empty containers with knowledge. In this case, teachers would take over the thinking processes instead of activating their students. When learning is viewed as a process where knowledge is *to be integrated, or assimilated* into an existing framework of knowledge, a qualitatively different category

is described. Teaching in this case often includes making use of the experiences and the framework of the learners, and logically takes the learners' background into account. When learning is conceptualised as change or *transformation*, teachers may provide students with an opportunity to change and reorganise their framework by for instance helping students to make their conceptions overt, by expressing their beliefs or conclusions, and helping them develop these conceptions. *Transposition* could be a way to describe the view that learning is the application of knowledge that usually refers to the application of formal knowledge into informal or practical settings (Dahlgren et al., 2005). However I suggest the problem with this concept is that it only seems to go one way, from theory to practice, and not from the practical situation to the creation of theoretical knowledge, as is the case with knowledge learned in practical situations. Finally, when learning is seen as *construction of new knowledge or change as a person* (Marton & Booth, 1997), the teacher is aware that learning has to take place within the learner. Hence, it can never be enough for a teacher with such a conception of learning to just lecture to students. This teacher must give time for students to create their own knowledge, and to find out whether or not this has happened students need to make their constructions overt. Seeing learning as change, transposition or construction could be reflected as applying activating instruction (Lonka & Ahola, 1995) or process-oriented instruction (Vermunt, 1995).

It thus seems crucial for educational developers to investigate teachers' conceptions of learning and teaching. Only by understanding how teachers think can we work with conceptual change, supporting teachers in the clarification and development of their conceptions and approaches to teaching, and hence influence the ways teaching is carried out within universities to best support the student learning experience. This is one of the main tasks for educational development practice. Even though there is plenty of research on students' ideas of learning, research on teachers' conceptions of learning is scarce. This dissertation aims at shedding more light on understanding the ideas and conceptions of medical teachers.

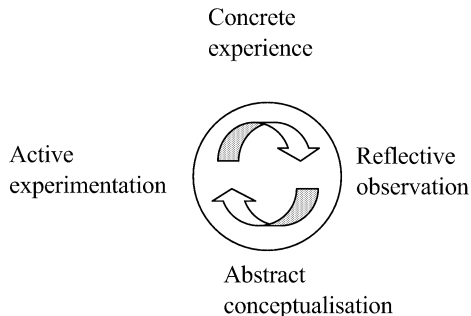
Based on what is discussed above about students' and teachers' approaches to teaching and learning the implications for practice seem clear: to promote meaning oriented learning with students, teachers need to help students make their conceptions overt, reflect on content, give constructive feedback on student thinking as well as performance, and organize learning activities where students can use higher order thinking skills (Boekaerts, 1999), such as relating, analyzing and evaluating knowledge (Biggs, 1999). Also, teachers need to help students develop as autonomous learners through the application of student-centred approaches. Different modes of how to organize learning activities for teachers that will influence them in this direction include experiential learning and reflective practice (Trowler & Bamber, 2005), which is outlined below.

### **Experiential Knowledge and Reflective Practice**

Based on what was known about how adults learn, grow and develop the theory of experiential learning was put forward by David Kolb (1984). In his theory experience is emphasized as central to the learning process and hence differentiates it from cognitive learning theories, which tend to focus on the role played by cognition over affect, and

from behavioural learning theories, which neglect the role of subjective experience in learning (Kolb & Boyatzis, 2000). In experiential learning theory, learning is viewed as the transformation of experiences into knowledge through a learning cycle which starts with a concrete experience, through reflection and conceptualisation, to active experimentation, leading to a new experience (Kolb, 1984) (Figure 1).

Figure 1: The experiential learning cycle



Kolb’s learning cycle has sometimes been criticised for suggesting that we simply learn by trial and error. The theory of single and double loop learning suggests however, that we do not have to go through the whole learning cycle. By focusing our attention on critical reflection of what we actually do, it is suggested that we can take a meta perspective on our own learning, and critically investigate our so called ‘theory-in-action’ (Argyris & Schön, 1974). This can help us ask the right questions to come up with constructive strategies for taking action.

As a consequence of this holistic view of learning, where process and learning objectives are intertwined, learners are seen as responsible for their own learning and activity in constructing their learning experience. Hence autonomous learning is promoted, something that was defined as important for the facilitation of meaning orientation with students. This view also implies that learning is strongly influenced by the context in which it takes place.

Reflection is clearly an essential part of experiential learning. This was also emphasized by Donald Schön, who introduced the concept of ‘reflective practice’ as a method for the development of professionalism/ expertise. In his book “Educating the Reflective Practitioner” (Schön, 1987), he showed how professionals develop a “reflection-in-action” approach to their work, to constantly develop and learn from experience. By becoming a reflective practitioner you can bridge the gap between theory and practice. The view that teaching is a practical activity that should be based on theory, educational research, underlies much educational development (Rowland, 2003). There is however, in my view, a need for a place to reflect on one’s own, personal, tacit theories of practice, to be able to link these to formal theories of, in this case, teaching and learning. For instance, McLeod et al. (2004) found that clinician-educators often possess tacit knowledge of basic pedagogic principles. However in order to improve individual teaching effectiveness, it was suggested that this tacit knowledge needs to be

converted into explicit knowledge. One such arena may be provided by the teacher training program.

After forty years of teacher training within higher education, much teaching continues as it has done for a very long time, often focusing on the transmission of knowledge rather than the facilitation of student learning (Trowler & Bamber, 2005). It is therefore worth asking whether teacher training courses should continue as means of educational development within higher education. Several studies have been carried out in this area (Gibbs & Coffey, 2004; Lonka et al., 1996; Prosser et al., 2006). These studies show that training often has a positive impact on changing teachers' approaches to teaching from a teacher-centred to a student-centred approach. Accordingly, they indicate that the teacher trainees' students adopted a surface approach to learning to a lesser extent after one year of their teacher training.

Despite this evidence that training can influence teachers so that their students improve their learning (Gibbs & Coffey, 2004; McLeod et al., 2004), there is a lack of evidence for their long-term effect (Trowler & Bamber, 2005) and such conceptual changes often lack coherence with institutional structures and processes (Prosser et al., 2006). In other words teacher training provides one way of facilitating desirable conceptual change around teaching and learning. However, this formal knowledge seems not to be enough for developing expert teacher thinking and changes in teaching practise that influence the student learning experience (Lonka et al., 1996). Although evidence suggests that students adopt a deep approach to a greater extent after their teachers had been trained, this change was small and not significant (Gibbs & Coffey, 2004). Suggested reasons for this include the different teaching and learning regimes within local departmental and workgroup cultures (Trowler & Cooper, 2002), the disciplinary context (Lindblom-Ylänne et al., 2006) and non-formal learning, i.e. learning which is situated in the context where it is applied. Non-formal learning is suggested to be more impacting than formal learning (Knight et al., 2006). According to McLeod et al. (2004), the learning contexts seem to influence the difficulty with which learning is transferred from one area to the other, specifically when it comes to practical knowledge. Back in the departmental context, teachers often find it difficult to hang on to the ideals or ideas that they developed in a course in higher education (Boud, 1995). It is therefore important to be aware of aspects of the teachers' every day environment that affect their thinking, as well as finding ways of influencing their thinking in that environment.

Another argument for the focus on context in this study concerns the issue of paradigms. The section outlined above on approaches and conceptions of teaching and learning in higher education mainly stems from a perspective, where learning to a large extent is viewed as an individual activity. From this perspective the teacher may conceive of both learning and teaching in different ways, and hence design their teaching practice accordingly.

Findings that indicate that teachers who teach in disciplines such as engineering and medicine, have been found to be more likely to adopt a teacher-centred approach to teaching (Lindblom-Ylänne et al., 2006; Lueddeke, 2003; Trigwell, 2002). This challenges the assumption that teaching and learning should be studied as separate from



the context because it suggests that there is something about the context which influences the teaching and learning that is carried out.

The concept of the reflective practitioner as it is used in teacher training courses is also problematic because of its reliance on individual change for systematic change (Trowler & Bamber, 2005). On returning to every day teaching practice it may be difficult to keep up with the intention of pursuing reflective practice if the departmental culture does not value such changes. Socio-cultural researchers interpret context as central for the establishing of conceptions and approaches. In this way the epistemological beliefs that are fostered by the paradigm within which teachers are working outline the necessary conditions under which teachers' conceptions and approaches need to be understood. It is therefore important to study teachers' reflections on their teaching in *their* context. In this case I have chosen the context of teachers involved in the teaching of medical students from the medical education context, rather than the context of a teacher training course.

## **CURRENT TRENDS IN MEDICAL EDUCATION**

### **Medical Education practice**

The every day environment of medical teachers, and hence the context in which medical students are taught is influenced by several actors; students, the doctors, their patients and society as a whole (Dent & Harden, 2000). However, the context of medical education has changed radically, perhaps even more than many other educational contexts. Medical knowledge is constantly increasing; the role of information technology has a direct impact on the skills that are required; patients' expectations have changed etc. All these aspects have changed what is expected of a graduated doctor and therefore have implications for the way medical curricula are designed and implemented (Dent & Harden, 2000).

#### *The Core Curriculum*

As a reaction to the changing context described above, the idea of developing clear intended learning outcomes has been put forward by the Bologna Declaration (1999), the World Federation for Medical Education (WFME, 2003) and governmental bodies such as the National Agency for Higher Education in Sweden. Harden (2001) argues that teachers must recognise that students cannot learn everything, and because of the vast information available, students need support in focusing on those learning outcomes that are necessary for shaping professional practice: the *Core* of the Curriculum. He suggests that these learning outcomes should focus on the most important competencies which the students are expected to achieve, and which have been arrived at through consensus between stakeholders. The features that a core curriculum should comprise are (Harden, 2001):

- That it covers topics which are essential to all students, as distinct from topics in the self-selected part of the curriculum, which students may or may not choose to study.
- That it covers competencies essential for the practice of medicine, which, if lacking in a doctor, result in him or her being incompetent.

- That it requires a high standard of competence before satisfactory completion of training.
- That it covers skills and attitudes as well as knowledge.
- That it provides a foundation for study in subsequent stages of the curriculum or phases of education.

The conventional medical curriculum in Sweden and elsewhere, is generally divided into two stages. The first stage includes basic science disciplines, such as anatomy, cell biology, pathology and physiology. These areas are usually taught by teachers who devote a large part of their time to research in these areas, and who do not necessarily have any experience of clinical practice, which their students will eventually be facing. The other stage is carried out in clinical practice, usually after two years of study, mainly at university hospitals. Areas that are included in this stage are internal medicine, surgery, paediatrics, psychiatry etc. Results from empirical studies on student learning in this context emphasise the dilemma of providing education at the same time as producing health care (Wichmann-Hansen, 2004). It is the availability of patients rather than pedagogy that underpins the design, and hence the context of medical education.

According to Biggs (1996), the pedagogic context established is at the core of teaching, apart from students and ourselves, and includes several components: the curriculum that we teach; the teaching methods that we use; the assessment procedures and methods of reporting results; the climate that we create in interaction with students, and the institutional climate. By aligning these components in a balanced system, a so called constructive alignment, the components will support each other and can work towards the common goal of meaning oriented learning.

Every teacher plays a part in nurturing their students' epistemological values and hence their conceptions of what learning is, and how it should be undertaken. This is rarely explicit (Polanyi, 1967) in course learning outcomes, because these tend to be concerned with the content of what should be learnt (Laurillard, 2000). However, it *is* communicated to students in the so-called 'hidden curriculum'. A hidden curriculum is usually defined as the implicit cues that students interpret from the assessment, and that steers them into a certain approach to learning, which is sometimes contrary to explicit aims and outcomes (Snyder, 1971). In other words, the quality of learning associated with a deep approach strongly relates to particular qualitative features of academic contexts (Ramsden, 1992). Educational developers therefore need to work strategically with context to enhance the quality of student learning.

Examples of how institutions that provide medical programs have tackled the changing context include the introduction of problem-based learning curricula (PBL); integrated learning; and inter-professional learning. However, moving from traditional teaching to an emphasis on the facilitation of learning may prove difficult. It requires new approaches to learning by teachers and students, and not all students find that these 'activating' approaches suit them (Dent & Harden, 2000).

So, what are the tools at hand within a conventional medical curriculum context for directing teacher efforts towards the facilitation of high quality student learning? Rules

and regulations concerning respectfulness, sexual harassment and the inclusion of a gender perspective are rarely specific and usually only serve as general guidelines for teaching. The most obvious instrument that influences teachers' teaching is the core curriculum because it is supposed to provide an overall rationale for the educational program (Kelly, 2004). In this thesis, the role of the core curriculum in the teaching and learning context is therefore investigated. I explore the significance of the core curriculum further in the following section by examining the issue of transfer.

### **Medical Education and the Issue of Transfer**

Areas that are specifically emphasized in medical education research are the role of the core curriculum and the development of medical students as expert physicians. A central problem has been defined as the problem of accessing knowledge in a different context to that in which it was learned. This is the problem of transfer which I discuss below.

One of the problems medical students face is in the change of context from university based medical education to clinical contexts of practice. Originally medicine was learned by apprenticeship, in other words students followed their supervisor and learned content in the same or similar context that they would later perform their profession. However, today fewer patients are available since day-case surgery is outsourced to other locations of patient care (Dent & Harden, 2000). Additionally, the medical curriculum has traditionally been split into a pre-clinical and a clinical stage. This creates the problem of transfer. The initial learning context differs from the context where knowledge will need to be accessed and applied (Gruppen & Frohna, 2002). This is not simply a memory problem. It is also a problem that arises where knowledge that is learned in one context is remembered, but not necessarily applicable or useful in the other.

Important elements in understanding transfer are the degree to which two situations are similar (both conditions and context), with structure and prior knowledge being others (Gick & Holyoak, 1987). The problem of transfer is old. Already in 1957, Smedslund concluded in his article "The problem of what is learnt" that if the way in which something is learnt could be determined it would be obvious that to the learner different contexts and contents are variations on a common theme. Hence, contextual changes would not be a problem and to Smedslund transfer appears to be a pseudoconcept. The problem of transfer in learning is however very complex. Many studies show how difficult it is to transfer knowledge from one situation to another (Chen, 1995; Norman & Schmidt, 1992; Prince et al., 2000). The transfer problem has therefore been defined as an issue of concern for medical education, and studies have been undertaken to find out how to help students partly overcome the problem of transfer across contexts.

There is evidence that the integration of basic science and clinical knowledge is a way of dealing with the problem of transfer. By applying the findings concerning medical expertise, Schmidt and Boshuizen (1993) proposed that integration of knowledge from different subject matter areas should be stimulated in order to acquire knowledge 'encapsulation', the integration of basic scientific knowledge into meaningful clinical concepts. Further, problems and representative cases should be presented in order to

help students develop functional so called ‘illness scripts’, as a way of preparing students for their future profession. These ideas form the basis for the PBL curriculum (Norman & Schmidt, 1992), which has also proved to be an effective approach to facilitating long term retention of knowledge for students (Dochy et al., 2003). Also, transfer varies with the degree of practice with the task and the number of similarities between learning tasks (Gentner et al., 2003). If for instance, students are asked to distinguish the similarities and dissimilarities between the shoulder joint and the knee joint, the focus would be directed towards the function of the joints rather than the structural details, and transfer would increase.

Other important aspects for the facilitation of transfer are the diagnosis and activation of students’ prior knowledge in educational situations. This is a central idea in ‘*activating instruction*’ (Lonka & Ahola, 1995), which stresses the importance of first finding out about students (mis)conceptions and then supporting their learning by giving constant constructive feedback. As has been mentioned above in the section on approaches to teaching it is crucial to make ideas and conceptions overt in discussion in order to foster conceptual change.

One way of investigating teacher thinking in the medical context is to identify a problem which is central for a group of teachers and to focus the investigation around this. This problem can then form a framework within which to interpret teachers’ varying conceptions. The transfer problem can be seen as a central issue to medical teachers at different levels of the curriculum, and provide a context for the investigation of teachers’ conceptions and strategies for teaching. Also, the issue of expertise provides a framework for the interpretation of teachers’ conceptions of learning since it is an issue of high relevance to the development of the medical profession.

#### *Development of Expertise in Medical Education*

Medical education practice is concerned with the development of students entering the medical field as novices and their development as expert medical practitioners. The concept of expertise can be used to inform teachers of how they can best support this development.

Research on expertise has been carried out since the 1970s, building on Kuhn’s theory of paradigm shifts (Kuhn, 1970), and Perry’s (1968) theory on students’ moral and epistemological development. It has been suggested that large amounts of factual knowledge are not sufficient for acquiring expertise (Bereiter & Scardamalia, 1993). Expert knowledge consists of several components: formal and theoretical knowledge, such as what we learn in the educational system; practical or procedural knowledge, such as skills and ‘know-how’, that is learnt in practical situations and which is often also informal and tacit in nature; and finally self regulatory knowledge, involving meta-cognitive and reflective skills. It has been suggested that the development of expertise is a long-term process during which the three parts (formal, practical and self regulatory knowledge) are integrated into a whole – and the question is how to enable the achievement of this integration (Tynjälä et al., 2001).

The development from novice to expert has been described as a five-step-process where the novice needs to focus on certain rules to perform a task. Becoming more competent, he or she can analyse a situation and choose how to act on the information received from the situation. At one point during the process there is a qualitative change in the way a person perceives the information. Instead of experiencing information as separate, information is 'chunked' and sub-grouped in such a way so that the expert develops an intuitive feeling for what decision to make (Dreyfus et al., 1986).

The idea of chunking information has been developed further in the medical context by Schmidt and his colleagues (1993). They found evidence that medical experts encapsulate knowledge into concepts that were clearly qualitatively different from those of novices. They also carried out studies to show that the development of expertise can be facilitated. Integration of content matter, early patient contact and ill-defined problems were found effective as ways to facilitate the development of expertise (Boshuizen & Schmidt, 2002).

Such studies of expertise, are from within the cognitive psychology paradigm: focusing on what goes on inside the head of each learner and, it is argued (Bolander et al., 2006), are oriented towards what Sfard (1998) has defined as the 'acquisition metaphor'. The acquisition metaphor refers to the view that knowledge is a 'commodity, applied, transferred (to a different context), and shared with others' (p.6). In other words, learning is a process of turning concepts into someone's private property, and the teacher's task is to help the student in this process of acquisition. These views are significantly different from what can be summarized as the 'participation metaphor'. This metaphor derives from a socio-cultural paradigm, suggesting that knowledge does not exist apart from human beings and, cannot therefore be achieved in such a way that there is an end point to learning. Learning is seen as a process that is embedded in action and the context in which it takes place.

After considering what we know about the relationship between teaching and learning described in the previous section, that students' approaches to learning reflect that of teachers', medical teachers could be thought to play a major role in the process of fostering expertise. It would therefore be of interest to find out how medical teachers' conceptions of learning and teaching relate to the idea of the development of expertise, and which metaphor they base this conception on.

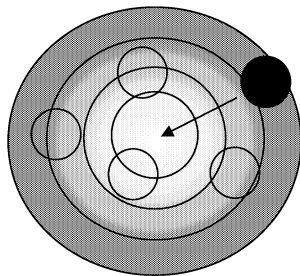
Medical education research has largely developed within a natural science paradigm, in which the testing of hypotheses through controlled, experimental studies and quantitative research designs is normal. It draws on research that is rooted in cognitive psychology, which focus on the individual and how teachers and students develop their conceptions through different clearly defined stages of development (Trowler & Cooper, 2002). However the social theory of learning which takes as significant culture and the discipline as an agent of socialization is also present within medical education research (Becher & Trowler, 2001). In other words, it is not only in relation to other subject areas, but also within the discipline of medical education that a tension between different paradigms exists. As with some researchers such as (Cobb & Bowers, 1999; Sfard, 1998) - and in opposition to others such as (Anderson et al., 1996) I would argue that there is a need for bridging cognitive psychology and socio-cultural perspectives

when working with educational development within a medical education context. The next section describes a theory of learning that focuses on the participation metaphor and therefore provides opportunity for a widened view of learning and expertise: the theory of communities of practice.

## COMMUNITY OF PRACTICE

Community of practice theory offers a social theory of learning (Lave & Wenger, 1991). The theory describes how communities are formed around practice by the members in any kind of organization. Members of a community of practice are not just a group of people, or a web of interactions. They are a group who share an overall view of the domain in which they practice and have a sense of belonging and mutual commitment to this view (Wenger et al., 2002). From the perspective of communities of practice, learning is seen as a socialisation process through which professional identity is constructed by integrating formal knowledge (that is, knowledge learned from books) with informal or tacit knowledge (Eraut, 2000). The view that learning is also participation in a community of practice (Wenger, 1998) describes learning as a process through which novices progressively become experts as they move from the peripheral to the central part of the community of their chosen profession (figure 1). This process requires active participation as a way of learning, and suggests that the acquisition of tacit knowledge is context-dependent (Pratt & Associates, 1998).

Figure 2: The learning trajectory in a community of practice



According to Wenger (1998, p.73) a successful community of practice should be based on *mutual engagement*, how members engage with and respond to each others' actions and establish relationships based on this engagement; *joint enterprise*, how participants in the community understand, contribute to and take responsibility for the development of the community of practice; and a *shared repertoire*, the ability to make the range of resources employed into something that is used and engaged in. This requires participation and the ability to make practices meaningful.

The concept of 'reification' helps in the process of making practice meaningful. By treating abstractions as concrete 'things', as though they were active agents, reifications help us in the negotiation of meaning (Wenger, 1998). For example, 'teaching' is said to 'influence learning', as if it was something concrete, but 'teaching' as well as 'learning' has become a reification that carries meaning. It is of

interest to investigate the relationship between the meaning teachers in a community of practice attach to learning, their conceptions of learning, and how these conceptions relate to their practice as teachers. The creation of meaning around teaching and learning as a feature of communities of practice is an issue that I hope to contribute to in this thesis. When a broker enters a community of practice with a different conception of 'learning', for example, an opportunity for a renegotiation of meaning of that reification is offered.

An important aspect of the community of practice is the emphasis on the identity of the members within a community. Identity depends on a number of factors, one being the hierarchical value of different positions within academia such as researcher and teacher. The construction of identity is dependent on five different components (Wenger, 1998):

- Identity as the learning trajectory. What we have learned and where we are going.
- Identity as multi-membership. How we integrate membership of different communities of practice, such as that of viola player in an orchestra and researcher, into one identity.
- Identity as a relation between the global and the local. The negotiation of local ways of belonging, with your colleagues, to broader constellations manifesting broader styles and discourses, such as within the community of educational researchers.
- Identity as participation and non participation. What we define as familiar and unfamiliar.
- Identity as negotiated experience. How we experience ourselves through participation and how we and others reify ourselves.

However there is a constant tension between the identity and the level of vulnerability the identity is exposed to. There must be a balance of negotiability between these two to drive it forward in development (Wenger, 2007). If identity is constant, and cannot be influenced by for example experiences and learning, the level of vulnerability is low, and little or no development of identity will occur. However, if identity is highly vulnerable, it is not stable and hence provides a loose connection and influence on the practice of the community. Reifications and artifacts help in the establishment of identity and facilitate our ability to move between the different communities of practice we may be members of. Hence, to establish identity in a (new) community of practice based on teaching and learning, the creation of reifications could serve as a way forward.

In a community of practice, such as the community of educational development practice, or that of medical education practice, constant negotiation of meaning goes on around the purpose of the practice. This is referred to as the *enterprise* of a practice (Wenger, 1998). Hence, in the terminology of communities of practice, the enterprise of educational development practice is to create reflective communities of practice around teaching that discuss what students are prepared for. A problem, however may be that the community of practice from which educational developers take their starting point differs from the community of practice in which medical teachers identify themselves, not only when it comes to the group of people, but also concerning their

epistemological beliefs, and the paradigm they work within. Hence, it is important to scrutinize how to bridge and learn across those paradigms.

## **ISSUES FOR INVESTIGATION**

The discussion of current trends in educational development suggests the following as significant questions in the educational development project of enhancing teaching and learning within higher education: What are teachers' conceptions of teaching and learning? What features of teachers' context support conceptual change regarding teaching and learning? The socio-cultural perspective indicates the importance of studying these questions within the context of practice, in this case, the context of medical education.

The review of the medical education literature identified the core curriculum, the development of expertise and the problem of transfer as important aspects of this context. This leads to the following question: What is the role of the core curriculum in relation to teacher conceptions and practice? For the understanding of teachers' conceptions and strategies, the concept of expertise defined as including the acquisition and the participation metaphor was seen as applicable, and the transfer problem was seen as contextualising the investigation of teachers' conceptions and strategies.

The idea of context in the form of the community of practice, as facilitating learning and as indicating what is valued and emphasized, seems necessary for understanding how to best support the development of teaching in higher education. Methodologically this means a focus on teachers as a group, for example by investigating how a group of teachers within a department conceive of learning and how they carry out their teaching practice in relation to that. This leads to the following questions: What is the relationship between teachers' practice and their conceptions of learning? How can we understand the development of teaching within a community of practice?

The investigations reported in the thesis stem from two projects that were initiated by two different individuals who approached me with concerns about the quality of teaching and learning in the departments they were involved in. Project I stems from the concerns of a surgeon, who at the time was newly appointed as a teacher in anatomy. Her surgeon colleagues had complained that even though students could refer to mnemonics, or point out anatomical structures on a map, they could not use this knowledge in the surgical context. This problem was defined as a transfer problem, and became the starting point for the investigation of teachers' conceptions of learning and teaching in the medical context. Study I & II were undertaken within the framework of this project. Study I is about the question of expertise and core curriculum, whereas study II focuses on how medical teachers address the question of transfer.

The findings from Project I pointed to the need to adopt a socio-cultural perspective to the investigation of teachers' conceptions of and approaches to teaching and learning rather than the cognitive psychology perspective underlying Project I. Project II started with the request from a newly appointed director of studies to collaborate within a department that had the aim of enhancing the quality of teaching. This collaborative project is an example of a way of working at the level of the group rather than the level



of the individual teacher. It is therefore included as the second part of my thesis. Study III & IV were undertaken within the framework of this project. Study III explores the relationship between teaching practice and teachers' conceptions of learning. Study IV is a qualitative analysis of how we can understand the development of teaching within a community of practice.

