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Networked Learning

Maarten de Laat

Leren in Netwerken (met een samenvatting in het Nederlands)

Proefschrift

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Introduction

The increasing integration of computers in our daily lives seems unstoppable. Some people think this development is frightening, while others simply love it. I belong to the group that likes it; and always have. As children we played with computers, trying to make simple programs that said 'hello world' on the screen, to more complicated, but still pointless, creations in the greater scheme of things. Later on, around 1993, something more exciting happened to us...and my friend Joël and I, would cycle for 20 minutes to the university to make use of it: the internet. There wasn't much to see or do on the web at first, but the idea of connectivity and being able to share information and chat with each other through computer networks was, for us, something worth exploring. And it still is! The use of the internet as a communication device has great potential for learning. Humans are social learners; they like to tell stories, ask each other for help, discuss issues that puzzle them and solve problems together. Using the internet in such a way, now feels natural and many people use it to do so, by emailing, instant messaging, taking part in online discussion groups, or joining web-based communities. The demand for online communication has now become so strong that educational institutes and organisations are actively making use of network technology to facilitate communication and online learning. In this context we speak of networked learning. By networked learning we mean how internet-based information and communication technologies are used to promote collaborative and co-operative connections: between one learner and other learners; between learners and tutors; between a learning community and its learning resources, so that participants can extend and develop their understanding and capabilities in ways that are important to them, and over which they have significant control (Banks, Goodyear, Hodgson & McConnell, 2003, p.1).

At the beginning of this thesis, which was commissioned by the police academy of the Netherlands, we had lengthy discussions about how to study this networked learning phenomenon within the context of the workplace – a place where police officers naturally discuss their work-related problems, share knowledge and criticise and develop their practice. During this time the Dutch police was rapidly building networks to support the exchange of information. The aim is twofold: 1) to make police knowledge and procedures available nationwide (accessible to every police officer through their desktop computer) and 2) to engage police officers in processes of collaborative learning and knowledge-building together through social interaction. This network (called Police Knowledge Network) facilitates online communication, using email, chat and discussion forums. Using these tools the police academy plans to increase connectivity amongst police officers, to stimulate them to share work experiences and discuss work-related problems as a way to keep police knowledge and procedures alive and up to date. Similar developments were taking place in the police academy, aiming to offer online education and support to their students. One of the key ideas to support communication was to offer the possibility of building or joining online communities on the police network where workers could share and discuss their expertise or students could collaborate on course assignments. The focus on communities of practice (Wenger, 1998) seemed appropriate because this was an emerging concept and still is a central concept influencing research agendas in the areas of human resource development, knowledge management and networked learning. This concept of learning in communities captured the notion of negotiation of knowledge through participation in groups of people, sharing a similar interest for a certain domain or practice, while building a sense of belonging and shared identity. Communities not only provide an open learning space where they develop their knowledge domain and practice. It is also a place where community knowledge is kept alive and learning is situated in the activities, context and culture of the community. Learning community knowledge and skills are processes of participating

in community activities where knowledge is constructed through social interactions (Lave & Wenger, 1991). This process can be largely facilitated by the internet (or network technology); and the concept of communities provides an interesting theoretical perspective through which learning in the workplace can be studied and designed.

Over recent years we have witnessed a growing interest in learning in the workplace (Bolhuis & Simons, 1999; Eraut, 2000; Onstenk, 1997; Poell, 1998; Van Woerkom, 2003). Bolhuis and Simons (1999) mention several developments that point in this direction. First, there is a growing gap between knowledge and competencies taught during formal education and organisational requirements. This means that organisations will have to start 'training' their new employees right at the start. Secondly, there is the awareness that knowledge and skills currently applied are quickly outdated. Organisations have realised that the workplace provides a powerful (authentic) learning environment where employees learn from each other (Doornbos, Koopmans & Van Eekelen, 2004). Thirdly, the workplace is also a place for invention and creativity, where new products can be developed and knowledge is being created to attain or sustain competitive advantage (see for example, Nonaka & Takeuchi, 1995).

In a recent report by Broer (2002), on the police academy, this shift towards workplace learning is summed up as *Kennis als Kans* (translated as 'Knowledge as Opportunity'). This report offers a view on a re-orientation of the police academy as a training institute towards a knowledge and expertise centre, arguing for a transformation towards a learning organisation. This transformation will not take place only within the police academy, but will affect the entire organisation, and aims to develop a learning culture where learning is linked to strategic direction and cultural change (Cunningham, 1993). From this view human resources become a central part of the organisation. Furthermore, this means human resource management departments will have to start thinking more strategically about what the core competencies are that their organisations need to realise its strategy (interview with Etienne Wenger; Coenders & De Laat, 2004). Human resource management will have to evolve from a more operational function within the organisation to a more advisory role on building capacity and making sure that the knowledge exists in the organisation to realise the business strategy. Learning, according to this view, is a continuous, strategically used process integrated with, and running parallel to, work (Watkins & Marsick, 1993).