## GENERAL OBJECTIVES

This thesis is a 'story' of how to enable people to collaborate across paradigms in order to enable learning. The overarching objective is to investigate how educational developers can work strategically with change to develop quality in higher education institutions in general and in medical education more specifically. The overarching questions that are investigated and discussed in this thesis are:

- What are feasible strategies for enhancing communication across paradigms?
- How can educational developers work with teachers in their contexts of practice?

An assumption made on the basis of the theoretical background described is that there is a need to investigate teachers' conceptions of learning and teaching to promote conceptual change in order to influence teaching practice so that the student learning experience is well supported and enhanced. In the medical education context, the concepts of expertise and the problem of transfer are the issues which form the focus of the investigation. Considering the essential role the core curriculum plays in the medical teaching context, it was also of interest to investigate the role it plays in the construction of medical teachers' conceptions.

In *Project 1* the following questions were asked:

- What conceptions do medical teachers hold of learning, and more specifically of the development of expertise, and what strategies do they use to support their students in this? (study 1, study 2)
- What role does the core curriculum play in relation to teacher conceptions and practice? (Study 1)
- How do medical teachers conceptualise the problem of transfer and what does this mean for their teaching practice? (study 2)

The idea of context is central to the current thesis. On basis of the concept of communities of practice, and of the findings from Project 1, a shift was made from focusing on context in relation to the conceptions of individual teachers, to emphasizing teachers as a community of practice in Project 2.

In *Project 2* the following questions were investigated:

- What is the relationship between teaching practice and teachers' conceptions of learning? (study 3)
- How can we understand the development of teaching within a community of practice? (study 4)

## **METHODOLOGY**

As discussed in the introduction, the epistemological and the methodological questions say something about the paradigm in which we are working. I have discussed the epistemological question; how the different paradigms I am involved in view knowledge and learning, and have now reached the point where the methodological question, how to go about the investigation of knowledge, will be discussed.

### **QUALITATIVE RESEARCH DESIGN – TOWARDS AN ACTION RESEARCH APPROACH**

In the current research the objective was to understand how medical teachers conceptualise learning and teaching to better organize interventions that can facilitate the development of teachers' practice as professional teachers. The research questions call for a qualitative design and data collection since the research questions concerns aspects of human behaviour – thinking - which is not measurable in a quantitative way. The purpose was not to find an 'average teacher' among a large group, but to get insight into different ways of thinking around a number of specific issues (see objectives section).

Qualitative studies follow a different logic from quantitative research. Also, the concept 'qualitative' assumes a meaning in educational and social scientific research that differs from how it is used within natural scientific research. Quantitative design generally follows a model based on hypothesis and testing, which assumes that a unit or situation can be expressed by the use of a number of variables that can be measured. Qualitative analysis in a quantitative design context generally refers to the discernment and description of different variables, e.g. what substances constitute a material or tissue. Quantitative methods are then used to find out how much or how many of these exist in the material. This latter approach to research belongs to the positivist paradigm. Some educational researchers accept such an approach whilst others argue that it is impossible to reduce human behaviour to a set of variables and hence consider quantitative research ill-suited for the research of individual or group behaviour in different situations. Instead, human action is seen as the meaning individuals attribute to a situation and educational research concerns the interpretation of the data you can gather from interviewees, documents and observations (Eggins & Macdonald, 2003). The current thesis is based on this view of how to get to know the world and therefore applies an interpretivist approach to research within the interpretivist paradigm. However, working in a context that generally applies a natural scientific view of methodology, it was thought necessary to relate to that view, and see whether quantitative approaches, such as a questionnaire with closed questions, could accompany the otherwise qualitative approach.

The idea that experience is a form of perception that can be mapped only through interviews and observations of how people, for example teachers, perceive their situation, originally stems from phenomenology, a field of philosophy founded by Edmund Husserl (1859-1938). Husserl's emphasis on human descriptions of their understanding of their experiences as important for understanding a situation is crucial

within educational research and has informed research methodologies to focus the underlying meaning that is expressed in interviews as well as documents.

## **Applied Research**

Research on student learning has mainly been studied learning as an activity, for example by asking students for their account of the learning experience as in phenomenographic studies or analyzing students' responses to assessment questions (Marton & Booth, 1997). Such research tries to understand the basic nature of the phenomenon of learning and can hence be defined as basic educational research (Patton, 2001). Applied research, however focuses on the application of basic theories to real-world problems and experiences.

Applied research is typically aimed at policymakers, directors, managers and professionals working on specific problems. However, in applied research it is central to be aware of the contextual features of a certain study because the purpose is to contribute knowledge that will help the understanding of a problem in order to intervene in the environment. While the source of basic research are issues in the discipline, applied research stems from problems and concerns experienced by people (Patton, 2001).

In the current thesis an applied research design was taken as a starting point because of the concerns that initiated the two projects, and ultimately my own concerns as an educational developer with a background in social science but working within a natural scientific context. As the project evolved however, a change in methodology emerged.

Project 1 kept to a more traditional applied research design, where the aim was to understand medical teachers' conceptions of learning and the transfer problem, and how this related to their teaching practice. This was thought of as a way to enable me as an educational developer to support and help teachers understand what they needed, to be able to develop their teaching in such a way that it became closer to the idea of the development of expertise. It was therefore making use of or applying, the theory of expertise.

In Project 2, however, a focus on *change* took a more prominent role. The idea of research as a way to engage people in a process, where the data collection also becomes an intervention, was acknowledged. For example a questionnaire is an intervention in itself. In this way, Project 2 came closer to the idea of action as in action research, which is often inherent in the work of educational developers. Educational development involves inquiry aimed at learning, improvement and development of organizations:

*“These problem-solving and learning oriented processes often use qualitative inquiry and case study approaches to help a group of people reflect on ways of improving what they are doing or understand it in new ways.” (Patton, 2001:179)*

## Action Research

Action research has been defined as the  
*“study of a social situation with a view to improving the quality of action within it”*  
(Elliot, 1991:69)

Action research aims at solving specific problems within for example an organization. By engaging people within the organization in studying their own problems the distinction between action and research becomes rather blurred, and the methods tend to be informal and quite specific to the organization for which the research is undertaken (Patton, 2001). In action research the people in the situation studied are often directly involved in gathering and analysing the results. According to Patton (2001) the findings of action research are seldom disseminated beyond the community or organization for which the research is carried out. However, in this case, dissemination make an important aspect of the findings, since the community of educational developers is distributed all over higher education institutions in Sweden and elsewhere. The difference between my study and action research as defined by Patton is that the application of the findings are thought to inform a broader audience than only those involved as subjects in the research.

The action research approach taken in this thesis applies a combination of traditional qualitative methods, for example interviews, and also ideas from ethnomethodology. Ethnomethodologists are interested in how humans make sense of the world and how they manage to negotiate that sense making as they go (Garfinkel, 1987). We make all sorts of assumptions about the nature of reality, of how we should respond to each other, and we draw on what are called ‘members resources’ in order to make that sense. Ethnomethodologists often go about their research by disturbing the norm. For example, in certain Western cultures when you are in a lift you tend not to look at other people. Ethnomethodologists would argue that by challenging a social convention, you can arrive at an understanding of those conventions and what is revealed about the underlying assumptions (Patton, 2001). This idea of intervening into something and learning from the intervention is echoed in the approach of Project 2 in the current thesis.

As mentioned above, action research often takes the case study approach as a way to enable reflection. Yin (1989) defines a case study as *“an empirical inquiry that: investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used [to increase validity and reveal diverse perspectives]”* (Yin, 1989: 23-25)

A case study approach is used when the researcher strives for understanding and exploration of complex social phenomenon and processes for which there is yet no in-depth perspective. By defining a case as a ‘bounded system’, a process or phenomenon bounded by time and place, data is collected for analysis within this system. One of the purposes of conducting case studies is to be able to generalize beyond the particular case or cases studied. This method is called ‘analytical generalization’, a method where the results of the case study is compared to a previously developed theoretical model

(Yin, 2003). In Project 2 the case study approach was adopted as a way of understanding the development of teaching within a community of practice.

To summarise, a qualitative methodology was applied with a focus on applied research in Project 1, for reasons of understanding medical teachers' conceptions and strategies for teaching to be able to develop them. However, for the overarching purpose of understanding how educational developers can work with teachers in their context and what strategies for communication across paradigms that are applicable, an action research design developed as Project 2 progressed. In project two I therefore took a more prominent role in the striving for change when the development of teaching was studied by applying the theory of communities of practice.

### **Validity and Credibility**

The literature about qualitative research methodology contains a number of suggestions for its justification and credibility (Denzin & Lincoln, 1994; Guba & Lincoln, 1994; Patton, 1990). Whilst validity and reliability are important criteria for assessment in studies undertaken in the positivist tradition (Patton, 1990), interpretivist traditions of inquiry adopt alternative criteria such as credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985).

The aim of this thesis was to explore how educational developers can work strategically with change to develop quality in higher education institutions. Hence, under the criteria of transferability the study was perceived as relevant to anyone involved in the pursuit of educational development generally and within health science education specifically.

Collected data and analysis has been discussed with colleagues, supervisors and collaborators throughout the process of the studies to avoid bias, keeping to the criteria of confirmability, the degree to which the results could be confirmed or corroborated by others. Also, the theoretical framework from which the data has been interpreted has been provided to the reader of the studies to reduce the risk of letting my values intrude on the data analysis.

The validity of the 'theories' or hypotheses generated by action research does not depend so much on scientific tests of truth, as on their usefulness in helping people to act more intelligently and skilfully. This means that these kinds of theories are not validated independently, but through practice, in other words by educational developers applying these theories to other contexts and evaluating their usefulness, the outcomes of this thesis become validated. During the process of this thesis audits have been carried out with educational developers from other universities concerning Project 2. Regarding Project 1, the dependability is strengthened by the fact that the two articles in Project 1 have been reviewed by an international audience and published in journals within the field of educational development.

By combining methods or data in triangulation a study is strengthened (Patton, 2001). Triangulation can be achieved in several different ways; by using different sources of data, through the use of several researchers or evaluators, through the use of multiple theoretical perspectives and the use of several methods to study the same phenomenon (Denzin & Lincoln, 1994). In Project 1 triangulation was carried out by using several

researchers to carry out the interviews as well as to analyse the interview data. Also the use of document analysis in Project 1 was used as a means of data triangulation. In Project 2 several data sources, (questionnaire, interviews, workshop) were used as to triangulate the data.

The point with triangulation is not to demonstrate that the different data sources yield the same result but to test for consistency (Patton, 2001). Different kinds of data may yield different results since data is sensitive to methodology. Thus inconsistencies can shed light on and deepen our insight into the relationship between the inquiry approach applied and the phenomenon under study.

# INVESTIGATION AND ANALYSIS

## CONTEXT OF PROJECTS

The context of the study was a Swedish university where clinical and pre-clinical studies are clearly separated within the five-year long medical program. There is no consistent educational philosophy at the university. Instead, teachers have the freedom to choose an educational approach that they like. This means that even though a large part of the medical program has a traditional approach with lectures and seminars, there are individual teachers who apply case-based teaching or problem-based learning in one course module, whilst another course module might be 'flexible', where computer resources and web-based learning platforms are used to support learning. The program is divided into a preclinical phase (basic science studies) and a clinical phase.

### Project I

Project I was initiated due to the concerns put forward by several surgery teachers to a teacher in anatomy about students' prior knowledge. Surgery teachers complained that even though the students could remember concepts and mnemonics they had learned in anatomy, they could not apply them in the surgical context.

The anatomy course comprised of eleven weeks, where full class (140 students) lectures constituted the basis for learning. These sessions included lectures given by a clinical doctor, for example a thoracic or orthopaedic surgeon, who tried to explain how the anatomical knowledge would fit into his or her specialty. In connection to each lecture session, tutor led dissections sessions were given. Students also participated in seminars in practical anatomy where they learned how to identify structures and organ projections on each other. Students were required to study with mannequins and computer programs on their own. Every other week students had to pass oral exams on anatomical theory as well as identify certain structures on the bodies that were under dissection. At the end of the anatomy course, students must pass a five-hour written exam.

The surgery course runs over sixteen weeks. Students attended ward placements which changed every other week according to a rotating scheme so that they would get acquainted with different sub-specialties. Students were supervised by a clinician, but were not assigned to a certain person. A mentor system, where students met a mentor at least once a month was thought to support students' development. Sometimes students attended lectures or seminars around patient cases. The assessment comprised of a two-hour Objective Structured Clinical Examination (OSCE)(Harden & Gleeson, 1979), as well as a six-hour theoretical written exam and an oral exam.

### Project II

The department is a successful research organisation of some 150-200 individuals (postgraduate students, post-docs, faculty, and administration) within basic science. The department was at the time responsible for teaching medical students within the first semester, as well as involved in two other undergraduate programs. However, teaching was only a minor activity creating only a small percentage of the total departmental funding and most teachers were involved in teaching only a few days every year.



## **Participants**

The teachers involved in Project I were teachers of first-year and fourth-year medical students. The teachers of first-year students were full-time researchers at the department of neuroscience giving lectures approximately six weeks per year in anatomy. The teachers of fourth-year students were full-time clinicians dividing their time between teaching in surgery, research and clinical work. These teachers use a variety of teaching methods, from lectures, to seminars, bedside teaching, clinical supervision and problem-based learning.

In Project II seventy-nine employees were involved in teaching activities. A majority of these were PhD students. Eleven held a position as professor. All teaching staff were involved in the project via the questionnaire and the change of seminar questions as described in study IV, and a selection of staff were invited to a workshop. The director of studies, who has a central role in Project II, was interviewed several times. Six members of staff in different positions within the department were approached for an interview.

## **INTERVIEWS**

Interviews are a way of finding out from people what we cannot directly observe and the purpose of interviewing is to find out something about another persons' perspective (Patton, 2001). In Project I, interviews were the main source of gathering information. The purpose was to find out about the conceptions of learning and other aspects that could provide some understanding of the subjects' views on expertise. Interviews were also used to find out about medical teachers' conceptions of the transfer problem and how they perceived the influence of such a problem on their practice.

In Project II interviews were used for somewhat different reasons. These were to gain more in-depth information and different perspectives from a sample of teachers on what had already been investigated via the questionnaire; including the relationship between teaching practice and conceptions of learning, but also their conceptions of what was happening in the department concerning educational development.

In both projects an interview guide was used to list the questions that were to be explored in the interviews. By providing questions according to topics that should be covered in the interview rather than exact questions that should follow a stipulated order, the idea is to keep the interview more informal. Thus, the interviewer remains free to build a conversation around the issues under investigation. The advantage of the interview guide is that it helps make interviewing more systematic and makes sure the interviewer makes best use of the limited time available. The interview guide was specifically important in Project I, since two different interviewers, myself and one of my supervisors, carried out the interviews with the two groups. For interview guide for project I, see appendix.

Two interviews were carried out with the director of studies of the department in the case study throughout the process of Project II. These were carried out as open ended interviews, with the purpose of learning about the director of studies' ideas, thoughts

and reflections and were tape recorded. Also, several discussions with the director of studies were carried out and documented by field notes.

## **Sampling**

In qualitative inquiry there are no rules for sample size (Patton, 2001).

*“Sample size depends on what you want to know, the purpose of the inquiry, what’s at stake, what will be useful, what will have credibility, and what can be done with available time and resources.” (p.244)*

By focusing on the seeking of in-depth information from a small number of people this was thought to provide rich enough information to inform the research questions. Purposeful sampling should be judged according to the purpose and rationale of the study, rather than the logic of recommended sampling sizes as in probability sampling, which aims to strive for representativeness.

The sample was not meant to be representative of a population, but to be *purposeful*. This was accomplished by combining two sampling methods; intensity sampling and stratified purposeful sampling. The purpose of intensity sampling was the selection of information-rich cases that manifested the phenomenon under investigation (Patton, 2001): conceptions of learning, teaching strategies, experiences of the transfer problem (Project I), and teachers who to a larger or smaller degree applied activating strategies for teaching. The stratified purposeful sampling aimed to illustrate characteristics of particular subgroups, and hence teachers from two disciplines, surgery and anatomy, were chosen for Project I. Teachers in different scientific positions (PhD, Research Assistant and Professor) were chosen in Project II, both in regard to participating in the workshop, one of the interventions made, and for the interviews (study IV).

The emergent nature of qualitative research means that it is not necessary to define in advance aspects, such as sampling. The criterion of redundancy (Lincoln & Guba, 1985) means that the number of interviews stops when no new information is provided by the new interviewees. However, in Project I it was necessary to decide on an average sample size to get approval for the project. After scanning the number of staff available for interviews in anatomy and surgery it was found that there were only four teachers in anatomy who held a teaching position. Surgery was taught at four different university hospitals and thus could provide more opportunities for interviews, however that would provide an imbalance between the two groups. Hence, the teachers at two of the hospitals were selected, which resulted in six surgery teachers. In total ten interviews were carried out.

In Project II the intention was to interview six members of staff with teaching responsibilities who had filled out the questionnaire and responded in, if not opposite ways, at least qualitatively different ways. A spread concerning positions within the department was strived for to include members of staff at professorial level as well as PhD level since it was thought possible that they perceived the process in the

department, as well as teaching and learning, in different ways. A gender balance was strived for in both Project I and Project II.

## **QUESTIONNAIRES**

In an interview situation there is always the possibility of repeating the question or clarifying the purpose, however when using questionnaires this is not possible. The way a question is asked provides the information accessible to the respondent. In an interview situation questions can be open ended, where the respondents formulate their own answer, as well as fixed-choice, where the respondents choose from a list of possible answers, or values on a scale that best match their view. The latter is referred to as Likert-type questions. Questionnaires are commonly used to collect information about everything from knowledge of respondents, facts such as age, gender, education etc. to attitudes and conceptions of certain areas (Carlström & Hagman, 1995).

In Project 2, a questionnaire was designed with a twofold purpose; as an intervention to trigger discussion and reflection for all staff involved in teaching at the selected department, and to get an overview of the relationship between teaching practice and teachers' conceptions of learning within the department. Two different forms of questions were used in the questionnaire: open ended questions and fixed-choice Likert-type scale questions. These were derived from previous studies by Lonka, Joram & Bryson (1996) and Vermunt & Verloop (1999). Other questions included background questions and questions specific to the project (see appendix in study 4).

## **ANALYSIS**

When analyzing documents the researcher studies excerpts, quotations or entire passages from different documents or records. Qualitative analysis typically comes from fieldwork, where the researcher has spent time on the focus of his/ her study, for example a community or an organization (Patton, 2001). In content analysis the purpose is to identify the patterns that can be revealed in documents, interviews and other records.

Content analysis, or thematic analysis, is a process for encoding qualitative information into categories. The encoding can result in themes and categories that are generated inductively from the raw data or deductively from theory (Boyatzis, 1998). At its best the categories cover the meaning of what was expressed in the data.

In Project 1 the interviews and the core curriculum documents were analysed according to content analysis. In qualitative research, the meaning of a text is assumed to be interpreted, and hence influenced by the person who reads it. It was therefore important to analyse teachers' conceptions of the core curriculum in the interview transcripts as well as analyzing the core curriculum document separately from those interpretations. It is acknowledged that the analysis of the core curriculum and the interviews was influenced by my own interpretations in the light of theory on the development of expertise.

Two of the researchers read the interview transcripts individually. Dominant themes in the responses were extracted and quotes were clustered according to issues that related

to the questions that arose. The two researchers' categorisations were then compared and discussed. A commonly recommended method to ensure trustworthiness of qualitative research is to undertake member checks to validate the interpretations of data with the individuals actually studied (Harris, 2002). Hence, the interview participants read the results of the study to make sure it reflected what they wanted to express in the interviews and gave them a chance to raise any issues that they did not agree with.

In Project 2 the documents, interviews and workshop were also analysed using content analysis. The open-ended questions in the questionnaires were also analysed according to content analysis and inter-rated by two independent researchers. Categories were then created to cover the meaning of the responses. The part with the closed questions were analysed according to 'item response theory' (Embretson & Reise, 2000), a statistical method with the purpose of, among other things, being able to see how relevant and reliable the questions were rated by the respondents.

Given my involvement in an action research process over time in Project 2, other processes of interpretation and analysis were also going on. The discussions with the director of studies together with the interventions undertaken made it possible to get some deeper understanding of the culture and what was going on. This form of reflective analysis (Gall et al., 2007) provided a dynamic process of negotiation between myself and the director of studies.

## **ETHICAL DIMENSIONS**

This study was accepted by the ethical board of the university.

The consequences of producing 'good' are considered. The aim of this thesis is to understand how teachers' epistemological views of teaching and learning and how these are contextualized, to enable educational developers to work strategically with change to develop quality at higher education institutions. This is my research problem and I suggest that this is a means of 'doing good'.

The risk connected with the research project is mainly methodological. Because the results were based on qualitative research, with interviews as one important method of collecting data, the interpretation of the results is crucial. Interpretations are always connected to a certain degree of subjectivity, and it was thus of great importance to triangulate the data collection method.

Another risk is that the researcher (me) is collaborating with one of the subjects who is part of the study (Project 2). The beneficial part of this is that it is easier to get access to subjects for the study. Also, it was considered cost-effective, since part of the research stems from work, such as course evaluations, that was carried out anyway. However, I am aware that this could have a somewhat positive (or negative) effect on some of the interviewees. They might already have an image of me as 'someone from the teacher training unit' and might perceive participation in the study as compulsory. I therefore stressed the fact that participation in the study was voluntary, and that it was possible to withdraw from the study at any time. Each participant received information orally and in written form, and for the questionnaire they were asked to sign a form for informed consent if they wanted to take part in the study.

The subjects that were involved were informed of the purpose of the study before taking part. If someone did not want to take part, they could be excluded from the study. The subjects of the study, except from being involved in reviewing my analysis of the data as a form of validation, have been offered a copy of the studies that concern them before being published. All data is confidential and only researchers involved in the project have access to the data collected. In the articles all names have been de-identified.

The questionnaire used in Project 2 was piloted with four teachers from the department in question. Thereafter it was revised again before it was distributed to all members of staff who in one way or another were involved in the teaching of undergraduate students in the department. The questionnaire was coded, so that the results would not be traceable to the respondents. Respondents were asked to sign a form of consent which was attached to the questionnaire. When receiving the filled out questionnaires, the form of consent was immediately removed and each questionnaire was marked with a code for the purpose of anonymity.

By having one of my supervisors from abroad there was constantly someone from outside the department, and outside Sweden, who could overlook the research process, give feedback and make suggestions. Parts of the research were conducted in collaboration with my supervisor, Lars Owe Dahlgren, my former supervisor, Kirsti Lonka, and my co-supervisors Sarah Mann and Anna Josephson. Among other things, this led to a greater openness in the research process. It also facilitated the dissemination and implementation of the results of the study, since the network of the educational research community was widened. The goal was also to publish the results in international educational journals.

## FINDINGS

### STUDY I

In study I the role of the core curriculum in relation to medical teachers' conceptions of learning were investigated. These were analysed from the perspective of the development of expertise, a key value in medical education. Also teachers' strategies for supporting students' development of expertise were analysed.

The core curricula of anatomy and surgery were both found to express a view of expertise that focus on the learning of certain facts and competences, but exclude an emphasis on the learning process and social aspects of learning, such as attitudes and ethical considerations, that are inherent in the idea of the participation metaphor, discussed by Sfard (Sfard, 1998).

Three different orientations to the goals of teaching were identified in the interview data: content - competence-, and attitude orientations. *Content-oriented* goals focus on the content to be covered, such as the content expressed in the core curriculum, so that students get an overview of the important content, learn the central issues and pass the assessment. Content-orientations appeared to vary from very instrumental views, 'to pass an exam', to a more elaborated focus on the understanding of content. Teachers with content orientations to teaching were seen as acting within the acquisition metaphor, where expertise is mainly seen as a quantitative change in knowledge. *Competence-oriented* goals emphasized the competencies that students should learn: from very specific practical skills for one specific area of medical practice, to generic skills, such as clinical reasoning skills. Teachers with competence-oriented goals sometimes emphasized a perspective where learning was seen as participation in a community of practice, and hence got closer to a participation metaphor view of expertise. *Attitude-oriented* goals were concerned with the development of the individual student, their identity, motivation, interest and attitude. This was interpreted as an intention to integrate the medical students into a community of practice (Wenger, 1998), where learning is viewed as participation in a complex environment.

It was found that teachers are aware of the core curriculum and influenced by its content. Teachers' interpretations of the core curriculum varied, however, in accordance with whether their focus was on the acquisition of knowledge and content and/ or competencies or on aspects relating to process and the participation metaphor. Where teachers seemed to have a richer view of expertise, they were limited in enacting this by the context in which the core curriculum was interpreted. Also, the core curriculum seemed to inhibit or limit teachers' views of expertise since it is content-focused, and in this way also influences teaching practice.

## **STUDY II**

The purpose of this qualitative study was to explore whether transfer of knowledge was identified as a problem by the teaching staff of anatomy and surgery, and if so, what strategies they used to overcome it. Also, the purpose was to investigate teachers' conceptions of learning, and more specifically their conceptions of the development of expertise, and what strategies they used to support their students in this.

The idea that prior basic science knowledge is essential for the learning of clinical knowledge was evident from most respondents, whilst some supported the view that basic science and clinical practice are two worlds apart. Most teachers recognised that there was a problem of transfer and some individuals had adopted strategies to address this.

Teachers in anatomy and surgery did not view the medical program as development of expertise in the way that has been suggested by Schmidt et al (1992) with the model of encapsulated knowledge. They considered the problem of transfer a recall problem caused by the time lapse between anatomy and surgery courses rather than caused by a change of context that requires facilitation of the application of knowledge, as well as linking between contexts (forward and backward reaching transfer), together with multiple examples and commonality spotting. The strategies proposed by the teachers interviewed were focused on the repetition of knowledge and on the use of clinical examples for anatomy teachers, and some surgery teachers tried to reactivate prior knowledge by, for instance, applying brainstorming activities to their teaching. However, there was no formal educational strategy suggested to overcome the problem of transfer.

## **CONCLUSIONS FROM PROJECT I**

In study I it was concluded that to be implemented, a curriculum has to be interpreted by teachers, and this can lead to a mismatch between curriculum intentions and teacher goals. Hence, it is necessary to provide guidance as to whether the application of a core curriculum should be focusing on content only, or include socio-cultural ideas of learning encouraging an emphasis on process. The degree of teacher involvement in the design of the core curriculum seems to contribute to the clarification of the role of the core curriculum for teachers and students and make sure it is up to date and is linked to other courses.

Study II concluded that transfer needs to be properly addressed by basic science teachers and clinical teachers. This calls for a change towards more integration in the curriculum, where one way forward could be to get teachers together in communities of practice around teaching, to reflect on learning content in courses at other levels. Hence, in the terminology of communities of practice, the enterprise of educational development practice is to create reflective communities of practice around teaching that discuss how student development of expertise can best be supported and how the core curriculum can include a process perspective that specifically addresses the integration of basic science with clinical learning to bridge the problem of transfer. The question is how this integration could be accomplished.

The purpose of Project I was to get an understanding of the conceptions of learning and teaching held by medical teachers and how these were influenced by context to enable educational developers to work strategically with change to develop quality in medical education. However, the distance between researcher and the research subjects in Project I were considered problematic for this purpose because of the delay in time, as well as the lack of engagement and communication between the educational developer and the medical teachers.

Anatomy and Surgery can be described as two different epistemological worlds or landscapes (Nielsen & Kvale, 2000). An issue central to the development of education would be how to enable the issue of education to become part of those worlds. The idea of interventions to influence the discourse on education in a departmental context was seen as a possible way to enable this process, and hence a new research question was added for Project II:

- What educational development interventions can enable teaching development in a departmental context? (study IV)

### **STUDY III**

A questionnaire with the aim of finding out about teachers' conceptions of learning and how these related to approaches to teaching and teaching practice was distributed in the department in question. However, the questionnaire was also viewed as an intervention, to trigger discussion amongst teaching staff and support educational development.

Sixty two people out of seventy-nine (78%) of the respondents filled out the questionnaire. Fifty percent of these reported that they had taken some kind of course in education, but only 34% thought that teaching actually contributed to their career advancement. However, as many as 77% did find it stimulating, in one way or another, to teach students.

The results indicated that a vast majority (82%) of the respondents scored high on 'taking over' teaching strategies, and highest on 'taking over reproduction', which implies the likelihood that it is common for teachers to summarise available knowledge for students. Strategies for activating students were very rare. Only 13% reported such approaches to teaching.

Four different categories were outlined on the basis of the question on conceptions of learning, and five corresponding categories, plus one separate category was created regarding the applied task, which intended to provide some information on the approach teachers would take in an imaginative example. There was some overlapping between conceptions and approach, so that teachers defining learning as adding or understanding content seemed to emphasise teacher-centred ways of facilitating student learning. Teachers defining learning as change or creation of new knowledge however, suggested student activating ways of promoting learning.

When relating conceptions and approach to teaching strategy however, no co-variation was found. Also, a mismatch was found so that even though a fourth of the respondents



had conceptions of learning that tentatively could lead to activating strategies, only one out of eight actually reported that they applied activating strategies to create opportunities for meaning making and application for students.

#### **STUDY IV**

The purpose of this case study was to describe the process of a collaborative project aimed at increasing educational quality in a basic science department and how what happened in the project seemed to contribute to the development of a community of practice to include teaching and learning. The case study is analysed according to the theory of communities of practice and suggestions are made on how educational developers can work strategically as dialogue partners to empower departments into a process of educational development.

This study, which is focused around the story of the case, as told by the educational developer, aims to explore how teachers' thinking on learning can be developed to be an integral part of a community of practice. Indicators of change are suggested as a framework for developing a community of practice. The way teaching and learning was discussed and approached are discussed as well as the activities that were employed. Does change in how you talk about education automatically change how you do education?

The criteria of mutual engagement, joint enterprise and shared repertoire for the establishment of a community of practice were not entirely fulfilled. Hence, the results suggest that this intervention can only be seen as the possible start of the building of a community of practice around teaching and learning. The role of the broker was defined as central for this development, and in this case the role of broker as a 'pair', the director of studies and the educational developer, was emphasized because of the negotiation of meaning that results from such a collaborative process.

It is suggested that teachers' thinking about teaching and learning can be seen as influencing the community of practice. That is because it is in the interaction between the members of the community that change in the joint enterprise of the community of practice takes place. Indicators of change that may be taken into account when developing a community of practice are dependent on what kind of 'academic tribe' the community of practice is. In this case, it is that of a hard discipline, and it was evident that the informal ways of communication associated with this culture (Becher, 1989) were trusted as incentives for change.

#### **CONCLUSIONS FROM PROJECT II**

Project II applied a social theory of learning (Community of Practice) to improve the educational efforts of a department and the development of its members within this. The questionnaire results revealed inconsistencies between teachers' conceptions of learning and their practice as teachers (study III). This mismatch may be discussed in terms of theories-in-use and espoused theories (see below), but may also be a matter of identity and enterprise as emphasized in the theory of communities of practice.

The support of educational development within a department is a major task for educational developers. By working collaboratively as 'pair brokers' using different interventions, to make educational issues visible within a department, it is argued that this provides for the opportunity to create a joint enterprise around education. In the context of educational development the theory of communities of practice is of importance because it helps us to see and analyse the learning that goes on within different communities of practice and possibly helps us to understand why some communities may be more or less ready to take on board and negotiate meaning around issues of teaching and learning.

## **DISCUSSION**

### **CONCLUSIONS OF STUDIES**

The current thesis set out to find out how to enable teachers in a medical educational context to develop their practice in a context where the paradigm within which I am working as an educational developer is often quite different from the paradigm within which they are working. In Project I (studies I & II) this is undertaken by trying to find out how teachers think, and to investigate the conditions for teacher development. However, it became apparent that the influence of context on thinking is ever present. For example the acquisition metaphor that was found to underpin the core curriculum was perceived as influencing the goals of teachers. Therefore the theory of communities of practice was used as a framework for interpreting and understanding certain aspects of my findings.

Project 1 provided an understanding of the conceptions medical teachers hold of learning, and more specifically of the development of expertise and what strategies they use to support their students in this. It is suggested (study I) that a richer view of expertise includes both the acquisition and the participation metaphor (Sfard, 1998). However the view of expertise emphasized by medical teachers is oriented towards the acquisition metaphor rather than the participation metaphor. It is suggested that such an outcome is typical for the paradigm within which medical teachers are acting.

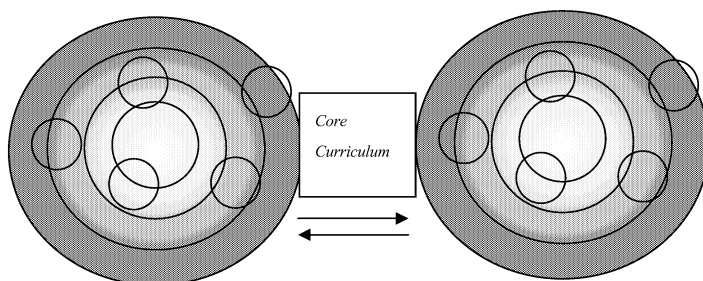
The focus on the acquisition metaphor also highlights the tension between formal/ declarative and informal/ procedural knowledge, or explicit theoretical and tacit practical knowledge emphasized by focusing on the problem of transfer in study 2. The problem of transfer was acknowledged by most teachers in the study and conceptualised as a problem of retrieval of knowledge rather than of a change in context. These ideas reflect a view of learning favouring formal, theoretical knowledge, which is common in conventional research oriented universities (Eraut, 2000). When applying a more practice oriented and integrated curriculum, as is often the case in problem based curricula (Norman & Schmidt, 2000), ideas of experiential learning and reflective practice are integrated in the philosophy of the learning cycle.

It is my interpretation that the focus on theoretical knowledge also is an expression of the acquisition orientation fostered within the positivistic paradigm and could be a way of expressing the identity of the practice of medical education, an issue that will be discussed in more detail below. In line with others (Hager & Gonczi, 1996) I suggest graduate educational programs that involve practical knowledge, as is the case with the undergraduate medical curriculum, should include the idea of integration between basic science knowledge and clinical practical knowledge to facilitate transfer. However, the transfer problem is not only a problem for students; it is also significant in understanding how teachers 'transfer' their conceptions to their everyday practice, an issue that was investigated in study III.

Paradoxically, the problem of transfer also stems from an acquisition metaphor of learning, since it views knowledge as something that can be implanted in the mind and then transferred and applied in a different context. To bridge the acquisition metaphor and the participation metaphor within teacher development, it is suggested that teachers

need to be engaged in communities of practice around the interpretation and implementation of the core curriculum. Then integration and support of the development of expertise in both the acquisition and the participation sense is aimed for. In this way the core curriculum becomes a ‘reification’, in other words an object that can carry meaning and an agent that has an influence on practice (Wenger, 1998). Through this reification it may also be possible to actualize participation as a goal of teaching and learning to promote a discourse on the integration of basic science and clinical learning. It is therefore suggested that the core curriculum needs to be integrated into the dominant discourse. However, the core curriculum must become a reification for the teachers who teach its content and who apply it, and not just for those who created it. It must become a ‘boundary object’ (Wenger, 1998) for the teachers who will use it. This requires discussion. As a boundary object the core curriculum can serve as a way of enabling communication across different communities of practice in, for example different departments and different parts of the medical program. The core curriculum could therefore trigger the negotiation of meaning around issues of learning and teaching (see figure 3).

Figure 3: Core curriculum as a boundary object for different communities of practice



In Project I context was emphasized in relation to the conceptions and strategies of *individual teachers*, whilst a shift to emphasise *teachers as a community of practice* was made in Project II. Thus Project II set out to understand the development of teaching within a community of practice. This was undertaken in the context of a collaborative project where an educational developer (myself) had the opportunity to collaborate with somebody within a department who was trying to develop a learning organization, or in my view a community of practice around teaching and learning. Within that context the experiences from Project I were applied to support an intervention as a way to try to establish an educational discourse, and the idea of the questionnaire as intervention to influence teachers’ thinking (study III) was adopted. However, other things were going on that I was not in control of, and that revealed something further about the process which was much richer than I had anticipated. Hence the decision to write it up as a case study to document these aspects and to learn from what happened in the project. However, Project II did not only mean a shift in focus but also a methodological shift (see below).

The results from the questionnaire showed that teachers’ conceptions of learning did not match their intentions to activate students during instruction and hence, the

assumption that conceptions of learning, and teaching practice, are aligned was challenged (study III). From a cognitive perspective a distinction was made between what Argyris & Schön (Argyris & Schön, 1974) called theories-in-use; that are implicit in what practitioners do, and espoused theories. Theories-in-use influence behaviour but are tacit and contain assumptions about self in relation to the environment. The way we talk about what we do, or what we would like to do, are called 'espoused theory'. When asked about what we do or would do, for instance in a teaching situation, the answer is the espoused theory of action, whilst the theory that actually governs teachers' teaching is his or her theory-in-use. The results from the questionnaire could be interpreted as a mismatch between theories-in-use and espoused theory.

From a social learning perspective however, the results could indicate that teachers' beliefs about learning and teaching are contextualised and influenced by the disciplinary tradition of how to view knowledge, for example within the epistemology of that discipline. Also, other aspects of the context in which teachers are working, for instance the core curriculum and the learning objectives outlined, may influence conceptions, as well as practice. These ideas lie behind the initiative to use the questionnaire as an intervention in a context which focused on teachers as a community of practice, and how such interventions can enable a development of the joint enterprise, the goals of the practice of the community, to include teaching and learning but also to influence the identity of its members.

#### *Identity in Communities of Practice*

A main focus of the theory of communities of practice is the emphasis on the identity of the members within a community. Identification depends on a number of factors, one being the hierarchical value of different positions within academia. This could explain why only a third of the respondents considered teaching to contribute to their career (study III). Possibly, this meant members of the community of practice identified themselves as researchers rather than teachers. If it is more desirable and valued by the larger community, the university, to be a researcher than a teacher, more people may identify themselves as such. Wenger (1998) calls this 'identity as negotiated experience'. It is not only what *we* think, or what *others* think about ourselves that construct our identity. "*Identity in practice is defined socially [...] because it is produced as a lived experience of participation in specific communities*" (p.151).

A main issue for this thesis was to find out feasible strategies for enhancing communication across paradigms. It is suggested that educational developers need to acknowledge the identities with which we are working/ involved in. There is a need to understand not only the conceptions and practice of teachers, or if they identify themselves as teachers or researchers, but their identity as influenced by the context, the research paradigm and epistemology they work within as well as their community of practice.

Within research based universities, identity as a researcher can naturally be considered very strong. It can therefore be useful to build on the research identity of teachers. By engaging with their existing identity, room is left for negotiation of identity, leading to the possibility for discussion based on educational issues. However, we need to find

allies within the community to call on their identity. These allies need to have credibility and legitimacy as members of the community. The pair broker model suggested in Project II, where the educational developer paired up with a member of the community of practice, is suggested to provide such opportunities.

The purpose of teacher training courses for teachers in higher education could be seen as building the identity of academics as teachers, as well as widening the perspective of individual teachers to see other communities of practice and hence perhaps educate brokers that can bring some of what they have learned and seen into their own communities of practice. However, for successful educational development I suggest we need to go further than teacher training courses. Going back to the main objective of this thesis of how to work with teachers' contexts of practice, I suggest one way of doing this is by working with academics' current identities as, in this case –researchers - to influence a) the enterprise they invest in and b) eventually the patterns of participation in educational development activity.

### *The Enterprise*

The community of practice defines enterprise as not in a vacuum, but in the context in which it works (Wenger, 2007). If, as educational developers, we want to influence the joint enterprise of a community of practice to enhance educational quality, there is a need to enable members to redefine their context, and to engage the leadership in the construction of this redefined context. In Project II the interventions served as efforts to promote such redefinitions of the context. These interventions - the questionnaire, the future workshop and the new seminar questions (study IV) - provided a context that the members of the community of practice responded to and hence led to discussion and re-negotiation of the enterprise. This re-negotiation was interpreted as a start of a new joint enterprise around teaching and learning. It is suggested that educational developers cannot redefine the enterprise for the community of practice, or even expect certain results of an activity. However, by providing an accessible context the range of possible interpretations and negotiations of that context may be influenced. A first step is therefore to make teaching and learning available in the tea-room; meaning that by provoking teachers a little bit they may be more inclined to discuss something, but also, by taking the common language, in this case the language of the paradigm and the existing joint enterprise into account, teaching and learning may more easily become an issue of discussion and negotiation. It does not in this way remain strange and distanced. If teaching and learning is approached in a way that is familiar to the members of the community of practice the enterprise could in this way be changed. One way forward might be scholarship.

### **Scholarship of Teaching and Learning**

Over the past 20 years the question of what constitutes high quality teaching has been discussed (Biggs, 1996; Entwistle, 1998; Ramsden, 1992). More recently, however, an agenda focusing on teaching as scholarship has arisen. Ernst Boyers' work 'Scholarship Reconsidered' (1990) marked the starting point for this debate. Boyer suggested that teaching is an activity that is influenced by the larger whole of academic work. Boyer emphasises that scholarship should be part of all academic work and suggests there are four separate but overlapping areas of scholarship: the

scholarship of discovery, integration, engagement (previously application) and teaching. These areas could be compared with the experiential learning cycle (Kolb, 1984). The scholarship of discovery concerns the traditional view of empirical research which compares with concrete experience. The scholarship of integration concerns reflection and putting new knowledge into a larger context; the scholarship of engagement means an outward direction for the purpose of emancipation; and the scholarship of teaching means the engagement of future scholars (students) into the learning of what has been found.

The idea of scholarship of teaching and learning has largely been embraced by higher education institutions as promotion criteria for teachers and/ or academic staff (Trigwell et al., 2000). The shift to a scholarship of teaching view of teaching suggests a change from teaching as an isolated activity, to one that requires communication and dialogue within a community. In this way becoming scholarly suggests a move from informal inquiry about teaching and learning to more formal approaches to inquiry (Andresen & Webb, 2000) as a way to secure quality for the publication of such knowledge to the larger community of scholarly teachers through peer reviewed journals or conferences. From a critical perspective however, the validity of quality teaching is more about whether the scholarship of teaching has made a difference to the teaching of teachers and hence, the learning of students, than whether it is peer reviewed (Kreber, 2005).

A focus on the Scholarship of Teaching and Learning also means a shift from focusing on instrumental outcomes, to focusing on process (Wenger, 2007). That is focusing on conceptions and approaches to teaching rather than on teaching method. Hence the understanding of teaching and learning phenomena – what teachers are trying to accomplish and why – is emphasized rather than the teaching methods. This emphasis assumes, however, a relationship between teachers' approach and their practice, i.e. that practice follows from approach, an assumption that I find problematic (study III). If the Scholarship of Teaching and Learning is approached from an action research perspective as in Project II, approach and practice are linked because of the emancipatory purpose of such research. Kreber (Kreber, 2005) suggests that a critical paradigm would widen the perspective on Scholarship of Teaching and Learning to include different forms of knowledge, such as procedural and declarative because the purpose of scholarship is aimed at praxis, where reflection on phenomena is an important prerequisite for change (p. 397). Similarly I suggest in this thesis that the assumption that practice follows from approach and conceptions of learning, which was an assumption in Project I, stems from a research paradigm where teaching and learning is made into an object, and the instrumental validity of relationships between teaching and learning become more important than the enhancement of teaching and learning. However, within an action research approach this issue may be solved through the striving for improvement and change in interaction with the context. Instead of focusing on conceptions of teaching and learning as causing a certain approach, the paradigmatic nature of the context may be acknowledged as influencing teachers' thinking and their strategies for teaching. Since educational developers aspire to contribute to change processes it may be in their interest to conduct action research where the focus is on practice in context, and in this way, to take on a scholarship of educational development.

The community of practice of educational developers is often viewed by university management, as well as by other communities of practice within the university, as separate from the enterprise of the institution - doing research, educating students and informing society. Specifically, this is the case in universities where educational development is viewed as a personnel service concerned with staff education rather than in institutions where it is viewed as an area of research (Boud, 1995). This reduces the legitimacy of educational development practice in relation to other communities within a higher education institution. A catch 22 situation is thus created for educational developers in working with the development of identity and the joint enterprise of academic communities of practice. To be able to support and develop educational quality from a holistic perspective, educational developers need to be made part of the communities of practice that possess that legitimacy. Alongside the idea of linking the enterprise of teaching closer to the identity of researchers, is the idea of a shift in focus for educational developers so that they may become part of the scholarly community of practice by taking on a scholarship of educational development. In other words I suggest it is not enough for educational developers to conduct action research that is only aimed at the local community. To become part of the scholarly community of practice we also need to engage in research that is peer reviewed and spread to a wider public.

### **Scholarship of Educational Development**

Whilst Boyer's categorisation of scholarship is used by many, others feel that a clear distinction between excellent teaching and the scholarship of teaching was lacking. Hutchings and Shulman (Hutchings & Shulman, 1999) suggested that the scholarship of teaching involves four additional attributes; a) being public, b) open to critique and in a form that others can build on and involves c) inquiry and d) investigation around issues of student learning. These attributes also apply to scholarly educational development (Macdonald, 2003).

A significant issue raised by Sarah Mann (2003) is whether the scholarship of educational development should be evidence-based, that is informed by published theory and research. Similar to Wenger's (1998) definition of practice, she suggests that "practice emerges in the here and now and is inextricably bound up with who I am, what I believe, what I value and what I know" (p.80). In a similar fashion to how teachers are influenced by context in how they interpret the core curriculum (study I), she therefore argues that educational developers interpret evidence in context. In this way, evidence cannot be taken as self-evidently a prescription for practice. Decisions about practice and the interpretation of relevant evidence have to be grounded in a clear articulation of educational philosophy and value. I suggest that Mann's concerns are of a paradigmatic nature. If evidence is only referred to as empirical research that has been found in studies that assume a cause-effect relationship similar to the ideas that were governing Project I, I share her concern. The idea that research and development projects should transmit their findings to users who will then go ahead and apply them have been heavily criticized (Murphy, 2003). When research instead is carried out with the purpose of making an impact on practice, as in action research projects such as Project II, shortcomings have been identified as them being too small scale and local and hence lacking in robustness. However, I suggest that there is much to learn from these action research projects. They need to be peer reviewed and disseminated to other practitioners with an awareness of the context in which they were originally implemented. To become more robust as research projects,



acknowledgement of these projects as demanding research funding, and collaboration with people who are well acquainted with social scientific research methodology is required.

The focus on scholarship could be an approach that is aligned with the third metaphor of learning, the knowledge-creation metaphor, a suggestion put forward for the linking of the acquisition and the participation metaphor (Paavola & Lipponen, 2004). The third metaphor of learning emphasises collective knowledge creation for the development of shared objects of activity. I suggest this idea comes close to that of Wengers' in that reifications may influence the negotiation of meaning. However, the knowledge-creation metaphor emphasises more clearly the direction towards the advancement of knowledge that these objects of activity may provide. Also, the knowledge-creation metaphor acknowledges the individual pursuit of knowledge creation, and as such provides guidance to work for the collective as well as individuals towards advancing knowledge.

## **METHODOLOGICAL CONSIDERATIONS**

At first sight, Project I looks as if it is based in traditional educational research where the researcher distances themselves from the object of research. This approach implies certain strengths and weaknesses. One strength is the advantage of seeing and hearing things for the first time, for example by not having a previous relationship with the interviewees in Project I, and without having established preconceptions concerning the data that could influence ones interpretations. The study is restricted in amount of data collection (interviews and document analysis) and the risk of data overload is therefore limited.

However, whilst the interviews with surgery teachers were carried out by me, the interviews with anatomy teachers were carried out by a surgeon who was becoming involved in anatomy teaching, responsible for a module on the anatomy course. This situation provided valuable access to additional information, and opportunities for clarification of the interview data within Project I. This was valuable when constructing the interview guide but naturally it could have influenced the outcome of the interviews. However, the coherence in the teachers' responses seems to indicate the credibility of the findings.

The advantage gained by involving the surgeon in Project I is that the studies published have greater credibility and have therefore been used in the development of the new core curriculum of the medical undergraduate program at the university. As such, this has informed practice by promoting integration and communication across the disciplines involved.

The selection of interviewees in Project I is another issue. Would the outcome of the first two studies have differed significantly if the interviewees had been microbiologists and clinicians of internal medicine instead? In the light of a socio-cultural perspective, this may be the case. The way the interviewees expressed their ideas, as well as the content, might have been different because of the influence of their context. However, in discussion with colleagues and in other interviews with teachers from other

disciplines than surgery and anatomy, as well as in comparison with previous studies in this field, key conceptions of what was expressed in the interviews seems to be valid.

A disadvantage of a traditional qualitative approach where conceptions and meaning is investigated in interaction with people concerns the relationship between researcher and researched. By distancing oneself as a researcher from the researched, the researcher takes no responsibility for the effect that for example an interview has on the person interviewed. In hindsight, I realize that the process of interviewing teachers had an influence by raising their awareness of how they think about their practice. This was evident from the interviewees, who all thanked the interviewers for a very interesting interview. This was an important outcome of Project I which fed into the design of Project II. Wanting to be more strategic in the pursuit of educational development, I considered the need to be more involved.

In Project I the purpose was to remain decontextualised. By entering the research field to find out something that could support my educational development practice, and therefore eventually lead to their educational development. The purpose of the second project was rather to work within the context of practice, where *one* purpose was to gather data, but to gather data that itself forms an intervention into the immediate context of practice.

## CONCLUSIONS

The current thesis set out to investigate how educational developers can work strategically with change to develop quality at higher education institutions in general and in medical education more specifically. The overarching questions that were investigated and discussed in this thesis are:

- What are feasible strategies for enhancing communication across paradigms?
- How can educational developers work with teachers in their contexts of practice?

The context in which medical teachers' practice is influenced by the research paradigm of the discipline. As is the context in which educational developers work. In the natural scientific and often heavily research focused context where the teachers in the current study work, the acquisition metaphor of learning is emphasized. Hence, the view of expertise held favours an emphasis on the achievement of content and competences rather than a view where learning is understood as participation in a community of practice, which requires the negotiation of meaning, value and attitude - issues that are seldom explicit. So, for instance, it was found that their interpretation of the core curriculum limits the goals teachers have and how they actually carry out their teaching.

Rather than being just a policy document, it is suggested that the core curriculum becomes a reification, a tool for actualizing participation as an integral part of the development of student expertise. Most teachers in the studies reported in this thesis perceive problems regarding the student learning, but they often do not know what strategies to use to help students overcome these problems, other than those based on common sense knowledge. By integrating core curriculum in the dominant discourse, the core curriculum can work as a boundary object, bringing teachers within communities of practice at different levels of the medical program together around issues of integration in the medical curriculum, an issue that was defined as important for overcoming the transfer problem.

I argue that a prerequisite for the development of teaching practice is the development of communities of practice around teaching and learning. Teacher training courses are important as they provide opportunities for learning and reflection, but to work strategically educational developers also need to work within teachers' context. If communities of practice are developed around teaching and learning, educational issues may become an enterprise, a goal of the community, which could enable teachers to integrate formal and informal knowledge of teaching and learning. All teachers have informal theories of learning and teaching, based on their experiences of being experts in learning, but until those theories are integrated with the formal knowledge base of teaching, teachers will use their informal knowledge, and thus behave like amateurs, however gifted, rather than professionals (Boulton-Lewis et al, 1996). I argue that effective educational development should assist teachers to achieve an integration of formal and informal knowledge of learning and in that way develop expertise in teaching so that conceptions of learning are aligned with teaching practice.