Developing an 'eye' for learning in the workplace has become one of the spearheads when designing the new police educational system, which is now centralised around core competencies, competencies derived from everyday police practice. Realising a close connection with police work is not the only innovation. The police organisation has also changed its attitude towards learning into a more student-centred approach providing the students with more autonomy and independence over managing their own learning goals and progression. As well as embedded active-learning tasks in the courses geared towards participating in or connecting with events that happen in the workplace. The police academy is currently organised around five knowledge domains (leadership, security, violence control, criminal

investigation, and traffic and environment) and a sixth domain on human resource development will soon be added. These knowledge domains cover all the competencies a police officer should have. These domains are (but not exclusively) used to educate new police officers. They act as an interactive knowledge base for police practitioners as well. This way, the knowledge domains are placed right at the heart of the knowledge management function of the learning organisation. Providing a platform

for students and practitioners to search, discuss and update police knowledge and co-develop, with other parties, police know-how.

With this new approach there is a strong focus on learning in the workplace and it is important to connect with types of learning that already exist in the police workplace. This has led to a study carried out by Doornbos (2005), identifying six types of informal work-related learning. One of her conclusions is that participants are particularly keen to learn from and with their peers. This is an important finding in the context of networked learning and strengthens the actions undertaken by the police academy to make knowledge management an integral part of fostering their knowledge domains. The key now is how to implement a way of managing knowledge, where the function is not simply to capture and store police knowledge and procedures, but to invite officers to take part where that knowledge and the procedures are critically discussed, based on their experiences, and updated, where necessary, through a process of sharing expertise. Amongst a healthy blend of activities, the police academy offers this police knowledge network where officers can communicate with each other via email and chat, but most importantly it provides platforms where people can meet virtually to share and discuss their experiences. Some of these platforms are open to everyone; some are strongly focused on specific topics with or without a dedicated moderator.

Besides supporting networked learning in the workplace the police academy also develops an e-campus to provide networked learning at their educational institute. This e-campus will be used to support collaborative learning on their courses and develop rich connections with learning in the workplace. Education at the police academy is organised around dual learning trajectories, partly to prepare students for workplace learning. In this dual learning, trajectory periods of institutional learning alternate with periods of workplace learning. The e-campus will be used as a networked learning environment to enable the students to learn collaboratively in their communities (Ter Huurne, Bots & Terlouw, 2004).

At the start of this thesis the police academy was pre-occupied with building the infrastructure for networked learning and trying to interest police officers towards this way of working and learning together. For this reason, during this thesis, the decision was made to conduct some of the research outside the police environment, while keeping a close watch on their developments. This way, findings on networked learning processes can be used to inform design and support for networked learning at the e-campus and the police knowledge network.

The main focus of this study became to describe how members of networked learning communities engage in collaborative learning activities. Our research question is:

How do participants of networked learning communities learn collaboratively?

The aim was to conduct exploratory research because the introduction of networked learning was a very new concept and still far away from common practice within the police organisation. However, conducting this kind of research would be beneficial to develop a greater understanding of the way networked learning can be implemented and supported within this organisation.

In this study the focus will therefore be on describing networked learning processes. To develop an empirical overview of the activities networked learning participants are engaged in when they are learning collaboratively. Networked learning is still a relatively new phenomenon and it is important to conduct rich empirical studies describing what it actually *is*, how it *works* before we try to intervene to improve or design networked learning more effectively. We believe that when encountering something new it is good to first stand still and look around before starting to intervene and improve.

By observing and documenting it is possible to gain a deep understanding of the processes at hand. As soon as we have found certain behavioural patterns or gathered stories from participants about their experiences we can develop some kind of baseline from which hypotheses for further research (both qualitative and quantitative) can be developed. Otherwise, one is in danger of second-guessing and drawing hasty conclusions based on data that does not necessarily reflect the 'real' situation or that is skewed by its experiment. When conducting educational research, where we, in many cases, at best have to deal with quasi-experimental designs (Tuckman, 1999), it is even more important to be careful because of the lack of possibility of proper control groups. Exploring the practice of networked learning contributes, at least, in two ways to a wider body of research and development of networked learning. First by theorising practice and secondly by developing support for networked learning through a connection with the practice developed by the participants based on their needs and desires.