The ‘pair broker’ – model is suggested as a way to develop communities of practice. Through working with a member who has legitimacy within a community of practice, the enterprise – the joint goal of the community of practice – could be influenced to include issues of teaching and learning and patterns of participation in educational development activity.

Additionally, communities of practice may be developed by acknowledging that the identities of teachers they work with, are influenced by their research paradigm. It is not enough to focus on changing teachers’ conceptions of teaching and learning to influence their practice.

Scholarship of Teaching and Learning is suggested as a feasible strategy for enhancing communication across paradigms. Firstly, the application of a scholarship approach can call on the research identity of many teachers within traditional research universities. Secondly, when working with the development of teaching and learning, it is essential to clarify whether educational developers’ identify themselves inside or outside the academic communities within which they collaborate. It is suggested in this thesis that educational developers should undertake a scholarship of educational development, and therefore emphasise their role as academics.

I argue that the scholarship of educational development should be undertaken through an action research approach. It is not feasible to rely on the implementation of research results where the researcher is distanced from the research object, and hence does not take responsibility for the enhancement of teaching and learning. An action research approach involves the researcher in a process of inquiry that aims to take action to improve quality. The credibility and robustness of action research projects could be enhanced by collaboration between educational developers and experienced social scientists.

There are micro and macro findings that come out of this thesis. At a micro level, I have learned something about how medical teachers conceptualize learning, and what strategies they employ to support student development. Also, the self evident link between teacher thinking and teacher practice is challenged. At a macro level, suggestions are made on how we can be more strategic when it comes to practicing educational development across the paradigms within which we need to collaborate. These suggestions describe a shift of focus which stems from what was learned from Project 1 and Project 2 at a theoretical and methodological level (table 1).

*Table 1: Shift of focus as suggested as a conclusion of Project 1 & 2*

		<b>Project 1</b>	<b>Project 2</b>
Theoretical	Metaphor of learning	Acquisition	Participation
	Core curriculum	As policy document	As boundary object
	Theorising teacher thinking	Conception	Paradigm

Methodological	Focus	Individual	Community of practice
	Data collection	As neutral	As intervention
	Relationship between researcher and researched	Subject - Object	Subject - Subject

To work strategically with educational development in a context that involves more than one paradigm, I therefore suggest this thesis has methodological implications that answer the question of how educational developers can work with teachers in their context of practice, and theoretical implications that answer the question of why we should work in this way. Methodological implications concern a) a focus that does not only emphasise the individual in relation to context, but also the community of practice in relation to context; b) that a scholarly approach to educational development is taken where intervention rather than neutrality serves the purpose for data collection, and therefore c) the researcher necessarily acknowledges and establishes an inter-subjective relationship rather than an objective relationship to the researched, and thus engages in an action research process.

The theoretical underpinnings of these conclusions are based on the importance of seeing that in the medical context, acquisition seems to outline the metaphor of learning construction and the acknowledgement of conceptions of learning and teaching as an integral part to the epistemologies as influenced by the paradigm in which teachers work. However, by adding a participatory perspective to this acquisition orientation, teachers can be encouraged to form communities of practice around issues of education, in which they can critique the goals of education, amongst other things. In this way, the core curriculum can be turned into a boundary object and work as a reification for actualizing participation and integration across paradigms.

The role of educational developers in this process is to collaborate with key members of such communities of practice to influence the context through interventions. More specifically, educational developers could focus on the stimulation of a certain approach, that is a Scholarship of Teaching and Learning.

In the light of the title of this thesis, ‘learning across paradigms’ it is essential for educational developers to problematise the different paradigms that they need to work within to be able to push the frontiers of knowledge and practice forward. Not only should educational developers foster a scholarly approach amongst teachers by facilitating the development of the Scholarship of Teaching and Learning, educational developers need to investigate their own practice through a Scholarship of Educational Development. In this way, they become brokers of scholarship to inform their own practice and that of the teachers they are working with and may also resolve the tension between the acquisition and participation metaphor by emphasizing the knowledge-creation metaphor.

## APPENDIX: INTERVIEW GUIDE FOR PROJECT I

- **Background questions:** Please tell me about your teaching. What and how do you teach? What is your role as a teacher? How do you like teaching?
- **Teaching goals:** Goals with your teaching? Are these achieved? How do you know that? The relationship your goals – core curriculum? Are the core curriculum goals achieved by students? How do you know that? Are these goals assessed? How?
- **Teaching design:** How is your teaching planned? Designed? How would you describe anatomy/ surgery studies to somebody who will just enter the medical program?
- **Learning and teaching:** Advice to a student on how to best learn during the course you are teaching? Difficulties in your discipline or the teaching situation? For yourself to teach? For students to learn? What is effective learning? How do students learn? How do students study for the current assessment in your discipline? How do you learn best yourself? Does the anatomy studies contribute to students' success in term 8, where they learn surgery? How and why?

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Klara Bolander Laksov



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# Teachers Promoting Expertise in Medical Education: understanding the role of the core curriculum

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**ABSTRACT** *The aim of this study was to investigate the relationship between the learning outcomes expressed in the core medical curriculum at a Swedish university and how these were interpreted by, and related to, teachers' teaching goals. Additionally, we wanted to find out how these teaching goals relate to the development of expertise, a key value in medical education. Semi-structured interviews were conducted with teachers in anatomy and surgery, which is taught in the first and fourth years of the medical programme. To be implemented, a curriculum has to be interpreted by teachers, and this can lead to a mismatch between curriculum intentions and teacher goals. Hence, it is necessary to provide guidance as to whether the application of a core curriculum should be focusing on content only or include socio-cultural ideas of learning encouraging an emphasis on process. The degree of teacher involvement in the design of the core curriculum seems to clarify the role of the core curriculum to teachers and students and certify its actuality and relationship to other courses.*

## Introduction

Since the 1990s the problem of curriculum overload has increased drastically. For instance, from the moment students enter a medical programme until they graduate the amount of information available to the healthcare professions will have increased drastically (Harden, 2001). As a reaction to this situation, the idea of developing clear objectives has been put forward in policies and principles such as the *Bologna Declaration* and the World Federation of Medical Education (WFME, 2003) *Global Standards for Quality Improvement in Basic Medical Education*. The *Bologna Declaration* has encouraged all European universities to reflect on their core curricula, i.e. the essentials that university students should learn during their studies. The process of curriculum design and how core curricula are interpreted and implemented is crucial from this perspective. The latter is considered in this paper through an investigation of the relationship between medical teachers' goals and their interpretation of the learning outcomes expressed in the core medical curriculum. The core curriculum in Sweden is independently designed by each university and not imposed by a

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regulatory body, as in many other countries. The purpose of this investigation was also to understand how teacher goals and the core curriculum relate to the development of student expertise.

### Development of Expertise

Studies on expertise suggest that the development of expertise in any domain calls for qualitative changes in the way people think (Chi *et al.*, 1988). Novices do not just have less knowledge than experts, they use knowledge in a different mode than experts. Experts are able to not only recall more when asked to solve a problem, they recall other facts; they perceive and process symptoms and signs as integrated concepts rather than individual items. Much research has been carried out on medical expertise, and this has convincingly demonstrated how experienced physicians operate using mental representations that are clearly different from those of novices and students. These expert knowledge structures are described as illness scripts that emerge from continuing exposure to patients and their wealth of clinically relevant information about disease (Schmidt & Boshuizen, 1993; Patel & Kaufman, 1995; Rikers *et al.*, 2005).

One view within medical education is that biomedical knowledge is necessary before developing clinical knowledge. However, based on the research showing how novices and experts differ in their use of biomedical knowledge (Rikers *et al.*, 2000) the view that clinical and biomedical knowledge are two separate areas of knowledge that require their own ways of reasoning and their own mental representations (Patel *et al.*, 1989) has developed.

The idea of knowledge encapsulation presented by Schmidt and Boshuizen (1992) stands between the two positions described above. It assumes that biomedical knowledge does play a role in the development of how practitioners apply clinical knowledge. However, biomedical knowledge does not in itself constitute a sufficient condition for bringing about effective transfer of that knowledge to clinical settings. Instead, through practice and application of biomedical knowledge in a clinical context, networks of biomedical knowledge turn into mental representations that are encapsulated into clinical concepts and that have a meaning in that context and, thus, are learned and remembered.

The notion of knowledge encapsulation corresponds well with the aims of medical education according to the WFME (2003), which includes the integration of basic sciences and clinical sciences in the curriculum. This idea is referred to here as integrated competence (Hager & Gonczy, 1996). Integrated competence constitutes a holistic view of the treatment of the patient, in which scientific thinking, knowledge of behavioural science and ethics is integrated with clinical knowledge, and is viewed as a key aspect in the development of expertise.

Studies in expertise, as described above, only account for one perspective on learning experience, which is a cognitive view of learning: they focus on what goes on inside the head of each learner. We argue that research on expertise is oriented towards what Sfard (1998, p. 6) has defined as the 'acquisition metaphor'. Acquisition metaphor refers to the view that knowledge is a 'commodity, applied, transferred (to a different context), and shared with others'. In other words, learning is the process of turning concepts into someone's private property, and the teacher's task is to help the student in this process of acquisition.

These views are significantly different from the views that can be summarized using the 'participation metaphor'. This metaphor derives from a social view of learning, which

suggests that knowledge does not exist apart from human beings and, hence, cannot 'be achieved' in such a way that there is an end point to learning. Learning is seen as a process that is embedded in action and the context in which it takes place. The participation metaphor focuses on how learning is developed in communication through social discourse with other professionals in a community. Social discourse includes not only communal conversations between professionals, but also the values underlying the discipline. Learning is about being part of a whole, and the role of the teacher is to be the maintainer of the continuity of that community.

Sfard (1998) concluded that both metaphors are needed to carry out practice (teaching and learning) and research satisfactorily; that there is a danger in choosing just one of the metaphors. Hence, the approach to the development of expertise is here widened to include a socio-cultural perspective.

The view that learning is also participation in a community of practice (Wenger, 1998) describes expertise as a process through which novices progressively become experts as they move from the peripheral to the central part of the community of their chosen profession. This process requires active participation as a way of learning and suggests that the acquisition of tacit knowledge is context dependent (Pratt *et al.*, 1998). From the perspective of communities of practice learning is seen as a socialization process through which professional identity is constructed by integrating formal knowledge (i.e. knowledge learned from books) with informal or tacit knowledge (Eraut, 2000). Students who are becoming doctors construct their identity by learning to mediate their activities by using artefacts that are typical of the profession, physical artefacts such as a stethoscope and conceptual artefacts such as taxonomies and Latin names for diseases. For instructional purposes this would describe an apprenticeship model in which students gradually become active participants in a specific community of practice and are seen as junior colleagues by more senior colleagues, who are role models, within that community (Irby, 2003).

So far, two perspectives on the development of expertise have been discussed. These lie within the acquisition metaphor and the participation metaphor. How teachers interpret their core curriculum and how their personal goals of teaching match or mismatch the learning outcomes expressed in the core curriculum could be interpreted in relation to the view that the development of expertise should include both the acquisition metaphor, such as integrated competence and the development of knowledge structures, and the participation metaphor, which includes the developmental and social aspects of learning. If this is what medical education should aim for it is important to find out how teachers interpret the core curriculum, what their personal espoused teaching goals are and, specifically, what implicit ideas of expertise are contained within these goals.

### Definitions

The terminology of the purpose of education is somewhat ambiguous, especially for people who are not from within the educational field. It is, therefore, important to make clear the use of key concepts to the reader, as well as how these concepts relate to the everyday language of the teachers who were interviewed.

When discussing teaching the term 'aims' is used to express the overall direction of student learning, the broad intentions of teaching—what it will lead to. To achieve these aims teaching staff set objectives for what they would like students to achieve. These objectives could be influenced by the learning outcomes expressed in, for instance, a core curriculum, which are stated as outcomes that students must achieve.

In Swedish there is only one word for goals, objectives and learning outcomes, 'mål'. For a lay person, even aims and purpose are often equivalent to 'mål'. Since 'goal' is the word that we think includes more of the meaning of 'mål', we have decided to use the word 'goal' in this paper when talking about what teachers want to achieve when they plan and carry out their teaching. Also, 'goal' captures something belonging to teachers, rather than to educational jargon.

### **The Study**

This study was introduced because of one anatomy teacher's concerns about how the current teaching and learning of anatomy fitted into the medical programme in supporting students to become physicians. Having consulted the literature on the development of expertise, it was considered interesting to investigate the relationship between what has been said in the literature and teachers' goals in teaching anatomy and in teaching a subject that logically builds on anatomical knowledge, surgery.

#### *Setting*

The context of the study was a Swedish university where clinical and pre-clinical studies are clearly separated within the 5 year long medical programme. There is no consistent educational philosophy at the university. Instead, teachers have the freedom to choose an educational approach that they like. This means that even though a large part of the medical programme has a traditional approach with lectures and seminars, there are individual teachers who apply case-based teaching or problem-based learning in one course module, whilst another course module might be 'flexible', where computer resources and web-based learning platforms are used to support learning.

#### *Participants*

The teachers involved in the study were teachers of first year and fourth year medical students. The teachers of first year students were full-time researchers at the department of neuroscience giving lectures approximately six weeks per year in anatomy. The teachers of fourth year students were full-time clinicians dividing their time between teaching in surgery, research and clinical work. These teachers use a variety of teaching methods, from lectures, to seminars, bedside teaching, clinical supervision and problem-based learning. Interviewees currently involved in teaching were selected, ensuring an appropriate gender balance.

#### *Methods*

It was assumed that teachers' ideas on how to develop expertise would be implicit in their teaching goals. It was, therefore, important to ask teachers what their goals were when they were planning and carrying out the teaching of their subject. The intention was also to see what they interpreted as their role (in relation to the core curriculum) and to see whether or not they were aware of, and influenced by, the core curriculum.

A content analysis of the core curriculum documents in anatomy and surgery was carried out to see what views of expertise were implicit in the expressed learning outcomes. The core curriculum was read and examined for consistencies and inconsistencies with the

expertise concept. The purpose of the study was, however, not to evaluate the core curriculum at the institution, but to use the analysis as a context against which to better understand teachers' conceptions of it.

It was assumed that teacher goals could be described in several ways. It was, therefore, important to ask questions from a range of different angles to reveal teacher goals, implicit conceptions of how expertise should be developed and how goals related to their subject core curriculum. For example, teachers were asked to tell the interviewer about their teaching, how they designed it and why they designed it in that way. Also, they were asked to describe how they saw their role in this design, what they considered important in teaching, what they emphasized and if, and possibly how, they related their teaching to other subjects the students had studied or would study within the programme. Finally, some specific questions about goals were asked, such as what they were, whether their personal goals coincided with the goals expressed by the institution, the core curriculum, and whether they thought the goals were realistic or not.

Data were collected through individual interviews with four anatomy teachers and six surgery teachers. This represented all the anatomy teachers and all the teachers of surgery at two hospitals used for clinical training in surgery with responsibilities for curriculum design and assessment in each discipline. The interviews were semi-structured, allowing the teachers to elaborate on topics that they found interesting. The interviews lasted between 60 and 100 minutes. With permission from the teachers, the interviews were tape-recorded and later transcribed in full.

The interviews were carried out in Swedish and the quotes in the Findings section have been translated into English to capture the meaning expressed.

### *Analysis*

The analysis is focused on both the core curriculum learning outcomes and on the teachers' goals. Dominant themes in the responses of the first and fourth year teachers' statements were extracted by reading the interviews in total and clustering quotes according to issues that related to questions that illustrated how they had tackled their teaching assignment. The results of the analysis will be presented in relation to the following themes:

1. views of expertise implicit in the learning outcomes of the core curricula of anatomy and of surgery;
2. teachers' goals and views of expertise implicit in these goals;
3. congruence between teacher goals and the core curricula.

### *Limitations of the Research Design*

The literature about qualitative research methodologies contains a number of suggestions for justification and credibility (Patton, 1990; Denzin & Lincoln, 1994; Guba & Lincoln, 1994). Whilst validity and reliability are important criteria for assessment in studies undertaken in the positivist tradition (Patton, 1990), interpretivist traditions of enquiry adopt alternative criteria, such as credibility, transferability, dependability and confirmability (Lincoln & Guba, 1985).

A commonly recommended method to ensure the trustworthiness of qualitative research is to do member checks to validate the interpretations of data with the individuals actually studied (Harris, 2002). In this case, all interviewees were provided with a draft of the article

and had the opportunity to raise any issues that they did not agree with in how their accounts were interpreted. None of the interviewees had anything to add or change. The criteria of credibility can thus be viewed as fulfilled.

The aim of this study was to better understand the relationship between teachers' implicit views of expertise and the core curriculum and thus to provide a basis for future redesign of the core curriculum. Hence, under the criteria of transferability the study is perceived as relevant to anyone involved in the development of educational programmes within higher education leading to a profession. The study is dependable in that the findings are likely to apply at other times, especially where the core curriculum is not regularly reviewed. This study might be critiqued from the point of view that it represents the authors' interpretations of the core curriculum documents and of the interviewees' accounts of what their goals are. This is not the same as saying that these are the goals. Thus, the interview data is not transparent evidence of a phenomenon, but the product of the social context in which it was expressed and interpreted. The investigators have provided the reader with the theoretical basis from which the data has been interpreted to reduce the risk of letting their values intrude on the data and thus keeping to the criteria of confirmability.

## Findings

### *Views of Expertise Implicit in the Core Curriculum of Anatomy and Surgery*

*Anatomy* The core curriculum of anatomy, as well as other pre-clinical courses, is subdivided into sections and designed by different teachers. It is then proposed to a course leader, who presents it to the faculty board, where it is agreed. The core curriculum of anatomy is presented at two levels: situating anatomy within the medical curriculum; as a number of statements of what students should be able to describe, such as subdivisions of anatomical parts of the body. The curriculum also includes a list of body structures and their Latin names, which students are assessed on. About half the core curriculum consists of competencies that students are required to learn, which are oriented towards practical anatomy, such as palpation, percussion and identification of anatomical structures during dissections. Finally, students are expected to be able to identify anatomical structures using different radiological techniques.

Missing from the curriculum are ethical considerations in relation to organ donation, donation of corpses for dissections and death. Also missing is reference to how the curriculum should be implemented, for example the teaching and learning processes that should be adopted. The only explicit tools for learning that are mentioned have to do with radiology and dissection. The use of computer technology or anatomical models (manikins) is not a requirement in this core curriculum. Although there are differences in how the medical curriculum is controlled, by an external regulatory body or as in this case by the local university, traditionally each teacher is free to choose the approach to teaching a given content. The freedom in the approach to teaching is important, however, may require guidelines or pointers in a desirable direction to include the wider view of expertise discussed above.

The view of expertise expressed by this curriculum is therefore one that considers basic science as necessary before developing clinical knowledge. Since there is no focus on how students can develop knowledge structures that are inclusive of clinical knowledge or how anatomy knowledge can be transferred to its clinical context, the view of expertise implicit



in this curriculum does not favour the idea of encapsulated knowledge. Also, the lack of emphasis on the learning process and the social aspects of learning, including ethical considerations, implies the acquisition metaphor view of expertise.

*Surgery* The surgery core curriculum is divided into a number of subcores, representing different specialties; general surgery, urology and orthopaedic surgery. Course leaders from the different hospitals discuss and design a common core curriculum and present it to the faculty board, where the core curriculum is agreed.

No general aim is given for the study of surgical specialties in the core curriculum document, although a list of two kinds of knowledge is provided for each specialty. First, there is a list presented at a very general level, for example to 'know, define, describe and understand pathophysiology'. Second, students are required to know details of specific diseases, such as pancreatic cancer, prostate cancer and appendicitis. There are also skills and competencies listed, some of which are general, such as admitting a patient and writing notes, and others are more specific, such as suturing techniques.

Again, there are no learning outcomes in the core curriculum analysed that focus on attitudes or ethical considerations. For instance, the written curriculum only mentions that one should be able to tell a patient about a diagnosis, not how it should be done (see the explanation above of how the core curriculum of each medical university in Sweden is developed independently). No objectives about how patients cope with physical and psychological stress are included or anything about how clinicians can learn how to handle their own reactions. The verbs used to define what students should learn are rather vague and do not include the process, i.e. how and how well students should be able to do an activity to achieve the learning objectives.

This curriculum, therefore, is similar to that of anatomy. It does not include a view of expertise that embraces integrated competence and the participation metaphor. Although there is a more evident focus on competencies than in the anatomy core curriculum, the competencies are listed in a way that provides no contextual aspects for how this should be carried out. Thus, the focus is on acquisition of content and competencies. Since this part of the medical programme is mainly taught in hospitals (the basic context of practice for medical students) this core curriculum limits the potential for developing the participation metaphor of expertise in the very context where one would expect it to be most appropriate.

Thus the core curricula of anatomy and surgery are more content-oriented than process-oriented and are also focused on the acquisition metaphor of expertise. The implications of this analysis is the fragmentation of knowledge for students, which makes it difficult for them to develop a comprehensive view of the knowledge required for the profession.

#### *Implicit Views of Expertise in Teachers' Goals*

When analysing the interview data a 'qualitative' difference between teachers' goals was identified which could be compared to the concept of 'orientations', as used in the classical studies by Säljö (1975) and Entwistle and Ramsden (1983). The term orientation, which stems from phenomenographic studies, outlines analytical categories 'which include the attitudes, knowledge, aims and action tendencies' (Land, 2001, p. 4) of, in this case, the teachers. The three different orientations to the goals of teaching identified were: content-oriented, competence-oriented and attitude-oriented.

*Content-oriented goals* Content-oriented goals focus on the content to be covered, such as the content expressed in the core curriculum, so that students get an overview of the important content, learn the central issues and pass the examination. This orientation is encompassed by the acquisition metaphor implicit in the acquisition of expertise research described above.

The aspect within the content orientation to teaching most commonly mentioned by both anatomy (A) and surgery (S) interviewees (IP) were to cover the core:

There is this core curriculum, with both practical and theoretical knowledge, and that's the minimum requirement. They are rather basic, but they have to know it. Then if they learn more, it's good, but we have tried not to overload too much. (IP3S)

That students are able to pass the exam with help from the core curriculum and 'structure lists'. (IP1A)

Other content-oriented aspects that appeared in the interviews concern giving an overview of content matter and learning the 'what is common' (IP2S), central issues or a base to be able to build on later. These ideas were also presented by both clinical and pre-clinical teachers.

A main objective is that they should have an idea of, understand and be able to handle the diseases we work with so that they can diagnose the illness and hopefully do something initially with it at least. (IP4S)

Students should learn the content that one could expect during the short period of time [2 weeks] they are at my disposal. I have to cut down the amount of information and give them a skeleton to build on. I keep to the large picture and avoid the details but try to put in clinical knowledge that will do them good. (IP2A)

That students, when they have passed our course, should have a base, a support for continuing education to become a physician. We want them to feel at home with the anatomical knowledge. That it [the knowledge] has been taken in! (IP4A)

Content orientation appeared to vary in degree. For example, at one end there was the view that, 'the aim of my teaching is that students should pass the exam!' (IP1A), whilst others had more elaborated views on content. Some teachers in this study expressed the aim as learning facts, such as the 'list of structures' (IP1A), but there were also interviewees who stressed the importance of understanding knowledge:

We have to try to understand and look at what lies behind the cook books, and why they made the conclusions they did. (IP4S)

I design it [the course] very much according to the principle that they should understand. They should understand the context. This idea that you add a vocabulary by reciting names is not the essential, but to have an understanding for how things look

in three dimensions. Naturally you can't get that understanding without grasping the structures that are there and then the names come with it in that context. I have the ambition to really bring out what is important and differentiate it from what perhaps isn't as important. (IP2A)

Some clinical teachers were concerned that students should be ready to put knowledge into practice when they commenced their internship.

You could say that the fact that one should be able to do the internship is a rather obvious goal. But then the question is how to achieve that goal. (IP2S)

Several interviewees referred to 'a list of things to be taught', such as the core curriculum or the 'structure list' in anatomy, which reflected their content-based approach. In relation to expertise, teachers with a content-oriented approach act within the acquisition metaphor and expertise is mainly seen as a quantitative change in knowledge.

*Competence-oriented goals* Other goals expressed by teachers in the study were to develop competencies that students should learn: a competence orientation to teaching. Some skills were very specific practical skills, relevant for every general practitioner, but some were practical skills particularly relevant to the specific medical speciality the teacher was working within:

On the one hand there is some professionalism that I think they should learn. I think that sewing is something everybody should be able to do; one should be able to sew a small wound as a local GP as well. Then, we must take care of those specialities, abdominal diseases for instance, which they must know. (IP5S)

Other competencies were concerned with skills that students should develop, such as clinical reasoning skills and critical thinking.

The aim is to make sure they can use their common sense when they find themselves in the middle of a situation. To think, 'what should I do?' You don't always have a response to that question when you stand there you know. For instance, if you have a knee case in the emergency room, the students think it's so easy so they stop thinking when they have made the diagnosis. 'But hello? What happens next?' I always say. I try to make them think in a longer perspective, so that they develop a way to make a plan of action in a natural way, that they don't panic but see that there are actually different ways to solve a difficult situation. (IP2S)

What I try to do is to lift it up, to raise the academic level. I mean ask the questions 'What is true? What is not true? Is this really it? Why would it not be like this?' (IP4S)

The quotations above indicate an effort to provide the students with metacognitive tools such that they are able to develop life-long learning, are able to continuously develop their thinking and practice. In this way the teachers also model critical thinking, rather than just

teaching knowledge. This is a move towards the idea of teaching from a community of practice (Wenger, 1998) perspective, as discussed previously.

Another subcompetence, even closer to the idea of the participation metaphor, that clinical teachers frequently mentioned was that students should develop a 'clinical eye', a feeling for how to interpret information that they see and feel, the art of being a physician:

Partly [the aim is] to mediate a particular knowledge, but most of all it is to try to mediate a clinical viewpoint ... The art of being a physician. I experience that they [the students], just like the internship physicians and younger physicians, focus too much on this with lab tests, X-rays and such. And a lot is about the feeling that you get. They can come and ask: 'Can I learn to take sedimentation rate?' Then I say: 'But look at the person, he has no temperature, looks fine, eats and drinks. We don't treat tests, we treat patients! (IP5S)

Exactly what this competence consisted of was never expressed. It seemed that there were aspects of 'tacit' knowledge here (Polanyi, 1967; Mogensen, 1996) that were not explicitly expressed. Another interviewee developed the same idea when saying:

you see things, you are observant and you can feel things and can find things out through the diagnosis, that you've got in your fingers. (IP6S)

But there were also aspects that concerned ethical matters, such as how to interact with patients. One interviewee told the interviewer that this was incorporated in the whole course:

But also attitudes ... we also try to ... the whole surgery course tries to add a physical examination where they tell patients [some bad news]. I have something this term I call 'teaching outward clinic', where they have quite a lot of time [with patients] under supervision. (IP1S)

However, the competencies discussed above were never focused on as a whole (Hager & Gonczi, 1996), but as integrated competencies (Schmidt & Boshuizen, 1993). Teachers focused on one or a few isolated competencies at a time. This view is close to the idea of communities of practice because it stresses the importance of how students start thinking like experts.

*Attitude-orientated goals* Finally, there were two interviewees, one pre-clinical and one clinical, who expressed rather different approaches, neither focusing on content or competence but on an attitude orientation to teaching. These were instead concerned with development of the person, their identity, motivation, interest and attitude. One way of interpreting the next two statements is that the goal of these teachers was to integrate the medical students into a community of practice, as discussed above (Wenger, 1998).

The process of becoming a doctor doesn't have to do with my particular subject, but with maturing as a person and trying to understand that you yourself are a tool. It's not knowledge as such. It's experience! (IP4S)

I want them to approach a patient with what [mention of colleague's name] would call 'anatomical confidence'. The patient won't represent some horrible and

untouched ground that you are frightened to put the stethoscope on because you don't know where you are or that you pull a knee without knowing what you are pulling. There should remain sufficient knowledge from this course about the living patient so that students can assess the state of the patient and take action with a kind of confidence and actually also some knowledge of what they have inside the shell, inside the skin costume. (IP2A)

This approach is very close to seeing learning not only as a process going on in somebody's head but as participation and becoming a professional physician, by maturing as a person and understanding how you fit into the complex environment

It seems that medical teachers already approach professionalism and the idea of communities of practice in their personal goals of teaching, but these remain hidden; a kind of hidden curriculum. This implies that these personal goals are not spelled out explicitly to students. Instead, students try to interpret the cues of what is demanded of them by different teachers to pass the course. This was also what was found in a concurrent study of the students on these anatomy and surgery courses (Scheja *et al.*, 2004). A hidden curriculum is usually defined as implicit cues that students get from assessment, for example, which steer them into a certain approach to learning which is contrary to the explicit aims and outcomes (Snyder, 1971). However, in this case the students miss the hidden participation metaphor cues and focus on the explicit acquisition metaphor cues of the core curriculum. The formal, explicit curriculum is more powerful in this case, as the implicit participation cues are not embedded either in the content, the processes or the assessment strategies of the core curriculum.

It would thus seem important to make the ideas of this hidden curriculum more explicit in the core curriculum, as a way of educating students in their future professionalism by focusing more on 'expertise as participation', where attitude and integrated competence are an important part.

#### *Congruence Between Teachers' Goals and the Core Curriculum*

It is obvious that pre-clinical teachers are very aware of the core curriculum, and the same applies to most clinical teachers. Expressions like 'cover the core' when explaining what they do in their teaching are common among both pre-clinical and clinical teachers. However, there seems to be a division when it comes to what teachers think of the core curriculum. Some pre-clinical teachers express their satisfaction with the core curriculum, which perhaps has to do with the fact that two of the teachers actually wrote a subdivision it:

I am the one who wrote core curriculum for my section. It is written on the basis of my lectures. I have missed not having an experienced anatomy teacher to discuss it with. (IP3A)

We have discussed the content of the core curriculum for decades, most intensively during the 70s, with strong pressure from the students, when everything was questioned. Those who were responsible at the end of the 70s thoroughly reviewed what was relevant. Definitions of what was important and a description of the aims were made. All this is in other words done. (IP2A)

These two teachers seem to be taking different angles on their involvement in the design process. One is satisfied with the result, while the other seems to be expressing insecurity about it because of not having the opportunity to discuss it with subject expert colleagues.

A relevant issue is how often a core curriculum should be changed. Is it enough to lean on a core curriculum designed 'some odd 30 years ago', as was implied by one of the anatomy interviewees? According to the Bologna declaration this is unsatisfactory. It states how important it is that universities 'ensure that higher education and research systems continuously adapt to changing needs, society's demands and advances in scientific knowledge' (Confederation of EU Rectors' Conferences and the Association of European Universities, 1999). Even though some disciplines, for instance anatomy, are mostly based on knowledge that can be viewed as permanent, the clinical application of such knowledge is under constant change and thus should influence the core curriculum.

Clinical teachers instead see the core as a basic requirement which is more or less clear or relevant. One teacher identified a need for integration with the anatomy core curriculum which none of the others pointed out:

I think it can be changed and adjusted of course, but content-wise, it is really not that bad, but that's just pure urology so to speak and then we haven't discussed integration: what would our core look like together with the core of anatomy, for instance? The core [now] is purely based on what we do clinically. But I'm sure it's possible to change and improve it further. (IP4S)

This interviewee had already started thinking about the link between the anatomy course and the surgery course. However, we cannot know whether this would have happened had an interview not been performed.

The revision and integration of curricula are important issues to consider in all professional education areas, such as engineering, accounting and law. Many universities are anxious to live up to the requirements of quality assessment bodies and thus implement core curricula without enough consideration, or knowledge, of alternative curriculum models (Kelly, 1999). There is a risk that striving for a coherent core curriculum which tends to focus on learning outcomes, where outcomes and content go together, will direct teachers' thinking towards a content-oriented approach to teaching and thus not help them develop an approach promoting the wider view of expertise discussed above. Additionally, Kelly argued that a common problem in this use of the curriculum is that an overall aim of the educational programme is lacking. This was also clearly stated by one of the interviewees:

to me it is a bit unclear for what we educate our students ... what the final goal is. The final goal is not only this course, but it is the medical programme as such. That final aim is diffuse. Is it future general practitioners we educate? Is it future scientists we educate? Is it future surgeons we educate? Or rather, I know it is not future surgeons we should educate. (IP4S)

It is of great importance for teachers and students at all levels to have a common idea about what the final goal of the medical programme is. A visible link is needed throughout the programme, and the final goal should be a mutual vision that any teacher and any student can refer to at any time. It needs to be possible for each teacher to guide the students in the direction of achieving this final goal. The core curriculum should support the students and teachers in attaining this goal.

An issue of importance in obtaining a clear idea of the overall aim could be the degree of involvement of teachers in the process of designing the core curriculum within the

university. A difference between anatomy and surgery concerning this issue was noted, which might have implications for teachers' interpretations of the core curriculum. This is most obvious in the example of the two anatomy teachers who were involved in the core curriculum design process. They were satisfied with the core curriculum. One could assume that the more a teacher was involved in the core curriculum design process, the closer the match between the document and their interpretation of the document. This would suggest that problems in the design process of the anatomy and surgery curricula also differ. The design process in anatomy gives some teachers a thorough knowledge of 'their' part of the anatomy core curriculum through their involvement in its design. However, no one has a complete overview of the core curriculum of their specific discipline or of how this is integrated into or relates to the whole medical curriculum. In surgery, however, a few course leaders may have that overview. They have discussed and negotiated a common core curriculum. The problem here is, instead, that few teachers might feel 'ownership' of the core curriculum. This is reflected in the interviews by the fact that surgery teachers have a 'looser' relationship with the core curriculum.

### **Conclusion**

We found that teachers are aware of the core curriculum and are influenced by its content. We also found that the teachers' interpretations of the core curriculum vary according to whether their focus is on the acquisition of knowledge and content and/or competencies or on aspects relating to process and the participation metaphor. Where teachers do seem to have a richer view of expertise, they are limited in enacting this by the context in which the core curriculum is interpreted. Also, where teachers might have developed a richer view of expertise, the content-oriented core curriculum in both subjects inhibited the possibility of this development.

### *Implications for Practice*

By providing a plan of content listing knowledge, skills and attitudes, the core curriculum currently limits teachers' teaching practice, partly because of their preconceptions of what the core curriculum is and how it should be followed, but also by how it directs teachers into a certain way of thinking about teaching, focused on the acquisition metaphor and, therefore, what the core curriculum allows teachers to do.

The core curriculum needs to play a significant role in the development of a richer model of expertise in the medical curriculum and, most likely, also in other curricula leading to a profession. It can only do this if it promotes a view of expertise that includes both the acquisition metaphor and the participation metaphor (Sfard, 1998), which focuses on both process and content. It can also play an important role in promoting integrated competence, an important aspect of the development of expertise, by giving teachers an idea of what is taught at other levels of the educational programme, an integrated curriculum. One way of doing this is for the curriculum to clearly state broad educational learning outcomes that include process.

An emphasis on process could be made via the inclusion of explicit underlying principles, as Kelly (1999) suggested, for example by including a principle that argues for the development of a holistic view of expertise based on the concept of communities of practice. However, the issue of teachers' interpretations of what this means will remain. Therefore, it is important to clearly provide principles at the level of process regarding what students are

able to do, such as critical thinking and clinical reasoning, as well as concerning the process of learning, such as applying student activating strategies for learning. This would guide teachers into a richer view of expertise which not only gives a structure for what students will learn and understand, but also a holistic view which includes social aspects of learning and where the development of encapsulated knowledge (Schmidt & Boshuizen, 1992) and the idea of integrated competence is built into the core curriculum.

A key to the problem seems to be the level of involvement in the design process. It is, however, not realistic that everyone should be involved in every bit of design and have an overview. It is clear though, that involvement in design and review of the core curriculum is important for teachers' interpretations of the core curriculum. Teachers need to recognize their own role in relation to implementation of the core curriculum, as well as being involved in the process of updating the core curriculum. One way of making sure this is done is to keep a 'best before date' on the core curriculum, to make sure it is revised.

The example in this paper concerns a core curriculum where there is a possible closeness between teachers and designers of the curriculum, since they work at the same university. Despite the closeness, problems of understanding the role of the core curriculum remain. In an externally regulated curriculum these problems are probably just as evident, since the teacher is even further from the designers of the core curriculum.

Consequently, one suggestion is that teachers need to be engaged in communities of practice themselves, around the interpretation and implementation of a core curriculum that aims to support the development of expertise in both the acquisition and participation senses.

A successful way of achieving such engagement has been introduced in, for instance, Sheffield. They have introduced a searchable core curriculum (Newble *et al.*, 2005): students and teachers can easily identify components of the core curriculum and their application in the clinic. This gives both students and teachers a more holistic view of the knowledge required for their profession. Also, core curricula should be revised on the basis of nationwide evaluations, regularly engaging teachers in the process of revising the core curriculum in an outcome-based context (WFME, 2003). This leads to more communication between teachers and to professionals who are ready to use their knowledge in practice.

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## How do medical teachers address the problem of transfer?

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**Abstract** Clinical teachers often complain that medical students have forgotten or somehow “lost” knowledge that has been taught at pre-clinical levels at the time of entering the clinical part of education. The purpose of this qualitative study was to explore, whether transfer of knowledge was identified as a problem by the teaching staff of anatomy and surgery, and if so, what strategies they used to overcome it. Semi-structured interviews were conducted with ten medical teachers in anatomy and surgery. Most teachers recognised that there was a problem of transfer and some individuals had adopted strategies to address this. However, there was no formal educational strategy suggested to overcome the problem of transfer. The conclusion is that transfer needs to be addressed both by basic science teachers and clinical teachers. There is a need for a mutual educational discourse of the contexts students will face.

**Keywords** Transfer · Student learning · Curriculum design · Teacher training · Undergraduate education · Medical education

### Introduction

The experience in numerous medical schools that apply a discipline-based model of educational curriculum is that information learned in the basic science years is not easily activated in clinical situations. This is a classical problem within medical education, for instance in anatomy teaching, where previously learned knowledge about healthy and normal body structures is supposed to transform into pathophysiological explanations later in medical studies.

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This study was initiated due to the concerns put forward by several surgery teachers about students' prior knowledge to a teacher in anatomy. It became evident that students were not able to apply concepts or mnemonics, such as \*NAVEL\* for nerve-artery-vein-lymph, that they had learned during their anatomy classes in the clinical context.

One way of explaining the problem would be to refer to it as a problem of recalling information from memory. That would mean that students fail to recall the original biomedical knowledge once they enter surgery classes. Another way of viewing it is to say that students are actually dealing with the problem of transfer: how to apply basic knowledge, acquired in a totally different context, into real-life situations later in the medical career. This idea has been supported by research within the area of novice and expert thinking (Rikers et al., 2005; Schmidt & Boshuizen, 1993a) and the cognitive processes of clinical reasoning (Norman, 2002). In this paper this problem will be referred to as 'the transfer problem'.

A question that rarely has been investigated however is how medical teachers perceive and approach the transfer problem and how this is mirrored in their teaching. The main objectives of this paper are therefore to explore whether or not biomedical and clinical teachers experience the transfer problem in their teaching, and if they do, how they deal with it. The interview data is analysed with reference to the literature on transfer and the development of medical expertise.

### **What is the problem of transfer?**

The problem of transfer in learning is very complex. Many studies show how difficult it is to transfer knowledge from one situation to another (Chen, 1995, 2002; Norman & Schmidt, 1992; Prince, Van de Weil, Scherpbier, Van der Vleuten, & Boshuizen, 2000). A typical approach to the transfer-problem is the metacognitive perspective. This approach has been described as the capability of investigating our own cognitive process of learning and hence focuses on individual cognition. From this perspective, the problem of transfer can be viewed as a problem of application of knowledge in situations that are different from the learning context (Gruppen & Frohna, 2002). According to Gentner (2003) learners tend to focus on surface features that are specific for a certain situation, for example the localization of different kinds of tissue when learning about joints, instead of emphasizing the underlying features, in this case the function of the joints. Novices are particularly prone to focus on surface features since they do not have a general understanding of the context.

A complementary approach to the metacognitive perspective on the transfer problem is represented by situated learning theory. The situated approach regards knowledge to be bound to situations and address the interaction between people and their environment. Students should learn in the same environment they are to apply what they learned and the focus is on how each individual experience an event or activity and the problem of transfer is rather about whether transfer can occur at all, since one experience never is entirely reproducible (Soini, 1999). According to situated learning theory, students learn best through an apprenticeship model, where they in the process of learning move from being peripheral members of a community of practice (Wenger, 1998) to be active and fullworthy members of that community. However, as has been pointed out by Andersen, Reder, & Simon al. (1996) there is

evidence of transfer across contexts where transfer seem to be stimulated by the contextualisation of the transfer task during learning. Transfer increases if subjects are given a hint so that they pay attention to prior problem solving (Catrambone & Holyoak, 1989), for example by asking students what would happen to a patient's ability to move his arm if one component of a shoulder joint was damaged.

Also, transfer varies with the degree of practice with the task (time on task) and the number of similarities between learning tasks. If, for instance, students are asked to distinguish the similarities and dissimilarities between the knee joint and the shoulder joint the focus would be directed towards the function of the joints rather than the structural details and transfer would increase (Gentner, 2003). The problem of transfer is a matter of changed context rather than the passage of time from the occasion of learning to the application of the task (Catrambone & Holyoak, 1989). Anatomy could be taught through an endoscope to enhance transfer to future clinical practice, where an endoscope is often used. The degree of transfer has been found to increase with concrete examples combined with abstract instruction (Anderson et al., 1996). In the present study learners are seen as active participants in the process of transfer, where transfer is possible if it is appropriately addressed.

#### Types of transfer

One way of describing transfer has been to refer to low-road and high-road, commonly called near- and far- transfer (Perkins & Salomon, 1994). Low-road transfer occurs when transfer automatically emerges when two tasks are closely linked to each other, for instance if you know how to drive one car, you can most likely drive other cars as well, even though they are not exactly the same. High-road transfer refers to the intentional application of previously acquired knowledge in new situations.

High-road transfer can be divided into two kinds; backward-reaching and forward-reaching (Salomon & Perkins, 1989). Forward-reaching transfer occurs when basic elements are learnt for later application. This type of transfer would be typical for the learning of basic science in a conventional medical curriculum. Backward-reaching transfer refers to the process of searching back [in memory] for relevant knowledge already acquired to solve a present problem. This kind of transfer occurs when students are engaged in a clinical reasoning task and need to access basic scientific knowledge to explain a complex problem.

The present study is primarily concerned with forward-reaching high road transfer and backward-reaching high road transfer. Facilitation of forward-reaching high-road transfer would mean that surgical cases and clinically relevant contexts are used and linked to in the learning of anatomy. Backward-reaching high-road transfer would imply for instance, that the understanding of anatomical structures were activated and used in the learning of surgery.

#### Is there transfer from biomedical context into clinical context?

Research on the nature and organisation of expert medical knowledge has led to a number of different views on the role played by biomedical knowledge in the process of transfer from pre-clinical to clinical learning and further into the development of medical expertise (Van de Weil, 1997). These views will be presented below, together with the implications for curriculum design and teaching that they bring.

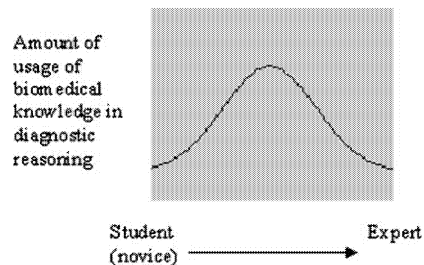
Empirical studies carried out by researchers within the area of expertise assumed that biomedical knowledge plays a central role, and thus deep knowledge of anatomy and physiology are necessary as prior knowledge for guiding correct diagnostic thinking. *“It is the opinion of these researchers that establishing detailed understanding of the normal and abnormal functioning of the human body will help students to develop knowledge that can be flexibly applied in and transferred among clinical situations”* (Van de Wiel, 1997, p. 5)

Several research studies have been designed to distinguish the role that biomedical science plays in the construction of clinical knowledge (Patel, Evans & Groen, 1989; Patel & Kaufman, 2002; Schmidt & Boshuizen, 1993b). In general, these studies found that biomedical knowledge is commonly used among students and increasingly by medical practitioners early in their career. However, when it comes to experts, they seldom use biomedical knowledge in routine diagnostic reasoning. Instead they rely on associations between symptoms and diseases. This development (see Fig. 1), referred to as the intermediate effect (de Bruin, Schmidt, & Rikers, 2005; Rikers et al., 2005; Schmidt & Boshuizen, 1993b), could be a plausible reason for viewing clinical and biomedical knowledge as two separate areas of knowledge (Patel et al., 1989).

The idea that biomedical and clinical knowledge require their own ways of reasoning and their own knowledge structures has been put forward by some researchers (Patel & Kaufman, 2002). Differences between the different modes of learning have been explained by means of the so-called two-world hypothesis (Patel et al., 1989), which may be characterised as an absence of conscious use of basic scientific concepts in reasoning about medical problems in contrast to its primary role in the other sphere.

Researchers who promote this idea (Patel & Kaufman, 2002) suggest that clinical knowledge is based on a complex taxonomy in which symptoms and diseases are related, whilst biomedical knowledge, on the other hand, is based on general principles where chains of causal mechanisms are defined. Hence, basic science is not primarily seen as a way to facilitate clinical reasoning, but to create a basis for facilitating the establishment of coherence when explaining biomedical phenomena (Patel & Kaufmann, 2002). For instructional purposes these ideas suggest that clinical and pre-clinical teachers would ask questions about the same phenomenon but according to their different frameworks, and that they would require significantly different answers (Van de Weil, 1997).

**Fig. 1** The intermediate effect





The idea of knowledge encapsulation presented by Schmidt and Boshuizen (1992), develops the two positions described above. It assumes that biomedical knowledge does play a role in the development of how practitioners apply clinical knowledge. However, biomedical knowledge does not in itself constitute a sufficient condition for bringing about effective transfer of that knowledge to clinical settings. Instead, through practice and application of biomedical knowledge in a clinical context, networks of biomedical knowledge become encapsulated into clinical concepts that have a meaning in that context, and thus are learned and remembered (Rikers et al., 2005).

Expert reasoning is based on pattern recognition rather than detailed reasoning (Norman & Brooks, 1997). Experts tend to see patterns as “illness scripts”, in which a massive amount of clinical knowledge is combined and related to relevant cases. Students’ causal explanations are quite different from the illness scripts used by experienced clinicians and they tend to focus more on details (Schmidt & Boshuizen, 1993b; Schmidt, Norman, & Boshuizen, 1990). For students it may be difficult to differentiate between relevant and less relevant aspects of a medical case. Experts have knowledge available in different layers that are activated in different situations. In clinical settings pathophysiological mechanisms are only consciously considered when pattern recognition and predictive reasoning falter (Coderre, Mandin, Harsym, & Fick, 2003; Norman, Trott, Brooks, Smith, & Kinsey, 1994; Patel et al., 1989). This typically occurs when the discriminating questions that the clinician uses to rule in the primary hypothesis and to rule out other possibilities or the findings on physical examination, do not yield the expected result.

### **How to teach for student learning—to facilitate transfer in medicine**

It has been suggested that students need the basic science explanations for diagnostic reasoning as a means to reconstruct the framework, and hence the features into which to fit the basic science explanation (Woods, Brooks & Norman, 2005). However, this does not mean that basic science and clinical learning should be separated but rather that they should be integrated.

Patel et al. (1989) showed 1989 that biomedical knowledge is not used optimally in clinical contexts, and that basic science knowledge may even interfere with clinical reasoning. Hence, Patel and Kaufmann (2002) conducted a study aimed at understanding the effect of different designs of educational curricula, a conventional curriculum divided in pre-clinical and clinical years and a PBL curriculum, on students’ learning of clinical reasoning. This study showed that when basic science information was provided before a clinical problem, students did not integrate clinical basic science into the clinical context, however when basic science was given after the clinical problem, there was integration. This led the above authors to a paradox. Since they suggest that basic science knowledge should make a better anchor for clinical knowledge rather than the other way around transfer is facilitated in the curriculum by an early introduction of clinical problems to provide structure support, a framework, to basic science, which still produces the anchor for learning (Patel and Kaufman, 2002).

In a conventional curriculum, where basic science and knowledge generally are kept separate, it is important to diagnose and activate students’ previous knowledge in educational situations. This idea, referred to as “activating instruction” (Lonka &

Ahola, 1995) stresses the importance of first finding out about students (mis)conceptions and then to support their learning by giving constant constructive feedback. It is crucial to make ideas and conceptions overt to discussion in order to foster conceptual change in students' thinking.

In a PBL curriculum basic science and clinical knowledge are spontaneously integrated (Norman & Schmidt, 1992). However, there are results showing that students have problems in decontextualizing the basic science once it is integrated in a clinical context. The reason for this are thought to be the emphasis on detailed causal reasoning and elaboration, which is assumed to generate a greater load on working memory (Norman, 2005; Patel & Kaufman, 2002).

Medical studies could also be enhanced by applying the theoretical and empirical findings concerning medical expertise. Schmidt and Boshuizen (1993) proposed that integration of knowledge from different subject matters should be stimulated in order to acquire elaborated causal knowledge structures. Further, problems and representative cases should be presented in order to help students develop functional illness scripts as a way of preparing students for their future profession. Van de Wiel (1997) suggested that a combination of early practical experience with real patients, not only paper based cases; tutorial groups and self-study may lead to improved integration of knowledge, so that more coherent networks of knowledge become associated with the relevant clinical concepts. When students have entered clerkships, tutorial group sessions should be continued to discuss and explain the clinical problems they encounter in terms of the underlying pathophysiology. She also argues that this so called 'integrated curriculum' may help change the experience of those students who find that medical training and clinical practice are two worlds apart.

The strategies for facilitating transfer that teachers use could tentatively be influenced by teachers' orientation to teaching their subject. For example, in teaching anatomy and surgery three qualitatively different orientations to teaching anatomy and surgery are reported; content orientation, competence orientation and attitude orientation (Bolander, Josephson, Mann, & Lonka, 2006). These results can be compared with similar results from phenomenological studies by among others Trigwell, Prosser & Taylor (1994). They showed in an interview study with university teachers in physics and chemistry that teachers have qualitatively different intentions with teaching, and that these intentions, or approaches coincide with certain teaching strategies. It has been found that university teachers' approaches to teaching in general focus on content, where students are viewed as passive recipients of that content.

An established tool to influence student learning is the design of assessment (Biggs, 1999; Prosser & Trigwell, 1999). Results from five-year period data on student performance after increased clinical correlation teaching in a first year anatomy program suggested that more problem-focused assessment of student learning resulted in better performance (Vasan & Holland, 2003).

Even though views on the role that basic science plays in the development of expertise differ it seems clear in the literature that the idea of knowledge encapsulation is of importance for the development of expertise. In the current study anatomy and surgery teachers' perceptions of the development of expertise were examined by focusing on the problem of transfer. Their strategies for facilitating learning were also investigated and compared with the strategies suggested for promoting encapsulation of knowledge.

## **Context**

The context of the study was a six-year university medical school with no graduate entry. The program was divided into a preclinical phase (basic science studies) and a clinical phase. No general educational model was applied, such as Problem Based Learning. After the present study was completed, a re-construction of the medical curriculum was initiated.

The anatomy course comprised eleven weeks, where full class (140 students) lectures constituted the base for learning. These sessions included lectures given by a clinical doctor, for example a thoracic or orthopaedic surgeon, who tried to explain how the anatomical knowledge would fit into his or her specialty. In connection to each lecture session tutor lead dissections sessions were given. Students also participated in seminars in practical anatomy where they learned how to identify structures and organ projections on each other. Students were required to study with the mannequins and computer programmes on their own. Every other week students had to pass oral exams on anatomical theory as well as identifying certain structures on the bodies that were under dissection. At the end of the anatomy course, students must pass a five-hour written exam.