In the first part of this dissertation we explore the concept of collective learning, with a particular interest for communities of practice, before turning our attention to communities in the Dutch police. In Chapter 1 we focus on social aspects of learning. The aim is to conceptualise various forms of collective learning and then explore the concept within the context of learning within organisations. We will discuss how people learn from each other through participating in networks, teams and communities, of which the latter will be explored more extensively since learning in communities is the main focus of this thesis. Chapter 2 discusses how the police academy implements knowledge management as a way to stimulate learning in the workplace. This knowledge management approach includes the realisation of a police knowledge network to present police knowledge as well as to facilitate networked learning. In this chapter we conduct a tentative pilot-study to describe how communities of practice within the Dutch police might use this network to facilitate their learning.

In the second part we make a journey outside of the police context, studying networked learning communities in higher education, aimed at describing the learning and tutoring processes that participants engage in when learning collaboratively. This part is organised around two case studies. In Case study 1 (Chapters 3–5) our attention goes out to one particular networked learning community. This case study in the first place seeks to provide a rich empirical description of the learning and tutoring processes that take place in this networked learning community from both the teacher and students' perspective. Secondly, during this case study we develop a method for studying these processes.

Chapter 3 presents the results of content analysis on learning and tutoring processes, which were used to conduct a critical event recall interview with the teacher of this community. The analysis shows how learning and tutoring processes evolve over time, emphasising different needs and activities through various stages of collaborative learning. This chapter also presents the teacher's intentions and experiences about his participation in this community. In this chapter we have begun to develop a multi-method approach to analysing networked learning, which will be further explored in the successive chapters.

Chapter 4 extends this case study by presenting the students' perspective on their engagement in this community, using the same research method, in order to provide a more holistic and complementary description of this particular networked learning community. Based on the participation patterns, summary tables and the teacher's critical event recall interview we selected three students to analyse the development of emergent roles, tasks and strategies as the students shape their collaborative endeavour through an online discussion.

In Chapter 5 we explore the use of social-network analysis as a way to add more colour to the picture of networked learning painted so far. We felt that although we know more about the learning and tutoring processes that were taking place and to some extent why, it was not clear how these activities were spread amongst the participants or how their engagement changes over time. Does a high contribution of learning activities mean that this person is also communicating extensively or frequently

with fellow members of the community or was everything said in one message and perhaps ignored by the rest of the group? This chapter analyses the interaction patterns amongst the students and explores group cohesion over time.

Chapter 6 and 7 (Case Study 2) is a replication of the previous case study. The aim is to extend our understanding of the learning and tutoring processes of the networked learning communities that are undertaking this course. Firstly to study if there are consistencies and/or differences between the different communities in the way they learn collaboratively and secondly to reapply the developed method of analysis.

In Chapter 6 we present research on the online teaching-styles of two teachers (one experienced and one beginning) who each tutor a networked learning community on the course. Chapter 7 presents student engagement with learning and tutoring activities. The multi-method approach could be used to study these two networked learning communities. Unfortunately we were unable to transcribe the critical event recall interviews with the students due to bad recordings, so for our contextual analysis of the student experiences and intentions we had to rely on the students' self-assessment reports.

In the third part we synthesise our findings with a larger body of research in networked learning processes and reconnect with the current state of networked learning within the Dutch police.

Chapter 8 provides a synthesis of findings of related studies in networked learning processes. This chapter enables us to contextualise our findings in a wider context as well as to develop an overview of the current state of networked learning research and its outcomes. The findings are synthesised around key themes; collaborative learning, the role of the teacher, teacher-student relationship, group regulation and pedagogical orientation, and participation in networked learning communities. Chapter 9 is the concluding chapter in which we related the findings of the synthesis with our own two case-studies and where we develop some general design guidelines for support for networked learning in higher education and the police organisation. We will also discuss some theoretical and methodological implications for further research into networked learning.

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Chapter 1

Collective Learning

Abstract

In a learning organisation, workers are stimulated to share and develop knowledge together within their workplace. The learning potential of these groups has become a matter of interest, and social and cultural aspects of learning have become important to understand and foster their learning. In this chapter we focus on social learning from various theoretical perspectives. It is our aim to conceptualise collective learning and explore this concept within the context of learning in organisations.