The surgery course ran over sixteen weeks. Students attended ward placements which changed every other week according to a rotating scheme so that they would get acquainted with different sub-specialties. Students were supervised by a clinician, but were not assigned to a certain person. A mentor system, where students met a mentor at least once a month was thought to support students' development. Sometimes students attended lectures or seminars around patient cases. The assessment comprised a two-hour Objective Structured Clinical Examination (OSCE) (Harden & Gleeson, 1979), as well as a six-hour written exam and an oral exam.

## **Method**

### **Participants**

Data were collected through individual interviews with four anatomy teachers and six surgery teachers. Those four anatomy teachers who were interviewed represented all teachers with responsibilities for curriculum design and assessment. They were full-time researchers at the Department of Neuroscience and taught anatomy to first year students by giving lectures and leading dissection seminars approximately 4–6 weeks per year. The six surgery teachers were full-time clinicians who divided their time between teaching, research and clinical work at two different university hospitals. The teachers were using a variety of teaching methods; from lectures to seminars, bedside teaching, clinical supervision and PBL-influenced seminars.

### **Materials and procedures**

The interviews were semi structured, allowing the teachers to elaborate on topics that they found interesting. The interviews lasted between 60 and 100 min. With permission from the teachers, the interviews were tape-recorded and later transcribed in full.

It was assumed that the problem of transfer could be described in several ways, and questions were asked from a range of different angles to find out whether teachers had identified the transfer problem and what their strategies to overcome it were. For example, teachers were asked to tell the interviewer about their teaching, how they planned their teaching and what they found important that students learned. Some questions were focused on the difficulties they had encountered in students learning their topic and what they found difficult in teaching their topic. Finally questions more to the point of transfer were asked such as 'what role does prior knowledge play in learning this topic?'

The interviews were carried out in Swedish and the quotes that are referred to in the findings section have been translated into English to capture the meaning expressed.

#### Methodological limitations

The literature about qualitative research methodology contains a number of suggestions for its justification and credibility (Denzin & Lincoln, 1994; Guba & Lincoln, 1994; Patton, 1990). Whilst validity and reliability are important criteria for assessment in studies undertaken in the positivist tradition (Patton, 1990), interpretivist traditions of inquiry adopt alternative criteria such as credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985).

The aim of this study was to explore whether or not biomedical and clinical teachers experienced the transfer problem in their teaching, and if they did, how would they deal with it. Hence, under the criteria of transferability the study was perceived as relevant to anyone involved in the development of educational programmes within health science education traditionally separated into a preclinical and clinical part of the curriculum. In an ongoing survey of the medical programme at the institution it had become evident that students also had difficulties in explaining central physiological concepts when confronted with a clinical situation, even though they remembered them. They could identify when and where they learned the concept, but not how to apply it. Hence the problem of transfer was evident across the curriculum and not only relevant in anatomy studies.

The investigators provided the reader with the theoretical basis from which the data has been interpreted to reduce the risk of letting their values intrude on the data and thus keeping to the criteria of confirmability.

#### Data analysis

Two of the researchers individually read the interviews in total and then via content analysis extracted and clustered quotes in the following themes:

1. The identification of the problem of transfer and how teachers perceived the link between basic science and clinical learning.
2. Reasons for the problem of transfer
3. Strategies to facilitate transfer

The two researchers' categorisations were compared and discussed. A commonly recommended method to ensure trustworthiness of qualitative research is to do member checks to validate the interpretations of data with the individuals actually

How do medical teachers address the problem of transfer?

**Table 1** Summary of the interviews

	Identification of Problem of Transfer			View of relationship basic science-clinical practice			Reasons for problem of transfer		Strategies to facilitate transfer					
	Identified problem of transfer on own	Identified problem of transfer down transferred	Did not identify problem of transfer	From knowledge essential	Two-way relationship	Knowledge Enrichment	Recall	Contexts differ	Repetition	Formative assessment to point at long/shorts	Reactivation of prior knowledge	Construction of prior knowledge	Creating a meaningful context	Preparing students for future problem
<b>Anatomy Teachers:</b>														
Teacher 1	++			++			+		+				+	
Teacher 2	+			+			+				+		++	
Teacher 3		++		+					+				++	
Teacher 4	++			+				+					++	
<b>Surgery Teachers:</b>														
Teacher 1	++			++			+	++		++		++		
Teacher 2		++		++			++		+	++		+		
Teacher 3		++		+			++		+			+		
Teacher 4		(+)		+		(+)	++		++					
Teacher 5		(+)		+			+		+			+	+	
Teacher 6		(+)		++			+		+					

studied (Harris, 2002). Hence, the interview participants read the results of the study to make sure it mirrors what they wanted to express in the interviews and give them a chance to raise any issues that they did not agree with. None of the interviewees had anything to add or change. The interviews have been categorised as either “anatomy teacher” or “surgery teacher” and have been numbered to indicate the person in question.

The intention has been to shed light on the problem of learning transfer between the subjects of anatomy and surgery from the perspective of research on transfer, student learning and medical expertise. Table 1 shows a summary of how the interviews have been analysed in relation to the questions raised at the beginning of this paper. Here follows a discussion of the results in relation to the theoretical frameworks presented at the beginning of the paper.

**Results**

Identification of the problem of transfer and how teachers perceived the link between pre-clinical and clinical courses

When asked about the difficulties of teaching, some teachers immediately identified the problem of transfer by emphasizing the problem of relevance and linking of knowledge to future courses:

...it's too long between term two and when they will use what they learned in practice. I think we have managed pretty well within the time frames we've got at our disposal when it comes to the aims, but I think we've got a problem with the long interval.  
(Anatomy teacher 1)

The problem is that they can't use the knowledge in an extensive way today and I think that is a disadvantage. There is a few years gap between term 2, when they learn anatomy, and when they are going to use the knowledge [in surgery]. (Anatomy teacher 4)

The problem was also identified by some of the clinical teachers. These teachers agreed with the view that basic biomedical knowledge is necessary for learning the diagnostic reasoning skill to become a clinician (Van de Weil, 1997). Others had really never thought about the relation to pre-clinical knowledge, until prompted, and even questioned whether there was a link, as described by the 'two world hypothesis' (Van de Weil, 1997). It was obvious one of the interviewees had never considered it until this very interview, since the question was answered as to whether the teaching in any way linked to students' pre-clinical knowledge by saying:

No, I haven't actually. I have pretty much done what it says in the book and what is required by the goals, so I haven't, I don't think I do any linking to pre-clinical, I don't. (Surgery teacher 6)

During the interview, however, this teacher made a turn, and concluded that:

It [basic science] is probably more important than I said at the start. Yes, it is a stepping stone, you could say that. I guess I haven't given it a lot of thought... (Surgery teacher 6)

This obviously had to do with the interviewer's questions and there were reasons to believe that the teacher would not have developed the idea of linkage between pre-clinical and clinical knowledge otherwise. Generally however, there seemed to be agreement among both pre-clinical and clinical interviewees that basic science was important or necessary for clinical knowledge. However, it was obvious that some teachers had thought this through, reflected on students' knowledge of basic science, or rather, lack of such knowledge, developed an explanation for the problem, and dealt with it in different ways.

Other teachers took students' knowledge for granted, knowing that they themselves had taken a course once, and said that they 'should be able to assume' that the students know these things, but because of forgetfulness, or that they never learned it properly, or that the anatomy course perhaps never stressed the aspects that are important in their particular speciality, they repeated or 'went over' the subject matter again, so that students would re-learn, learn or remember.

I think it [biomedical knowledge] is important, but anyway there isn't a lot [linkage] like that I suppose...I usually ask, for instance, why do you take away half the stomach? How it can work as an operation against stomach ulcer. And then all of them give the wrong answer. They haven't remembered how things really are. But otherwise there isn't any direct link [between pre-clinical and clinical]. (Surgery teacher 5)

Reasons that the teachers presented for the problem of transfer

Most surgery teachers perceived a problem in that students have 'forgotten or lost' anatomical knowledge when they entered the surgery course. The anatomy teachers

found it problematic that the students would not use the knowledge that was learned during the anatomy course a long time ago. A difference between the two groups however, was that teachers in surgery did understand the transfer problem although they did not bring up the problem of transfer spontaneously, as the anatomy teachers did. The time period between the courses were seen as the cause of the transfer problem. Additionally, pre-clinical teachers did not link anatomical knowledge to specific practice in clinical situations, and clinical teachers did not link back to anatomy knowledge. One reason could be because they did not know how the students were taught or what they knew. None of the interviewees reported that they knew what was taught at the [other] course.

Clinical teachers were generally not aware of what was taught in other courses that were related to their own subject. The knowledge of how the anatomy course was taught was based on teachers' own experiences of being former anatomy students, but it was also based on their perceptions of whether their students' prior knowledge was adequate and sufficient. On the other hand, teachers of anatomy did not seem to know what anatomical knowledge was required in current clinical practice. They based their clinical conclusions on what they remembered from their clinical training some 10–30 years ago.

Two teachers, one anatomy teacher and one surgery teacher stressed the context as an explanation for the problem of transfer rather than recall

It is easy to teach [anatomy] and easy to understand [anatomy]. Although it might be easier if the course was applied in a real patient-doctor situation. That would create a much better framework [for the students]. As it is taught today the direct implementation [of the knowledge] is not obvious.

(Anatomy teacher 4)

This term we added a new topic that I call 'clinical anatomy', which also is introduced during the 'crash-course', so that they [the students] can repeat and go through things that you can feel and identify on the body that are necessary for us [clinicians] to know.

(Surgery teacher 1)

The teachers showed different degrees of awareness of the transfer problem. When interviewed, some teachers expressed that this really was a problem from their viewpoint and that they had taken action in relation to it. However, others had not previously considered this as a problem. Together with this variability in how the teachers perceived the transfer problem, their ideas of how to handle it varied as well.

Strategies that the teachers proposed to facilitate the problem of transfer

The clinical teachers did not try to find out exactly what students were taught in the anatomy course. Instead, they merely perceived that students had forgotten the anatomical details; that it "*disappears when you don't use the knowledge*" (Surgery teacher 2). Teachers used different strategies for dealing with this problem of their students insufficient prior knowledge. Four main strategies were identified.

#### *Repetition*

One strategy to facilitate transfer was to link the present course content to previous knowledge by repetition:

Well, you have to explain what they don't remember or have learnt. Sometimes you don't know whether they don't know or whether they have forgotten, but you'll have to repeat what is needed then.

(Surgery teacher 3)

Since we start thinking and look and nag them about it, they learn step by step again. They seem to pick up the knowledge. Hopefully they study. The diagnostic test gives them an idea of what they should go home and study, which you cannot know if they actually do of course. (Surgery teacher 2)

Surgery teachers presented the idea of repeating basic knowledge or making students remember previously learned content. Strategies for backward-reaching high-road transfer were not thought of. An alternative strategy for doing this, would include the use of cases with similar contexts to those students had previously encountered. For example, teachers could have presented students with clinical problems approached from an anatomical perspective. This systematic activation of prior knowledge was not, however, applied in the clinical course.

#### *Formative assessment to point out forgetfulness*

At one department an introductory formative assessment had been introduced to make students aware of what they had 'forgotten':

They lack, or they have forgotten all anatomy, which is the base when you get to the orthopaedic placement. You cannot examine a patient if you don't know the anatomy. So we have been forced to add a diagnostic test on the first day when they arrive here, and then it's really just the most basic and still, blank sheets are handed in when they are finished. (Surgery teacher 2)

#### *Reactivation of prior knowledge*

The idea of giving feedback and providing an initial formative piece of assessment in the surgery term was sometimes presented with the purpose of pointing out weaknesses in the students' knowledge base to motivate them to re-learn. This was a way of giving students feedback on how *much* they remembered or knew. Teachers did not mention giving feedback on *how* their students thought, a strategy suggested in the model of activating instruction. One of the teachers applied a strategy of using so called PBL seminars. This encouraged the students to focus more on the quality of their learning than mere quantity of recalled anatomical facts.

We use the fracture concept as a theme for a PBL session. We start by going through the theme and then follow brainstorming. This [the brainstorming] shows the student what they need to study and learn and then they make a mind map over what they need to further study....The big final theme is about the concept of back pain.. I start by handing out blank papers and ask them to consider what they want to learn and then write it down. Not more than two to five things...it can vary a lot what they write. I collect the papers and use their points as basis for my teaching. (Surgery teacher 2)



Here, students were persuaded to engage in high quality learning, which included making connections between different areas of knowledge, orientating towards meaning-making and thus deepening knowledge. The qualitative aspect of learning was promoted instead of mainly the quantitative.

#### *Creating a meaningful context*

For the anatomy teachers, the idea of bringing in clinical examples was the most common way of helping the students to use their knowledge in the near future. This could be viewed as a strategy to give a meaningful context:

I go through that part from A to Z. I mix with some clinic so that they will understand why knowledge of anatomy is useful.  
(Anatomy teacher 1)

#### *Preparing students for their future profession*

A strategy that would engage students in forward-reaching high-road transfer, however, could be trying to prepare students for their future profession. This would be done by focusing on the thinking process instead of purely the content to be learned. This was the intention of one anatomy teacher.

I want them to approach a patient with what [mention of colleague's name] would call 'anatomical confidence'. The patient won't represent some horrible and untouched ground that you are frightened to put the stethoscope on because you don't know where you are or that you pull a knee without knowing what you are pulling. There should remain sufficient knowledge about the living patient from this course so that the students can assess the state of the patient and take action with a kind of confidence and actually some knowledge about what they have inside the shell, inside the skin costume.  
(Anatomy teacher 2)

### **Conclusion**

It appears that the teachers who identified the transfer problem felt that biomedical knowledge played a central role in the achievement of clinical knowledge. However, two of the surgery teachers did not consider this a problem, and they appeared instead to entertain the two-world hypothesis, according to which anatomy and surgery are two separate worlds that are not naturally linked. The view of developing expertise in medicine through knowledge encapsulation was in general not reflected among the teachers. Instead they stressed the importance of re-learning and repeating anatomical knowledge during surgery courses. Only one clinical teacher demonstrated an ambition to integrate basic science into a clinical context by introducing a course in 'clinical anatomy'.

The problem of transfer was not a central concern for the participants of the present study. According to our interpretation, the strategies for dealing with transfer that were used by most of the medical teachers were based on common sense knowledge. The teachers had their own ideas of how students learn and what

they believed could be done to facilitate student learning. Most of the time this common sense knowledge did not include helping students develop as future professionals.

The interviews showed that the teachers who were involved in the study were professionals who were actively trying their best. They critically reflected on their practice as teachers, and they were concerned about their students' learning. We did not expect that ordinary medical teachers would be aware of theories of transfer. Theories of transfer merely formed the framework for interpreting teachers' varying conceptions. However, it looked as if the teachers not only lacked knowledge of student learning and how their students would develop into expert physicians, but knowledge of how difficult transfer is and what they can do about it. The transfer problem is not just a matter of the time lapse between learning and application (Catrambone & Holyoak, 1989). Neither is it only a matter of learning in context; transfer in a Problem Based Learning environment is just as hard as transfer in a conventional curriculum and requires learning of concepts during the problem-solving process and continuous feedback. Irby (1994) suggested that exceptional teachers deviate from content experts in clinical education, because they integrate their knowledge of medicine with knowledge of learning. This applies to basic science as well as clinical teachers. Teachers need to understand the learning process and how people in general become experts in their own discipline. This is a major challenge for faculty development programs.

Teachers need support and guidance, for instance by attending teacher training courses, but also by consultancy in planning their teaching so that they recognize the problem of transfer and apply the evidence on how transfer can be facilitated. Using multiple examples and directing students to commonalities between factors or processes between the examples, such as comparing joints presented earlier in this paper, are ways of facilitating transfer. It is necessary that teachers from different levels of a curriculum meet to discuss and reflect on learning content as well as the process of learning to facilitate transfer. For this to happen, university management needs to address the issue of teachers' approaches to teaching on a system level. Teachers must feel that it matters that they facilitate student learning. This is a matter of rewarding teaching with pull- and push forces for example by implementing guidelines including scholarship of teaching and learning for career-advancement within academia. Other possibilities are to introduce certificates of higher education and teaching portfolios as a mandatory part of recruitment policy.

A central problem that appeared in our study was that teachers were not aware of what was taught in other courses related to their own area. This calls for a change towards more integration of the curriculum. The general lack of integration may reflect the fact that the courses during the first years of the curriculum are commonly referred to as "preclinical courses" and the context is a subject-matter based curriculum (McCrorie, 2000). This probably contributed to the teachers' conception that biomedical subjects would precede in a strictly stipulated order. In an integrated curriculum, the division between preclinical and clinical studies would disappear. Early patient contact and increasing biomedical content during the clinical studies also weaken this distinction and strengthen the vertical integration of the curriculum. Another important way for anatomy teachers would be to figure out what is going to be taught during clinical courses and thus use this knowledge in constructing examples or problems for students to work with already during the first years of studying (Bolander et al., 2006) The World Federation for Medical Education

recommends integration between biomedical and clinical subjects as a sign for quality improvement (WFME, 2003). However, it was obvious that the interviewed teachers were not aware of these WFME guidelines.

Accumulating amount of research into the area of medical education should help both individual teachers who plan their teaching, and also those teachers who participate in the design of core curricula (Bolander et al., 2006). This would especially facilitate the transfer of knowledge across different areas of the syllabus. There is a need for a shift in thinking of both teachers and the administrative staff. Each of them needs to revise their ideas of learning and teaching. Teaching should be seen as a profession on its own right, where training and support are provided throughout the whole career. In the same way as researchers, surgeons and other professionals, the teachers need to constantly update their research-based understanding within their own field—medical education.

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## Does teacher thinking match teacher practice? - A study of basic science medical teachers

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### Abstract

*Purpose:* To get an understanding of the basic science medical teachers' conceptions of learning and their ideas for facilitating of learning.

*Methods:* Teaching staff of a bio-medical centre (n=62) were asked of their definitions of learning, their suggestions for how to solve an applied educational problem and their intended activities when teaching students. The research was carried out by using a questionnaire consisting of open-ended and fixed-choice questions.

*Results and Conclusion:* Even though one out of four teachers held constructivist

conceptions of learning, only one out of eight actually reported activating teaching strategies. Conceptions of learning did not co-vary with teaching practice.

The assumption that conceptions of learning and teaching practice are aligned was challenged. The current questionnaire could be used as an intervention tool for educational development to map whether or not teachers' conceptions and their practice match.

*Keywords:* Education, medical education, conceptions of learning, teaching practice

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### Introduction

This study addresses the question, whether conceptions of learning of medical teachers are related to their approaches and strategies to teaching. In general, conceptions of learning have been categorised into a continuum (1), starting with conceptualisations that refer to learning as a quantitative addition of knowledge, toward seeing learning as *a constructive activity aimed at making meaning* (2). In a study by Lonka, Joram &

Bryson (3) laypeople, novices, teachers, and experts were asked to define learning, and to give a solution to an applied problem. Results indicated that a constructivist approach to learning was associated with expertise in educational psychology, as assessed by participants' definitions of learning. However, only experts produced solutions to the applied problem that were consistent with their definitions. Formal training in educational psychology was related to constructivist ideas of learning, but experienced teachers proposed student-activating applications without having such background.

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Conceptions of learning and approaches to teaching do not develop in a vacuum. They are influenced by amongst other things, the educational culture and core curriculum of the university (4), but

<b>What is already known in this field?</b>
Several studies have shown that teachers' conceptions of learning and knowledge influence their approach to teaching. This has led to the assumption that approach and practice are related and justified an emphasis of changing teachers' conceptions of learning.
<b>What this study adds.</b>
In a biomedical department the quite sophisticated conceptions of learning expressed by teachers were not mirrored in an intention to activate students during instruction. This mis-match between teachers' conceptions and teaching practice challenges the idea of focusing on changing conceptions of learning to develop quality in teaching.
<b>Suggestions for further research.</b>
How could conceptions and practice be developed in the context where teachers practice their teaching.

Conceptions of learning and approaches to teaching do not develop in a vacuum. They are influenced by amongst other things, the educational culture and core curriculum of the university (4), but also by the values and beliefs about what constitutes knowledge and how it can be achieved, that are dominant of the very context. To get an understanding of the context it is therefore important not only to consider what kinds of conceptions of learning the teachers express, but also how they approach teaching situations and what strategies they apply in their teaching.

In this study, a questionnaire was designed with the aim of finding out what ideas basic science teachers in a department have

about teaching and learning, and how these ideas match with their reported practice. The results of the questionnaire were discussed within the department and were used as a means of promoting the educational development within the department.

## **Theoretical framework**

### ***Conceptions of learning and teaching***

It is evident from a large amount of research that university students adopt various orientations to learning and these strategies have consequences for the learning outcome (5-7). Basically, it means that students who concentrate on reproducing knowledge, repeating what others (eg. teachers or books) have said are less successful in the long run than students who are trying to understand, to create meaning and to integrate the information into their existing knowledge. Various concepts have been used to describe these orientations to learning, but in this paper they are referred to reproduction and meaning orientation.

Previous studies in medical education indicate that compared to students in psychology, medical students more seldom express constructivist ideas of learning, and mature medical students tend to be more application oriented than meaning oriented (8). In natural sciences, students' ideas of learning tend to be less meaning oriented in general (9). However, there is evidence that meaning orientation develop faster in problem based learning (PBL) curricula (10, 11), than in a subject matter based curricula. In the present study, the latter type was in question, where a more teacher-centred approach to teaching was expected.

Educational research suggests that there are differences between teaching-



centred and learning-centred orientations to teaching and learning (12, 13). Teacher-centred orientations focus on the didactic skills of the teacher whilst learning-centred, or student-centred orientations to teaching take into account how students learn, and are oriented towards the facilitation of meaning making instead of transferring knowledge. Learning centred orientations have been shown to promote meaning orientations in students (13).

Previous research on teachers' goals with teaching showed that teachers tend to orient their teaching goals towards the content, competence or developing attitudes (4). Parallel studies on student learning styles indicated that students in social sciences (14) as well as in medicine (8) tend to be oriented towards reproducing orientation, application orientation, or meaning orientation, the last two learning patterns appearing to be more desirable than the first (15). Vermunt and Verloop suggested that students' learning styles mirror teachers' ideas of teaching (16). Reproducing orientation in students could then reflect content-oriented teaching, whereas application orientation and meaning orientation in students could be more related to competence- or attitude-oriented teaching

### ***Control vs loose control***

Teachers' orientations to teaching can be placed on a continuum ranging from strong teacher control, where the teacher controls the learning activities taking place in the classroom, to loose teacher control, where teachers either share control of activities with the students, or exercise a low degree of control of those activities (17). There are indications that releasing of control is constructive to a fair amount but may vary according to students' experiences and capability of self-regulated learning (18).

The aim for the teacher is to find the point for each group of students where students are helped to develop their self-regulatory skill by the application of activating teaching strategies and thereby sharing the control with students. This search has been called constructive friction (16) between learning and teaching, or the zone of proximal development (19). The aim for the teacher is to find the right balance for shared regulation and thereby discover the highest level of achievement for each group of students.

On the basis of our theoretical framework, it would be logical that teachers who view teaching as delivery of content usually would apply strong teacher control. These teachers would probably take over the activities of creating meaning and applying knowledge. On the contrary, those teachers who view learning as active construction of knowledge would focus on the process of student learning. They would provide time for reflection and have a looser control over the learning situation. A teacher with this view would hopefully activate students to create meaning and apply knowledge themselves. When relating orientation to teaching (4) to the conceptions of learning and orientations to teaching held by teachers, it might look like in Table 1.

This paper intended to investigate biomedical teachers' conceptions of learning and whether these ideas were mirrored in their orientations towards teaching. It was thought that teacher-centered ideas would relate to the 'taking over' strategy in teaching, whereas learning-centered approaches would be related to the 'activation' of meaning or application in students (15).

**Table 1: Conceptions of learning in relation to teaching orientation**

<i>Conception of learning</i>	<i>Orientation</i>
Storing/ adding on existing knowledge	<b>Content orientation:</b> - Transfer of information
Integration/ assimilation of knowledge	- Taking student background into account
Change / reorganization of knowledge	<b>Process and attitude orientation:</b> - Teacher-student interaction, making student conceptions
Construction of new knowledge	overt - Fostering reflection, dialogue and feedback

## Method

### *Context of the study*

A departmental project aiming at developing educational competence was initiated at a major Swedish medical university in 2003. At the department of this study teachers were involved in teaching students at the medical program, the biomedical program and a joint program with another Swedish university. The starting point of the project was an effort to get an overview of the conceptions of teaching and learning existent among teaching staff, to be able to track a possible process of development at a later stage.

### *Participants*

Seventynine members of staff were involved in teaching at the time, Sixty-two (78%) out of these filled out the questionnaire of this study. Two thirds of these were PhD students; others were post-docs, research assistants and professors. Most of these teachers were only involved in teaching during short periods of time, ranging from a few hours up to a few weeks, every year.

### *Materials and Procedures*

Participants completed a questionnaire consisting of three sections. The first section comprised background questions and questions about the work as a teacher at the department. The second section included a

selection of open-ended questions derived from the study by Lonka, Joram & Bryson (3), where the idea was to see what kind of expressions subjects used spontaneously while defining learning: "Give your own, subjective definition of learning", and the application of their definitions of learning to a problem: "What do you think would be the best way to enhance students' ability to learn?". By posing these questions it was thought possible to learn about teachers' implicit conceptions of learning, as well as to look at their orientation towards teaching. This was done by asking how they would prefer to facilitate learning.

The last section of the feedback form consisted of an inventory developed by Vermunt & Verloop (16), and was thought to provide information on teachers' strategies when teaching. The inventory consisted of eighteen propositions on which teachers had the opportunity to grade how often they performed certain teaching-related activities on a Likert-type scale, ranging from 1-5. The propositions were linked to either an 'activating' approach, (e.g. Make students formulate their own point of view) or a 'taking over' approach ( e.g. Give examples or ask detailed questions) and based on the three themes mentioned above; meaning, application- and reproduction. Vermunt's inventory is

based on these six aspects of teaching. According to a template teachers could summarize their scores and draw a graph, which indicated their teaching strategy profile, and which in turn was used to encourage discussion on teaching issues.

By looking at whether teachers would obtain high scores on activating or taking-over learning processes, their definitions of learning, and their suggestions for solving an applied educational question it was intended to get a richer picture of how these three aspects were interrelated.

#### *Ethical considerations*

This study was accepted by the ethical board at the university. The questionnaire was designed and piloted with four teachers from the department in question. Thereafter it was revised again before it was distributed to all members of staff that in one way or another who were involved in the teaching of undergraduate students at the department. The questionnaire was coded, so that the results would not be traceable to the respondents. Respondents were asked to sign a form of consent which was attached to the questionnaire. When receiving the filled out questionnaires, the form of consent was immediately removed and each questionnaire was marked with a code for the purpose of anonymity.

The responses to the questionnaire were analysed according to content analysis and categorised by two independent researchers. Different categorisations were then discussed and negotiated.

#### *Reliability*

The interrater reliability of the final categorisations of the definition and the applied question varied from 91% to 87% between two independent raters.

On the Vermunt and Verloop inventory the measures for activation of application ( $\alpha=0.63$ ) and meaning ( $\alpha=0.57$ ) can be considered fairly reliable, whilst the activation of reproduction scale was not considered reliable ( $\alpha=0.07$ ) and was therefore left out from the analysis.

#### *Statistical analysis*

First the answers for the open-ended questions were categorised. Then scores on the Vermunt inventory, the categories of learning and the answers to an applied question were cross-tabulated.

### **Results**

Fifty per cent of those who filled out the questionnaire (78%) reported that they had taken some kind of course in Education, but only thirty-four per cent thought that teaching was actually contributing to their career advancement. However, as many as seventy-seven per cent found it stimulating, in one way or another, to teach students.

Four different categories were outlined on the question on conception of learning, and five corresponding categories plus one separate category were created regarding the applied example (Table 2).

**Table 2: Categories for the definition question and the applied example**

The categories made on basis of the definition question where learning was seen as:	The categories made on basis of the applied example where ways of enhancing student learning were suggested as:
<ol style="list-style-type: none"> <li>1. Intake or storing of knowledge to remember, adding of knowledge</li> <li>2. Interpreting or understanding knowledge based on what you already know to be able to apply it</li> <li>3. Reorganisation or modification/ assimilation of knowledge to be able to communicate knowledge with others.</li> <li>4. Change to be able to create new knowledge, critical thinking and creativity and ability to see new patterns.</li> </ol>	<ol style="list-style-type: none"> <li>1. Teacher-centred or formal instruction, such as providing structured information</li> <li>2. Enthusiastic teachers</li> <li>3. Motivation of students</li> <li>4. Variation of learning methods and focus on students needs</li> <li>5. Student activating strategies, to give time for reflection and application</li> <li>-----</li> <li>6. A comfortable learning environment</li> </ol>

The categories created for the question on definition of learning were similar to previously established categories, where these are referred to as a scale of constructivity (3). Number one refers to the lowest level and number four to the highest level of constructivity, meaning a development in that number two may include number one, but number one does not include number two as they are expressed. In this way the categories are inclusive; a conception of learning viewing learning as construction of new knowledge implies a change or reorganisation of existing knowledge, understanding and ability to apply knowledge and some kind of adding of knowledge, but not the other way around. The first two categories on the applied question were viewed as content oriented, the third and fourth were perceived as more

process oriented and the fifth as tentatively dealing with attitude orientation (4).

The open-ended questions about how to define learning showed the following image (Table 3): Thirty-five per cent of the respondents defined learning as remembrance or some kind of intake of knowledge, as if it was something to just *add* on if you receive it properly packaged. Thirty-five per cent suggested that learning had to do with the understanding of knowledge in order to be able to *apply* knowledge, nineteen per cent that a *reorganisation* of the existing framework for an individual was required, and five per cent that learning was creation of something new and that it actually changes an individual. However, no co-variation with teaching strategy was found.

**Table 3: Definitions of learning in relation to teaching strategy**

Definition of learning	Taking over strategy	Activating strategy	No answer	Total
Storing/ Adding	16	5	1	22 (35%)
Interpret/ Understand	20	1	1	22 (35%)
Reorganisation/ assimilate	10	1	1	12 (19%)
Change/ Creation	3	0	0	3 (5%)
No answer	2	1	0	3 (5%)
Total	51	8	3	62

The respondents suggested the following alternatives on the application task (Table 4): provide students with structured information (10%); good teachers that are enthusiastic (17%); ability to motivate students (25%); variation of learning methods (20%); student activity including giving time for reflection and application;

and letting students guide the development of learning/ design of the course (20%). The two teachers who emphasized external factors that did not regard the relationship between teacher and student are not included in the table. However, no co-variation with teaching strategy was found.

**Table 4: Answers to applied example related to teaching strategy**

Applied example	Taking over	Activating	No answer	Total
1. Teacher-centered instruction,	5	1	0	6 (10%)
2. Enthusiastic teachers	8	1	1	10 (17%)
3. Motivate students	13	2	0	15 (25%)
4. Variation	11	0	1	12 (20%)
5. Student activating strategies	9	1	2	12 (20%)
No answer	3	2	0	5 (8%)
Total	49	7	4	60 (100%)

Since there was a rather clear difference between those who had high scores on taking over strategies and those who used activating strategies, a line was drawn between these two groups. The results on Vermunt's questionnaire from teachers suggests that a vast

majority (82%) of the respondents scored high on 'taking over' strategies of teaching, and highest on 'taking over reproduction', which implies that it is very common that teachers summarise available know-ledge for the students. Strategies for activating students were very rare. Only thirteen

percent reported such approaches to teaching. Unfortunately, as can be seen in Tables 3 and 4, it was not possible to find any significant relationships because of the few respondents with high numbers on activating meaning and application.

When comparing the learning definition with the application task a somewhat stronger

relationship was traceable. As Table 5 shows, respondents with content orientation (1 and 2) tended to see learning as storing/ adding or interpretation/ understanding to a high-er degree than those with competence (3 and 4) or attitude (5) orientation. These results are in line with previous research as discussed earlier.

**Table 5: Definition of learning related to the applied task**

<b>Applied example</b>	<b>Storing/ Adding</b>	<b>Interpret/ Understand</b>	<b>Reorganisation/ assimilate</b>	<b>Change/ Creation</b>	<b>No answer</b>	<b>Total</b>
1. Teacher-centered instruction,	2	3	1	0	0	6 (10%)
2. Enthusiastic teachers	5	3	1	0	1	10 (18%)
3. Motivate students	9	4	3	0	1	15 (30%)
4. Variation	3	5	2	2	0	12 (21%)
5. Student activating strategies	2	3	3	1	0	12 (18%)
6. External env.	0	2	0	0	0	2
<i>No answer</i>	2	2	1	0	1	6 (10%)
<b>Total</b>	<b>22</b>	<b>22</b>	<b>12</b>	<b>3</b>	<b>3</b>	<b>62 (100%)</b>

It is suggested in this paper that the categories developed in this and similar studies are depending on the context in which the respondents are working. In some areas, our last category, creation of new knowledge may be incorporated into the transformation category, however in this context it is believed that 'creation' has an outward reaching direction, whilst transformation is rather an internal process.

## Discussion

The link between conceptions of learning and learning outcomes has been established previously. Efforts have been made to establish a parallel link between conceptions of teaching, approaches to teaching and

learning outcomes (22). In the current research the link between teachers' conceptions of learning, their orientation to teaching in theory (the applied example) and their approaches to teaching in practice (the Vermunt inventory), were investigated.

In our study it seemed that roughly, a fourth of the participants had conceptions of learning that tentatively could lead to activating teaching strategies, almost two out of three would use activating strategies in an applied example, but only one out of eight did actually report that they applied activating strategies to create meaning and application among students. An interpretation of this data could be that it

showed how difficult it appears to put ideas into practice. This is in conflict with the results found by Trigwell and Prosser (23), which confirmed a relationship between intentions with teaching and strategy. The current study hence challenges the idea of a clear cut relationship between conceptions and strategies for teaching and add to the body of literature that suggest teachers do not always teach in accordance to their conceptions of learning, or even aligned with how they would solve a problematic learning situation (3, 24).

The mis-match could have to do with environmental aspects such the epistemological assumptions of the discipline (9, 25). Teachers' beliefs of learning and teaching are contextualised and influenced by the disciplinary tradition of how to view knowledge, but also by the context in which teachers are working, for instance the core curriculum and the learning objectives outlined (4, 26). Teachers may follow a traditional way of teaching, ie a content orientation to teaching for several reasons. One reason could be a lack of confidence when teaching undergraduate medical students because of their identity being that of researchers rather than medical practitioners, which is the aim for medical students. Perhaps teachers believe that physicians especially must have knowledge that is 'correct', which steers them into a content oriented approach to teaching.

Many respondents emphasized motivation as a key to learning. This was also typical in a previous study, where experienced teachers did not have very constructivist ideas of learning, but focused heavily on motivation (3). These ideas of learning are in line with traditional humanistic ideas motivation (27) where people were seen either motivated internally or externally. That interpretation would not leave much room for teachers to activate or motivate their students. From this perspective, it is good to have students who are motivated to

start with, or then you would need to punish or reward them. However, modern cognitive and motivational theories suggest that motivation can be triggered by the task itself or with meaningful learning activities, and motivation is therefore about the maintenance and development of interest, rather than about some already existent or non-existent motivation (28). For students to become self regulated, life long learners, they need to be able to activate themselves as learners (29). Teachers play an important role in this process.

Opposite to the teachers in the study by Lonka et al. (3), who showed a relationship between expertise in educational psychology and the tendency to suggest learner-centred ways to handle the applied example, these teachers were not experts in educational psychology. The participants of the current study do not possess the conceptual tools or the language to express what they actually meant by learning. Some teachers do have some procedural knowledge however, of how they would help a student having problems learning. This knowledge is possibly tacit. When it comes to action, how to implement their knowledge, they did not express very elegant solutions. The biomedical teachers who participated in this study did not appear to employ the tools for trying to activate meaning in their students or help them to apply their knowledge. They had, however, positive attitudes towards education, which is a good starting point for future staff development.

### **Implications for practice**

As established previously, the development of declarative knowledge does not mean that a change of practice has happened, however, it may work as a tool for such changes to be introduced. Language has an impact on our thinking

and effects of education are often a linguistic change (5). Apart from establishing a vocabulary of education around teaching for teachers to be able to express ideas of learning, teachers need tools for putting their ideas into practice. If the community of practice (30) within which they work does not supply an array of strategies for teaching, teachers are inclined to fall back on the traditional school like methods of teaching that they may have experienced themselves, and just make the best out of the situation.

The results of this study indicate that the development of quality of teaching should be implemented in the context of teachers' practice. We suggest that this kind of intervention is used not only as a tool for collecting data about medical teachers' conceptions and practice of teaching, but that it may be used as an intervention for mapping inconsistencies in conceptions and practice to get teachers involved in reflection on their practice (31).

**Word count: 3275**



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## **DEVELOPING A COMMUNITY OF PRACTICE AROUND TEACHING: A CASE STUDY**

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It is neither easy to change teacher thinking, nor is it easy to influence teaching practice by handing teachers the tools to do this on a course. It is suggested in this paper that it is not enough to let teachers who teach take a course on teaching in higher education. The process of influencing teachers' thinking should include working with the communities within which they practice. One way of doing this is to apply the theory of communities of practice to the academic department.

Drawing from quantitative as well as qualitative data during one year, this case study describes the process of a collaborative project aimed at increasing the educational quality at a research intensive department and how what happened in the project seemed to contribute to the development of a community of practice to include teaching and learning. Based on the involvement of an educational developer the study sets out to bring about a shift in the joint enterprise of the practice, which is a central aspect of a community of practice, and analyse how the research intensive department under study responded to the initiatives taken in the project. The case study is analysed on the basis of the theory of communities of practice and suggestions are put forward as to how educational developers strategically can work as dialogue partners to empower departments into a process of educational development.

### **Introduction**

Educational development in Europe and elsewhere has since the 1970's been characterised by a focus on teacher training courses for Higher Education teaching staff. Since the 1990s, however, there is an increasing emphasis on strategic educational development employing policy implementation as a way of improving quality, as has been the case for instance in the UK (Gibbs, 2003). These strategies have a top-down effect at departmental level, by putting constraints on faculty to follow and follow up provided guidelines. We have also seen an increase in a consultancy approach whereby educational developers work together with single departments or faculties on issues relating to the development of high quality teaching and learning practice. As a contrast to the top-down strategy, in the case reported in this paper, a research intensive department initiated a process of educational development within the department by employing a Director of Studies with a background within the discipline, but also with documented skills as well as an interest in educational issues. Hence, the initiative stemmed from someone within the department, who started out at the same 'level' as the teaching staff.

The current research project was designed to scrutinize the possibilities for an educational developer to support the development of teachers' thinking of teaching

and learning in a community of practice, through interventions. The intervention seemed to contribute to the development of the department into a community of practice which included issues of teaching and learning in their hitherto highly research oriented focus. The article also reports on what strategic lessons can be learned from this case for educational development.

The paper draws on the literature on teachers' conceptions of and approaches to teaching and learning and on communities of practice. The outcomes of the paper are both theoretical, with a focus on the concept of communities of practice - what it is and why it is significant, and practical - discussing what indicators of change should be looked for when developing a community of practice (Wenger et al., 2002) and, the role of teacher thinking in such a course of events.

### **Methodology**

A case study approach was adopted motivated by the desire to understand and explore a complex social phenomenon: the development of a discourse around teaching and learning in a highly research oriented university department. Thus, the focus is on a process for which we do not yet have an in-depth perspective.

Yin (1989) defines a case study as *“an empirical inquiry that: investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used [to increase validity and reveal diverse perspectives]”* (pp.23-25, Yin, 1989)

One of the purposes of conducting case studies is to be able to generalise beyond the particular case or cases studied. This method of generalization is referred to as “analytical generalization”, in which the idea is to compare the results of a case study to a previously developed theoretical model (Yin, 2003). In this case study we have integrated knowledge of conceptions of and approaches to teaching and learning with the theory of communities of practice to form such a framework.

The case for the study is a department and how it changes as a community of practice. It provides a “bounded system”, bounded by time (one year of data collection) and place (one single department). The data that informs this study are drawn from the strategies used for the development of educational quality within the department and provide multiple sources of information: feedback from questionnaires, workshop-results, interviews and documents such as course evaluations by students. Hence, an action research approach was taken, where the interventions undertaken for changing the community of practice also provided data that could be analysed and interpreted in order to understand what happened in the process of the project. The interventions carried out were 1) the use of a feedback form to enable for teachers to make their conceptions of teaching and learning explicit and possibly to trigger discussion on educational issues, but also to get feedback on how the group of staff involved in teaching perceived a number of educational issues. 2) A workshop with a purposeful sample of staff from differing positions (PhD, Research Assistant and Professor) to

identify weaknesses with the current educational quality, and a vision of the direction they wanted the department to go, as well as finding suggestions for how this could be done 3) Interviews with the Director of Studies and teaching staff in order to get a deeper understanding of their interpretations of the interventions. 4) The introduction of new seminar questions in response to the course evaluations from students where lack of alignment with the assessment as well as a promotion of a surface approach to learning was identified.

A detailed discussion of the intervention strategies and their results is presented in the main body of the paper under 'the story'.

The transferability of this case to other contexts was enhanced through triangulation and audit. The triangulation comprised the use of multiple sources of data and audits were based on discussions with educational developers from other universities. From the audits it became evident that this case might be of relevance to people working within strategic educational development.

### **Theoretical framework**

In this section, we indicate the significance of the theoretical frameworks used, how theories of teacher thinking and communities of practice interrelate, and identify key aspects of both that will be used to structure the discussion of emergent findings.

#### ***Approaches to teaching and learning***

An extensive research literature on students' approaches to learning identifies three approaches: deep, surface (Marton & Säljö, 1976) and strategic or achievement orientations (Entwistle, 1997). When students adopt a deep approach they direct their attention toward the meaning of a text, thus increasing the possibility of understanding the phenomenon dealt with in the text. However, a student adopting a surface approach attends to the surface features of a text usually to be able to reproduce it for assessment. Students adopting the strategic approach or achievement approach organize their studying so that they manage time well and adapt their approach so that they will pass the requirements of the assessment. Several studies have linked learning orientations with the outcome of how well students with different orientations perform, showing that students applying a deep approach perform far better than students applying a surface approach (Marton & Booth, 1997; Marton et al., 1996; Trigwell & Prosser, 1991).

Research on university teachers' approaches to teaching shows that there is evidence that these are linked to their conceptions of teaching and learning (Kember, 1997; Prosser et al., 1994). Teachers' approaches to teaching have been categorized as ranging from highly teacher-centred, where teaching is seen as the transmission and organisation of content, to student-centred, where teachers concentrate on the facilitation of student learning.

There is evidence (Trigwell et al., 1999) that teachers' approaches to teaching are related to students' approaches to learning, highlighting the importance of supporting

teachers in the clarification and development of their conceptions and approaches to teaching.

Teachers who teach in disciplines such as engineering and medicine, have been found to be more likely to adopt a teacher-centred approach to teaching (Lueddeke, 2003; Trigwell, 2002). This may have to do with the ontological and epistemological beliefs that are fostered within the discipline or the culture of the department (Becher & Trowler, 2001), or community of practice. It is therefore important for educational developers to understand these communities in order to support their development into student-centred communities of practice (Bolander et al., 2006).

### ***Community of Practice***

Communities of practice theory offers a social theory of learning, which assumes that we learn and become who we are through interaction with other human beings, and artifacts, such as books and computer programs (Lave & Wenger, 1991).

This approach to learning coincides with Bereiter's socio-cultural perspective on learning as building knowledge in interaction with others (Bereiter, 2002). Eraut (2000) argues that professional identity is constructed in contexts of practice through the integration of formal and explicit knowledge, with informal, or tacit knowledge (Eraut, 2000). People belonging to a community of practice are not just a group of people, or a web of interactions. They are a group who share an overall view of the domain in which they practice and have a sense of belonging and mutual commitment to this (Wenger et al., 2002).

A community of practice guides the attention of members through the negotiation of meaning that constantly takes place within it. For example, members of a community could give a positive meaning to 'teaching', so that it is something that is desirable to do, enthusiastically undertaken, and should involve professional development. Alternatively, another community of practice could work with a more negative view such that teaching is for those who are not successful researchers, that it is a 'must-do' thing that is peripheral to the central mission, the joint enterprise of the community of practice - research.

According to Wenger (1998, p. 73) a successful community of practice should be based on *mutual engagement*, the way members engage with and respond to each others' actions and establish relationships based on this engagement; *joint enterprise*, how participants in the community understand, contribute to and take responsibility for the development of the community of practice; and a *shared repertoire*, the ability to make the range of resources employed into something that is used and engaged in. This requires participation and the ability to make practices meaningful.

Going back to our original question, how to support the development of a community of practice around teaching and learning within an academic department, it is necessary to identify the criteria we can use in order to judge whether the



establishment of such a community has taken place or not. These are identified below and are based on Wenger et al (2002).

If a community of practice around teaching and learning has been established:

A. Participants will be *mutually engaged* in the teaching and learning of students. This suggests that the members of the community respond to each other's actions as teachers, for instance asking each other for advice, or finding collaborative partners for teaching activities.

B. A new *joint enterprise*, in addition to research, will be developed, that of education. Indicators for such a change could be that teachers understand and discuss the quality of student learning and what role they have as teachers in relation to student learning.

C. Participants will build a *shared repertoire* around teaching and learning through the development of tools and methods for the support of learning.

If a community of practice around teaching is established, teachers will not only evaluate their teaching and invent new ways of organizing teaching and learning, but will also reflect on their practice and share their ideas of new ways to support learning. The *enterprise* and the *repertoire* can change as new and existing members introduce and share elements of practice with each other. For example, a newly employed teacher who has experience of organizing lab teaching differently to the way it is currently organised may introduce this to his or her colleagues. This person thus becomes what Wenger (1998) calls a broker, 'breaking' the new ideas into existing practice.

A central problem for the development of educational quality within traditional academic institutions can be that the three aspects of a community of practice described above, focus on research. Thus, in this paper, we want to explore how a peripheral member, in this case an educational developer, can act as a broker to influence a community of practice to develop a new joint enterprise in addition to research, that of education. We will address the following questions:

- Is it possible to bring about a shift in the joint enterprise of a community of practice so that quality of education is either included in the idea of what is important for quality research, or made into a separate parallel joint enterprise?
- How does a research-intensive department respond to the initiatives taken in the collaborative project, to modify the joint enterprise?
- What are the conditions under which researchers will regard education as a joint enterprise?

### **The story**

The narrative is told in an informal way, where data from interviews, observations, questionnaires and workshops carried out during the period of August 2003 to August 2004 have been interpreted by me, the first author of this paper, to tell my story of the development of a department, with which I was involved as an educational developer.

#### *The Department*

The department is a successful research organisation of some 150-200 individuals (postgraduate students, post-docs, faculty, and administration) within basic science. The department was at the time responsible for teaching Cell biology within the first semester of the medical program, as well as involved in two other undergraduate programs. However, teaching was only a minor activity creating only a few percent of the total departmental funding and most teachers were involved in teaching only a few days every year. Seventy-nine employees were involved in teaching activities. A majority of these were PhD students. Eleven held a position as professor.

A system of rotating the position of Director of Studies had been going on for several years. Every year or so a new lecturer had to take on the position, relieving the previous Director of Studies from their duties to go back to focus on their research. This resulted in low continuity for students as well as for the teachers involved in teaching. The results of the course evaluations also showed that students were not happy with the courses provided by the department. There was too much content during the few weeks available, no 'visible link' between lectures and seminars, poor integration between different parts of the course, and the teaching was rated poorly.

After a decision by the Head of Department at the time, a new full-time Director of Studies was recruited. This person would be an established researcher within the field, but would also have documented skills and interest in teaching and education.

#### **The Director of Studies**

At the start of his new job, the Director of Studies quickly got involved in an educational project where a computer assisted learning tool was developed for one of the courses given by the department (Masiello et al., 2005). The Director of Studies later reported that

*"This was when I realized that you could actually work with education in a more strategic way, tracking processes and documenting development. Since then I have very consciously saved everything, and kept my diary, for later use, thinking that maybe some day, I will write it up into an article."* (Interview 1 with Director of Studies)

A year passed and according to the Director of Studies things pretty much went on as they had before, the focus being on getting to know the organization. At the beginning everyone teaching avoided the Director of Studies, afraid they would get some extra teaching, or that the Director of Studies would ask them a favour, as had always been

the case previously. The management of the department sometimes tried to get the Director of Studies to bring all teaching staff together for a quick course in 'how to teach the right way', to improve course evaluations. However, the Director of Studies rejected this and focused instead on mainly administrative tasks, such as how to best organize course schedules, allocate teaching, and reviewing course literature.

*"But most importantly, I have tried to get to know people, to gain their confidence, to ask them how their teaching went last week to show that they are not there for me, I am there for them."* (Interview 1 with the Director of Studies)

Later, in interviews with some of the teachers, they expressed the view that teaching was more effective since the appointment of the new Director of Studies because he took care of organizing things well, and they could focus on preparing their teaching, rather than worrying about booking lecture theatres, etc.

Another change was the purchase of an extravagant coffee machine for the coffee room. This encouraged staff to go to the common coffee room to take a real break and meet with colleagues:

*"Lately, I overhear colleagues talking about their teaching in the coffee room. They tell each other how their teaching went, ask each other for advice etc. I think this is an important change in the department when it comes to the attitude towards teaching"* (Interview 1 with Director of Studies)

### **The educational developer (Klara)**

I see myself as an interpreter and facilitator. I am interested in enhancing the student learning experience by collaborating with their teachers. Since teachers have developed expertise in their discipline, and teaching far too seldom is seen as part of being a professional in the academic world, I see it as my role to interpret educational theory into something understandable and applicable for higher education teachers. I believe that learners must construct their own knowledge in interaction with their environment. Hence it is my role to facilitate teachers learning about their own teaching, how it may best support student learning, and help them to critically reflect on what they are doing and why. The invitation to collaborate with the Director of Studies, provided me with the opportunity to work in a different way with teachers, that is to take a sociocultural approach working from within the department, and to thus eventually facilitate development towards a high quality learning experience for the students.

### **The collaborative project**

After about a year of getting acquainted with all levels of the department, the Director of Studies contacted me to talk about the possibility of getting some consultancy for the development of the educational quality at the department. I was told that teaching was seen as something that was not rewarded and not seen as something to invest a lot

of time in, even though later, the results of a questionnaire showed that a lot of the teachers involved actually did enjoy teaching for different reasons. After a few meetings it was decided to start a project that would last for three years and where the process would be tracked in several ways. A project plan was formulated with the general aims of achieving better education which in the long run would contribute to the general goal of the medical programme; better health care. Also a number of specific objectives were stated. One of these coincided with the purpose of this paper: to understand how a research intensive department could be developed into a high quality teaching department.

The following describes the four key interventions I was involved in as an educational developer, and their inter-relationship with the Director of Studies' own contribution.

### **1) The feedback form**

The first phase of the project included the design of a feedback form to find out what teachers thought about teaching and learning at the outset (Appendix A). The questions focused on how they viewed educational practice in the department, and their capacity to influence their own teaching and the educational situation. Also, open-ended questions about their definitions of learning (designed by Lonka et al., 1996), were integrated into the feedback form to get an understanding of teachers' conceptions of learning. Finally, a questionnaire on identifying teachers' teaching strategies (designed by Vermunt, 1995) was included. This form was also intended as an intervention tool for prompting teacher reflection on educational issues, giving teachers immediate feedback on their teaching strategies.