This chapter is an adapted version of:

De Laat, M. F., & Simons, P. R. J. (2002). Collective learning: Theoretical perspectives and ways to support networked learning. *Vocational Training: European Journal*, 27, 13-24.

Social Aspects of Learning

With the increasing possibilities of using computers as communication tools, they can play an important role in helping us to rethink and advance our current perspectives on learning and instruction, knowledge management and creation. In society, schools and organisations people are increasingly sharing, discussing, and negotiating knowledge through computer networks, therefore stressing the social nature of learning. When we study learning at an interpersonal level we look at social forms of learning. Social and cultural aspects of learning have therefore become important to understand and foster learning. Influenced principally by the work of Vygotsky (1962; 1978), many authors (Goldstein, 1999; Lave, 1988 & 1996; Lave & Wenger, 1991; Levine, Resnick & Higgins, 1996; Moll, Tapia & Whitmore, 1993; Resnick, 1991; Salomon & Perkins, 1998; Simons, Van der Linden & Duffy, 2000; Smith, 1994; Wegerif, Mercer & Dawes, 1999; Wertsch, 1991), in attempting to define cognition in groups, have suggested that in a group meeting, the situation itself may exert a strong mediating effect on individual cognitive and conceptual processes. The thinking of individuals is influenced by the group in which they are working. The merger of intellectual and social processes may be a fundamental feature of group-mediated cognition. A second key feature is the tension between the conceptual structure and understanding (of the problem or ideas under discussion) of the group, and that of the individuals within it. These individual understandings may vary from each other as well as the group. This tension is the driving force for the collective processing of the group. So, for example, when an individual member of the group expresses his or her opinion in relation to the shared public understanding of the group, this will be based on an attempt to synthesise his or her own understanding with the public one. The other members of the group will compare this new synthesis with their own understandings of the group-accepted version and their own disagreements with it. Depending on the outcome of this process there may be further interaction and negotiation until the group accepts a new meaning or understanding. In this process interaction between individuals, as well as their shared and individual cognitions, are the key aspects of co-construction of knowledge, meaning and understanding. During social interaction learners are linking new knowledge to their prior knowledge i.e. learning as a cumulative process; learners constructing new internal representations of the information being presented (Boekaerts & Simons, 1995). Learning, according to these theoretical positions, is a process by which the learner personalises new information by giving meaning to it, based upon earlier experiences. Meaning is seen as rooted in and indexed by experience (Brown, Collins & Duguid, 1989). Each experience with an idea, and the environment of which that idea is part, becomes part of the meaning of that idea (Duffy & Jonassen, 1992). Learning is therefore understood as situated in the activity in which it takes place (Brown, et al. 1989; Lave & Wenger, 1991). Whereas the social-constructivist perspectives makes a distinction between the individual cognitive activities and the environment in which the individual is present, the socio-cultural perspective regards the individual as being part of that environment. They point out that learning cannot be understood as a process that is solely in the mind of the learner (Van Boxtel, 2000). Knowledge distributed over mind, body, and its surroundings (Hewitt & Scardamalia, 1998) and is constructed in settings of joint activity (Koschmann, 2000). Learning is a process of participating in cultural practices, a process that structures and shapes cognitive activity (Lave & Wenger, 1991). The socio-cultural perspective gives prominence to the aspect of mutuality of the relations between members and emphasises the dialectic nature of the learning interaction (Sfard, 1998). Construction of knowledge takes place in a social context, such as might be found in collective activities.

In addition, Lehtinen, Hakkarainen, Lipponen, Rahikainen and Muukkonen (1999) argues that conceptual understanding is fostered through explaining a problem to other students. Therefore, in collaborative learning it is necessary to formulate learning objectives together, to make learning plans, to share information, to negotiate about knowledge and to take decisions (Veldhuis-Diermanse & Biemans, 2000). In a setting of collaborative learning, students can criticise their own and other students'

contributions. They can also ask for explanations and give counter arguments and, in this way, they will stimulate themselves and the other students. Additionally, they can motivate and help each other to finish the task.

These various perspectives on social learning (presented above), coming from different orientations like psychology, sociology or anthropology, are present in different social configurations, in which col-lectives learn.

In our practice, we found out that it is very useful to distinguish different variants of collective learn-ing, because they are difficult for people to conceptualise. They think, for instance, that they are learning collectively when they are involved in teamwork or a network. When this occurs, people fail to organise the possible, more *explicit* collective outcomes. Sometimes, people undergo or undertake learning together, but without any actual or intended collective outcomes. Then the learning processes are collective, but the learning outcomes may only be individual ones. In other cases, however, actual or intended outcomes of learning (in terms of learning and/or in terms of changes in work processes or outcomes) are collective. Thus there is a distinction between *learning in social interactions* (with and from others) and *collective learning* (where the members consciously strive for common [learning and/or working] outcomes). These forms of collective learning are also called “group learning” and “organisational learning”. We prefer to use the term “collective learning” for ways of learning where the intended outcomes (and maybe, but not necessarily, the processes of learning) are collective. Figure 1 shows the four possibilities, of which three are collective: individual learning processes leading to collective outcomes, collective processes with individual outcomes, and collective processes with collective outcomes. How can one make the step from individual outcomes to collective outcomes? We think that there are three answers to this question: (a) when groups or organisations reflect upon the common implicit outcomes of learning, (b) when they reflect on or plan common explicit learning outcomes and (c) when they define common plans for externalisation in the group or the organisation.

	Outcomes	Individual	Collective
Processes			
Individual		Individual learning	Individual learning processes with collective outcomes
Collective		Learning in social interaction	Collective learning

Figure 1. Individual and collective learning processes and outcomes

Forms of Collective Learning

Collective learning is gaining importance. The accelerating developments in our society make it neces-sary, but not sufficient, to have excellent groups of individuals in a workforce. Increasingly, people need to be able to work together in solving problems and innovating more accurately and more quick-ly. To highlight the different compositions of collective learning we propose roughly (read broadly) three types of collective learning: *learning in networks*, *learning in teams* and *learning in communities* (De Laat, 2001).

These different types share common elements, but also harbour distinct differences. The similarities let us think about social learning perspectives and contexts for learning. The differences make us realise how the intentions and outcomes of the collective affect the learning practices within the group. Or-ganisation-related collective learning refers to the processes and intended outcomes of the learning in the workplace. Groups decide to collaborate in learning, focusing on common learning activities and processes or on common outcomes related to their work. In “communities of practice” (Wenger, 1998), people come together to discuss their shared practice. Their collective learning outcomes are strongly related to the work context. Their interest is to improve their work.

Next we will discuss each type of collective learning in more detail. First we describe learning in networks, then a description of learning in teams is given, and finally learning in communities will be discussed.

Learning in Networks

Learning in (social) networks is the loosest form of collective learning. People in a network share a common interest, exchange ideas and help each other. People call on each other when they have a problem to solve or something to offer (Dekker & Kingma, 1999). The people in a network partici-pate voluntarily and have a great deal of personal freedom. Although individuals within the network frequently meet face-to-face, the whole network rarely meets together (McDermott, 1999). Networks facilitate individual collaboration and leave it to the individuals to determine the content and form of knowledge sharing (Walton, 1999). In such a network, power is, according to Walton, distributed. Everybody owns their own situation; those who can make continuous adaptations to discontinuous change survive and flourish. People create new, shared meaning through their network. They legiti-mise new ways of behaving, they provide systemic (as opposed to programmatic) solutions and they provide a framework in which focused improvement efforts can be launched. In order to operate within a network Walton points out some competencies people must possess in order to learn and participate in a set of relationships. Several relevant competencies are (see Walton, 1999, p541):

- *Spanning structural boundaries* – establish broad networks across existing hierarchy and work them directly, making opportunistic use of meetings.
- *Making transitions* – use transitions as opportunities to learn new skills, look for alternatives/rolem-odels, tend to dive in and enter quickly, stay focused on needs being served, facilitate major change through lots of communication, set new expectations, and build trust.
- *Communication skills* – engage in building shared meaning, focus on the need of others and antici-pate questions, the real communication tends to go on outside meetings.
- *Problem solving* – look at the whole situation (out of boundary or lateral thinking) or the big pic-ture, and coaching others.
- *Power relationships* – treat bosses as coaches or mentors, as supporters or as people who could add value to an idea. Play leaderships roles without authority.

Learning in teams

Where networks are loosely coupled, teams have a more structured pattern. Collective learning in teams is task oriented. Where people in a network contact each other to solve a work-related problem, teams are initiated or created around a certain task or problem that has to be solved. The temporary nature of teams is characteristic of learning in one. They are established for a certain task, when this is completed the team breaks up. When thinking of learning in teams a distinction must be made between working teams (organisation-related collective learning) and learning teams (professional-related collective learning). The learning that goes on in working teams is implicit but increasingly rec-ognised as an important asset for the organisation (Nonaka & Takeuchi, 1995; 2001; Engeström, 1999a; 1999b; Eraut, 2000).