The feedback form was distributed in paper to all staff (n=79) that were involved in teaching by a member of the administrative staff at the department. Sixty-two members of staff including PhD students, research assistants, lecturers and professors filled out the questionnaire. Each feedback form was assigned a code to which only the educational developer had the key. Except from the feedback form a form of informed consent was distributed. This was however collected separately from the feedback form so that it would not be possible to track to the filled out questionnaire.

The reactions after distributing and collecting the questionnaire were focused around three different issues:

*“There were those who enjoyed filling it out, who thought it was interesting and fun, that it made them think. Then there were those who protested: “This is not scientific!” they said – viewing science mainly in terms of experimental studies and the closest they get to behavioural science is by doing experiments on rats. Finally, there were those who were puzzled and a bit annoyed by it, because they thought the questions in the questionnaire were vague. An issue often brought up was whether they should think of under-graduate or post- graduate teaching when filling it out.”* (Interview 2 with Director of Studies)

It was evident that the feedback form had created some reactions and discussion, not only about educational matters, but also of puzzlement and sometimes annoyance, which I thought was good. At best, it meant that ideas of research and education were challenged; a worst case scenario meant that educational issues became even more peripheral.

Three teaching strategies were addressed in the feedback form. The first has to do with teaching so that students will understand; the second with teaching so that students will apply knowledge; and the third with teaching students to repeat knowledge. Each strategy can be approached in two different ways. A 'taking over' approach is when a teacher tries to be understandable, gives examples of the content matter in an applied context and repeats facts or information that are important. An 'activating' approach is when the teacher helps the students to reveal their understanding, lets students give applied examples and identify what is essential (Vermunt & Verloop, 1999).

The open ended questions in the feedback form were analysed according to content analysis to cover the meaning of what was expressed in the data. The Likert type questions were analysed in relation to whether respondents scored high or low on the 'taking over' and 'activating' strategies of meaning and application. The results of the questionnaire showed a dissonance between some of the teachers' conceptions of learning and the strategies they used in their teaching. (See(Bolander Laksov et al., 2007b). Even though almost a third of the respondents held a view of learning where learning was seen as some kind of transformation of the learner, only an eighth actually applied activating strategies in their teaching.

The results of the questionnaire were summarised and presented to all staff of the department via the departmental newsletter since it was thought important that staff would get feedback on the questionnaire that they had filled out. However, no explicit reactions were aired at this instance.

The questionnaire data called for some clarification. For instance, there were comments from the respondents about whether this concerned undergraduate or post-graduate teaching, which made me assume that teachers think completely differently when teaching undergraduate students compared with the ideas of teaching postgraduate students. I thought that the best way to find out was to ask a sample of teachers in interviews, which were carried out in August the next year. However, the Future workshop was the next step in the collaborative project, and will be outlined before the interviews.

## **2) The Future workshop**

The next step was to carry out a 'future workshop'. The purpose of a Future Workshop is to identify the problematic areas of today concerning a certain issue, and to explore how a possible future might look like (Denvall & Salonen, 2000). Finally the link between present and future is made by suggesting a number of concrete actions to be taken towards the future. Another objective for the workshop was to create a common experience of discussion around education quality and teaching and learning. It was

considered important to involve some members of staff in educational discussions in a creative atmosphere to create ownership of the department's change process.

A group of 12 people was selected for the Workshop based on stratified purposeful sampling where the aim was to get as many different views on the defined problem as possible (Patton, 2001). The group comprised of professors (2) lecturers (3), researchers (2), postgraduate (3) and undergraduate (2) students. The Director of Studies did not participate, since my assumption was that he would have too much of an influence on the process. The question posed for the Future Workshop was: "How could teaching at the department be more effective?"

The Future Workshop resulted in the identification by the group of several problem areas and ideas on how to tackle them. Students' lack of motivation to learn, surface approaches to learning, and teachers' lack of motivation and teaching competence were seen as central problems. The ideas for resolving these problems were aimed at better structuring of teaching, more time for students and teachers to meet, an improved curriculum and reward schemes for teaching.

A first step suggested towards implementing these ideas was that the Director of Studies would arrange for a meeting where these ideas would be presented and the issues discussed further. However, this was where the first conflict of interest appeared. In relation to the idea that ownership increases the experience of participation in the process of change (Wenger, 1998) the only advice the Director of Studies received from me was to pursue the results of the future workshop in a departmental meeting. Instead, he decided against it, and did it his own way:

*"This is a big department. Not everybody is involved in teaching and everybody treasure their time for research. Since I started we have only had one proper departmental meeting, and I believe most people here would consider it a waste of time. Instead, I have been talking to people. I go to them and ask. Also, when I look at the course evaluations and there is a positive comment, I go to that teacher and tell them: -well done!"* (Interview 2 with Director of Studies)

Some of the suggestions from the Future Workshop were dropped. For instance, the idea of rewarding excellence in teaching by giving teachers the opportunity to go to conferences and do more research was not possible, because of the way the budget was organised. However, one aspect that was seen as important was the contact between teachers and students, and how to support a deeper approach to learning.

### **3) The interviews**

To accomplish a deeper understanding of the results of the questionnaire and the future workshop, interviews were carried out. An interview guide covering areas from conceptions of learning, teaching and assessment, to specific questions regarding clarifications of the results of the feedback form was constructed (See appendix B). Six teachers were selected to provide maximum variation through a stratified sample

(Glaser & Strauss, 1967), a strategy aimed at representing diversity to more fully understand the multiple perspectives on the issue at hand. In this case the variation we sought concerned different conceptions of teaching expressed in the first questionnaire, gender, and employment position. Out of the six interviews planned, unfortunately only five were carried out, two women and three men at the employment positions of professor (1), researcher (2) and PhD student (2).

The interviews were tape recorded and transcribed in full and gave when subjected to content analysis, as I had hoped, a more nuanced picture of the results of the questionnaire and the workshop. First of all, there seemed to be a split between those who scored high on 'taking over' strategies and those who scored high on 'activating' strategies.

These results coincide with what has been found previously by Prosser & Trigwell (1999) among others. In their words there is a split between teachers who have a teacher-centred approach, the 'taking over' strategy here, and those who have a student-centred approach, the 'activating' strategy. An interesting aspect, however, was that none of the interviewees were 'purely' within one of these approaches. This could be because variation in approach arises from context and purpose as well as conception– the 'relational' approach (Marton et al., 1996; Prosser & Trigwell, 1997). Those who were mainly within the teacher-centred approach also talked about aspects such that students learn in different ways, and the importance of variation in teaching. In a similar way, those with a more student-centred approach still had strong traits of teacher-centredness, such as stressing the importance of students learning facts by heart.

#### **4) Change of seminar questions**

One way of supporting a deeper approach to learning, was to re-design the questions for the tutor-led seminars based on Biggs' and Collins' (Biggs & Collis, 1982) SOLO taxonomy. The seminars had previously functioned as a one-hour long seminar with up to fifteen students going through a list of 20-30 questions with a PhD student as a tutor. The seminars were seen as an important focus for intervention because of the many tutors involved and because these tutors were seen as the possible future lecturers at the department. By re-designing the seminar questions from a uni- or multi-structural focus ie focusing on factual questions, to a relational level emphasizing ie the analysis of relationship between facts, it was assumed that seminar tutors as well as the students would be forced to redefine the role of the tutor. Two of the tutors were among the PhD students interviewed. Considering the interview excerpts below, it seems that the change of seminar questions did have some effect.

*"My role is to tell the students the right answers. In the previous version of the seminar questions the seminar tutors could more give mini-lectures on topics that we felt the students needed, but now it has changed more into help the students to discuss the topics."*(Interview 1).

*"...[My role is] to get them to think creatively, not only answer questions, but consider how things are interrelated. [...]* The discussion

*groups give rather a lot, but this is new since this term, that we discuss before the lecture. The groups are smaller [than in lectures], 5-10 students, and even though the students start from the same materials, they have different questions, and it is a lot of fun because then they are stimulated in a different way. You can see that at least most of them start to think and not only focus on what is in the text book.” (Interview 4)*

After introducing the new questions some of the tutors as well as some of the students complained and found this process frustrating. Several tutors complained to the Director of Studies. A typical attitude was expressed in one of the interviews:

*Previously, we had a list of questions that we went over with the students, and if they didn't know the answers, you told them.... Now, the questions are in a way more fun, because they require that the students think a bit more, but they are too difficult and too many. It means that we don't have time to go through all of the questions, and they don't get the right answer, because the questions are more difficult now..... Also it is impossible for me to know the answers to all the questions, because this is not my speciality. (Interview no 1)*

Whilst the seminar questions seemed to activate students into higher order thinking strategies, the tutors seemed to have different strategies for handling the questions, depending on their conception of their role as 'taking over' or 'activating'.

#### **Discussion:**

The purpose of this case study was to describe the process of what happened when introducing an intervention aimed at developing teachers' thinking and how this seemed to contribute to the development of a community of practice including teaching in a highly research oriented department at a Swedish university. The scientific and methodological implications from this case will be discussed in this section. First, however, the case is discussed on the basis of the criteria for the establishment of a community of practice in this context, as outlined under the theoretical framework at the beginning of this paper. Practical implications are suggested in the conclusion.

#### ***Evidence for an extended focus of a Community of Practice:***

##### *Mutual engagement*

The department has grown considerably over the years, and consists of a large number of research groups, that internally share the domain of research. However, through the questionnaire, the future workshop and the interviews a somewhat different *mutual engagement* seemed to take shape for those involved in teaching – a concern for the quality of education. This conclusion is based on the discussions that took place in the future workshop, where participants started to discuss and negotiate meaning around the motivation of teachers to teach and the motivation and learning of students. But also as a result of the questionnaire, teachers started to discuss teaching and learning



with each other. In the interviews it also became obvious that the change of seminar questions had led to considerable discussion on the purpose of seminars.

Another change indicating mutual engagement is that since the employment of the Director of Studies, it has become routine to go to him with questions and issues relating to teaching.

Finally, a central part of the practice had become to drink coffee by the new coffee machine. The introduction of the coffee machine could be an aspect of what Wenger describes as development of *both public and private community spaces*. The coffee room could be an example of a public community space. It is open to everyone within the community and based on informal discussions of current issues. In this way relationships are established within the community. Public community events can serve as a kind of ritual, which is often the case with a coffee break in Sweden. Through these events people can experience being part of the community and see who else participates. However, the discussions that take place in the coffee room are also private. It can be a one-to-one networking where people share information with a limited number of people.

The effect of the future workshop is more problematic as not all proposals were built on by the Director of Studies. The pursuit of the ideas put forward in the future workshop could have resulted in mutual engagement, and maybe it did, even though it was not sustained by the Director of Studies.

To sustain the mutual engagement in the department, the Director of Studies, needs to find the right balance between working informally, and making people feel included and engaged in the community.

#### *Joint enterprise*

The results from the interviews show that the *community* around teaching and learning is dependent on the Director of Studies as an organiser and administrator, but also as a broker. By introducing the coffee machine, teachers meet more easily and hence can discuss teaching, but it seemed even more important that the Director of Studies worked informally, establishing a 'nice culture' around teaching, as was expressed in one of the interviews. Teachers reacted in different ways to this change, and thus contributed to creating a joint enterprise around teaching.

The questionnaire in itself also created reactions, and made it possible to see what disparate opinions and thoughts teachers were having around teaching and learning. It was not so much the results of the questionnaires that were important, but what discussions and changes took place as a result of the questionnaire.

Although the creation of annoyance and perhaps frustration could be interpreted as an unhelpful way to promote change, the negative and positive discourse that ensued makes an important contribution to the development of a joint enterprise. Part of the strategy was, however, not to leave teachers at this point, but to see this as a

beginning, to get a discussion going on the topic. It is therefore suggested that the idea of the community of practice as built on social interactions in a knowledge intensive context should also include a meta-cognitive perspective on the thinking of the members of the community. This could be a tool for developing a kind of self-understanding of the community by having its members reflect on the community's own activities, values and possible ways of developing.

A problem with the emphasis of the participation in a community (Lave & Wenger, 1991) is that the individual might be forced into a peripheral role if they do not comply with the community norms. This is relevant to the application described in the paper, since it was obvious that teachers did not agree on a common view of learning. The strategies adopted by the Director of Studies and the Educational Developer focused on the pursuit of the discussion on enhancing the quality of teaching and learning, in other words the development of the enterprise. Therefore they made a point of acknowledging teachers' initiatives and interests in teaching. The focus on educational quality and effectiveness of teaching that was emphasized in the future workshop was thought to enable teachers with differing views to get involved in this discussion. However, only 12 teachers took part in the workshop. What about the other teachers? Because of being at the stage of negotiating the meaning of the enterprise the most important action taken at this stage probably was to let teachers air their understandings and conceptions. Apart from teachers having this opportunity in the workshop, this was done in the interviews, directly to the director of studies and in the open ended questions of the feedback form. However, no consensus of an enterprise was agreed on, and hence a shift of the enterprise was not considered to be realized within the scope of the project.

#### *Shared repertoire*

Over time, when a community is pursuing a joint enterprise, resources for the negotiation of meaning are created. In this case, these resources - the shared repertoire - consisted of everything from documents, such as the new seminar questions and the feedback form, course evaluations, and the coffee, the coffee room, the outcome of the future workshop, as well as gestures, and symbols for example. All these have meaning for the community of practice, but can also be used in the production of new meanings. Another shared repertoire could be the use of teacher-centred or student-centred approaches to teaching, and whether the teaching strategies are oriented towards activation or taking over.

#### ***Who has the role of a broker?***

Was the role of the Director of Studies just to relieve teachers from practical administration? A secretary who would do things for them? No and yes! Teachers in this context spend very little of their time on teaching issues. If half of the time spent on preparation of teaching, instead has to be spent on sorting out practicalities, it can certainly be off-putting. For someone who is teaching maybe fifty percent of their work time, this might not be a problem, but for someone who is spending only four to five percent of the time at work teaching, it probably makes rather a large difference.

While writing this case study, it has become obvious that the role of the educational developer during this process was also significant for the development of the process. At the stage when the project plan was formulated, there was considerable negotiation between the educational developer and the Director of Studies. The Director of Studies was very explicit in stressing the importance of not using any educational jargon, or theorising what was happening at this stage. This probably resulted in a modification of language on the part of the educational developer, supporting the language from the management literature the Director of Studies was used to with a focus on 'learning organisation' instead of 'communities of practice'. What was important, however, was not the exact wording of what the project should aim for, but the negotiation of meaning taking place. The Director of Studies hence had an important role in bringing in educational ideas from the discussions with the educational developer, to translate these into his own environment and negotiate meaning around these ideas with other participants in his community. In that sense he was a broker between the educational developer and the dominant community within the department. However, the developer was necessary as a translator between the community of educational developers and the role of the broker was therefore considered to be carried by the director of studies and the educational developer as a pair.

### *Comments on methodology*

The use of a case study methodology meant that it was possible to explore how some initiatives to increase awareness of educational issues contributed to the development of a community of practice around teaching and learning. The opportunity to study a case in its natural setting made it possible to discern and describe the inner logics of the process of the case. Also, it seemed useful to apply the theoretical framework of communities of practice to the analysis of the case.

There is always a risk of bias caused by the researchers' involvement in the collection of data and engagement in a process, as on the part of the educational developer in this case. It is thus important for the researcher to de-center from her own perspective. The advantage on the other hand, is the possibility of receiving first-hand data. In order to minimise the potential risk brought about by this double role, the case study has been analysed in collaboration with two other researchers as well as discussed regarding the role of the educational consultant as an agent rather than only as data collector.

Concerning the interviews, there is a risk that the teachers felt that they 'should' take part in an interview when asked by the Director of Studies. However, it was thought to set a positive atmosphere, since it meant that the Director of Studies was interested in their opinions and thoughts even though he did not know who had expressed what.

When looking back at the interview guide (Appendix B) it is striking that the questions were mainly focused on the teachers as individuals, not on interactions with peer teachers, team teaching or discourse, which would have been appropriate given the community of practice focus. Could the questions as they were posed have steered

interviewees into a focus on the teacher as a significant individual, rather than focus on a collaborative approach where the teacher is part of a context? It is possible that the questions encouraged a way of thinking about teaching and learning which emphasized individual cognition rather than a sociocultural perspective, which is more congruent with a community of practice. The observations of what was happening in the extended community however mainly build on other sources of data.

### **Conclusion:**

In line with the strategic approach to development of quality in higher education, this case provides important understanding of how to support a development of communities of practice around teaching and learning within an academic department. Below are implications for practice based on our answers to the questions posed at the beginning of this paper.

#### *Did a shift in the joint enterprise take place?*

Interventions such as the use of a feedback form and the design of the new seminar questions can work as a way of introducing discussion and reflection on a new joint enterprise, such as in this case – education. However, at this stage a proper shift in the joint enterprise was not considered to have been achieved as included in the idea of high quality research. Rather it may be developed into a parallel joint enterprise within the same community by becoming more visible.

#### *How did the department respond to the initiatives taken?*

A crucial issue here is believed to be the initiative, which originated from within the department.

The importance of ownership and engagement for the creation of a joint enterprise and community of practice became evident from the Future workshop. Lack of interest or motivation can change into interest by putting an issue on the agenda and focusing on it. Also, the use of a shared language and letting participants formulate their own visions were considered helpful. Finally, we suggest educational developers not to lead the work of change. It may be initiated by you, but the internal agents must be the drivers for change. Hence, the educational developer is peripheral, and must remain so, for the department to develop its own specific joint enterprise. Ownership and dialogue is considered more important.

#### *What are the conditions under which researchers will regard education as a joint enterprise?*

It is important to find key words in dialogue with an internal agent that will trigger interest and engagement among staff, such as the concept of educational effectiveness, in the Future Workshop. In this case the concept of motivation, how to motivate students to learn and teachers to teach, turned out to be crucial for both the participants of the Future workshop and as a result of the feedback form. However, motivation often seems to be conceived as either something static - you have it or you do not have it, or something that it is for the teacher to impart to the students. By emphasizing the link between motivation and approach to learning, as was done with

the new seminar questions, the discussion on education could be widened as well as deepened.

A conclusion of this case study is that it should not be taken for granted that researchers are not interested in education – all of them have gone through education, and most of them were enjoying both teaching and learning according to the feedback form. The issue is rather, as has been pointed at previously (Bolander Laksov et al., 2007a), to make education visible instead of just a peripheral thing that has to be done every now and then. The initiatives taken during the collaborative project put educational discourse on the agenda, both formally and informally, and provided opportunity for the researchers and teachers within the department to negotiate meaning around their understanding of teaching and learning. It is our suggestion that by making teaching and learning an intellectual problem academics more easily approach this issue with interest, and the creation of a joint enterprise concerning teaching and learning can be achieved.

It is suggested that teachers' thinking about teaching and learning can be seen as part of the community of practice because it is in the interaction between the members of the community that change in the joint enterprise of the community of practice is possible.

This case study has hopefully shed some light on the concept of communities of practice and how it can be applied to a university context. For creating a balance between the two enterprises of research and education within this particular community of practice, the broker pair played a major role. An important issue however is how to maintain the sustainability of this new joint enterprise.

This case study strengthens the idea of widening strategic educational development work from focusing on top-down management led initiatives to emergent change, driven by collaboration and dialogue. It is necessary to be able to discuss and adapt an educational perspective to one that is useful and accepted by the people working in the organisation. The key to successful educational development lies not within agreement, but within dialogue, which is manifested by the creation of a community of practice around teaching and learning.

### **Acknowledgements**

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## Appendix A: The feedback form

1. Year of Birth: .....
2. Sex: M F
3. How many hours a year do you teach? .....
4. What position have you got in your department? (alternatives provided)
5. What educational programme/ s are you teaching? (alternatives provided)
6. What kind of teaching do you do? (alternatives provided)
7. Name of 1<sup>st</sup> degree received (e g MD, BSc.):.....
8. For how many years have you been teaching at a university? .....
9. For how many years have you been teaching at CMB? .....
10. What language do you teach in? Swedish/ english
11. Are you fluent in the language you teach? a) Yes b) so-so c) No
12. Have you taken any courses in teaching and learning?  
If yes, how many weeks? .....

In the next section you are asked to respond to a number of open-ended questions concerning teaching and learning. I ask you to think through each question and answer as honest as possible.

13. KI:s vision for undergraduate and postgraduate education
14. KI:s values for undergraduate and postgraduate education are:
15. The aim of a course specifies what? (Give an example if possible)
16. The goals of a course specifies what? (Give an example if possible)
17. The strengths of CMB in education (medical, biomedical, KTH, etc) are:
18. The weaknesses of CMB in education (medical, biomedical, KTH, etc) are
19. CMB has great potential in educational/pedagogic development in:
20. This must be changed or improved at CMB:
21. Rate your personal opportunities for developing the undergraduate education at CMB in general. Very Low -- 1 - 7 -- Very High
22. Rate your personal opportunities for developing specifically the course or course modules that you teach. Very Low -- 1 - 7 -- Very High
23. What is the major driving force for you as a teacher?
24. Has your work as a teacher in any way contributed to your career development in a positive or negative way? If yes, explain how.

### The following questions 25-29 have been designed by Kirsti Lonka et al. (1996)

25. Give your own, subjective definition of learning
26. Please explain the basis on which you gave your answer to "25"?
27. What else would you like to learn about the topic of 'learning'?
28. Is there anything about this topic (of learning) that puzzles/ confuses you? If yes, please describe below
29. What do you think would be the best way to enhance students' ability to learn? Why?

This questionnaire is about various activities that teachers undertake when they teach. Please read every statement carefully and then indicate the degree to which you use the stated activity in your teaching (circle the right number). The numbers behind the statements have the following meaning:  
 (© Jan D. Vermunt, ICLON – Graduate School of Education, Leiden University, Netherlands)

- 1= I do this seldom or never
- 2= I do this sometimes
- 3= I do this regularly
- 4= I do this often
- 5= I do this almost always

- |                                                                                 |   |   |   |   |   |
|---------------------------------------------------------------------------------|---|---|---|---|---|
| 30. Give an overview of the subject matter.                                     | 1 | 2 | 3 | 4 | 5 |
| 31. Tell students exactly what they have to know.                               | 1 | 2 | 3 | 4 | 5 |
| 32. Repeat subject matter.                                                      | 1 | 2 | 3 | 4 | 5 |
| 33. Ask about the relevance of the subject matter for real life.                | 1 | 2 | 3 | 4 | 5 |
| 34. Give examples.                                                              | 1 | 2 | 3 | 4 | 5 |
| 35. Make students formulate their own point of view.                            | 1 | 2 | 3 | 4 | 5 |
| 36. Let students make connections with their own experiences.                   | 1 | 2 | 3 | 4 | 5 |
| 37. Explain the subject matter step by step.                                    | 1 | 2 | 3 | 4 | 5 |
| 38. Ask detailed questions.                                                     | 1 | 2 | 3 | 4 | 5 |
| 39. Give students the assignment of making a diagram of the subject matter.     | 1 | 2 | 3 | 4 | 5 |
| 40. Explain how the theory may be applied.                                      | 1 | 2 | 3 | 4 | 5 |
| 41. Explain the relationships between parts of the subject matter.              | 1 | 2 | 3 | 4 | 5 |
| 42. Give exams that test factual knowledge.                                     | 1 | 2 | 3 | 4 | 5 |
| 43. Indicate relations between the subject matter and events in daily activity. | 1 | 2 | 3 | 4 | 5 |
| 44. Ask for similarities and differences between concepts.                      | 1 | 2 | 3 | 4 | 5 |
| 45. Explain in detail the difficult parts.                                      | 1 | 2 | 3 | 4 | 5 |
| 46. Let students solve real life problems.                                      | 1 | 2 | 3 | 4 | 5 |
| 47. Present arguments in favour of, and against a certain point of view.        | 1 | 2 | 3 | 4 | 5 |

**Computing your scores for your questions on the previous page.**

Add your scores on the questions below to get an indication of the degree to which you employ the named teaching strategies.

- Teaching strategy: **Taking over meaning** directed learning  
 Questions: 30 + 41 + 47. Your strategy score: .....+.....+.....= .....
- Teaching strategy: **Activating meaning** directed learning  
 Questions: 35 + 39 + 44. Your strategy score: .....+.....+.....= .....
- Teaching strategy: **Taking over application** directed learning  
 Questions: 34 + 40 + 43. Your strategy score: .....+.....+.....= .....
- Teaching strategy: **Activating application** directed learning  
 Questions: 33 + 36 + 46. Your strategy score: .....+.....+.....= .....
- Teaching strategy: **Taking over reproduction** directed learning  
 Questions: 32 + 37 + 45. Your strategy score: .....+.....+.....= .....
- Teaching strategy: **Activating reproduction** directed learning  
 Questions: 31 + 38 + 42. Your strategy score: .....+.....+.....= .....

**Creating your teaching strategy profile with the scores from the previous page**

Indicate your scores with a dot in the overview below and connect the dots with a line.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Taking over meaning</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Activating meaning</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Taking over application</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Activating application</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Taking over reproduction</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Activating reproduction</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

If you like to keep your Teaching strategy profile, please take a photocopy of the last two pages (or rather the whole form) before you hand it in. At the last page you will find an explanation of the teaching strategies and the terms used on this.

**Thank you for your participation!**

**Appendix B: Interview Guide**

- **Background questions:** Please tell me about your teaching. What and how do you teach? What is your role as a teacher, in the lectures/ seminars/ labs? How do you like teaching? How do you see the relationship between teaching and research? How do you see yourself – as a researcher or teacher or both? Why
- **Teaching design:** How is your teaching planned? How is the assessment designed? Who defines what and how you teach? How do you know if your teaching is successful?
- **Learning:** advice to a student on how to best learn during the course you are teaching? Difficulties in your discipline or the teaching situation? For yourself to teach? How do students learn? Can you exemplify a good and a bad question that you sometimes get from students? What are the differences/ similarities between undergraduate and graduate students?
- **The department:** What is it like to be a teacher at this department? Has this changed since you first started here? During the last year? How and why/ why not?



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