An example of learning in working teams is drawn from the work done by Engeström. He uses the ac-tivity theory to analyse work practices; also called activity systems. Activity systems are social structures in which people learn and work together, learning outcomes can be implicit and a side effect that remains unnoticed. Activity Theory provides three characteristics for analysing learning in work teams (Engeström, 1999a):

- Activity theory is deeply contextual and oriented at understanding historically specific local practices, their objects, mediating artefacts, and social organisation.
- Activity theory is based on a dialogical theory of knowledge and thinking, focused on the creative potential in human cognition.
- Activity theory is a developmental theory that seeks to explain and influence qualitative changes in human practices over time.

Collective activity is driven by a communal interest. This communal interest forms the object of the activity. The object in turn is to be understood as a project under construction, moving from potential 'raw material' to a meaningful shape and to a result or an outcome (Engeström, 1999c). During this process, expansive learning may occur. Expansive learning is a dialectical process by which contradictions lead to tensions in the activity system and enables transformation. Contradictions act as starting points and energy sources for development. Expansive learning begins with individual subjects questioning the accepted practice, and it gradually expands into a collective movement (Engeström, 1999c). The activity system model developed by Engeström (1987) provides a way to describe the actions that take place within the working team. The model provides a holistic picture of a collaborative knowledge construction process and its interdependencies, and can help to organise thorough descriptions of such systems (Hansen, Dirckinck-Holmfeld, Lewis and Rugelj, 1999). Human activity can be described as an interdependent system of several components namely: subjects, tools, rules, community and division of labour (see Engeström, 1987, for a detailed description).

The learning in working teams remains not only implicit, a working team itself can also be temporary. Instead of being part of a stable working team, the combinations of people collaborating to perform a task may change constantly. Yet in their basic pattern they are continuously repeated (Engeström, 1999b). Engeström recognises the temporary notion of working teams and suggest the concept of knotworking to capture the innovative and creative nature of team learning. Knotworking is related to the rise of temporary groups (Meyerson, Weick & Kramer, 1996). However teams are understood as one-time formations created for the purpose of completing a task with a clear deadline. Knotworking suggests a longitudinal process in which knots are formed, dissolved, and reformed. The notion of a knot refers to the rapidly pulsating, distributed and partially improvised orchestration of collaborative performance. Engeström therefore suggests that the knot itself should be the focus of attention.

The intention to learn within a learning team is different from a working team. A learning team is formed to explicitly study a certain task or problem. The members of a learning team organise meetings and make agreements on how to complete the task. Huczynski & Buchanan (2001) speak in this context about project teams. According to them a project team consists of individuals who have been brought together for a limited period of time (from different parts of the organisation) to contribute towards a specified task. Once this has been completed, the team is either disbanded or else its members are given new assignments.

Project teams are created when:

- Creative problem-solving is required involving the application of different types of specialised knowledge.
- There is a need to closely coordinate the work on a specific project.

The project teams are overlaid upon the existing functional structure of the organisation, and hence are an addition to it.

In total, learning teams have the following characteristics:

- Representative – They are representative in that their individual members usually retain their position back in their 'home' functional department.
- Temporary – They have a finite life, even if their end is years in the future.
- Innovation – They are established to solve non-conventional problems and meet challenging performance standards.

An example of team learning is action learning:

The term action learning was introduced by Revans. With it he meant creating learning teams to work on real organisational problems and to structure experiences in such a way that both useful solutions to these problems emerge and substantial learning occurs for participants, learning that it goes on beyond the technical details of the particular problem (Vaill, 1996). Within these learning teams people come together to discuss their own real work-related problem and share this project with the other members. Although action learning can be transferred to a wider scope, its focus was mainly on management education. Some elements of action learning are relevant here (see Mumford, 1999, for a more elaborate description). First the learning process is social, people learn best with and from one another, but the members are responsible for their own achievements in their own project. Next the social process is achieved and managed through regular meetings in which individual projects are being discussed. The group is usually called a set. The members are comrades in adversity (Mumford, 1999). Thirdly, the role of people providing help for members of the set is essentially and crucially different from that of a normal teacher. Their role is not to teach but to help to learn from exposure to problems and to one another.

Learning in Communities

Teams are, as aforementioned, created to solve a predefined problem. Communities are emergent (Brown & Duguid, 1991). Their shape and membership emerges in the process of activity, as opposed to being created to carry out a task. Communities emerge around a topic of interest shared by voluntary members. They can be characterised as an informal group that emerge from spontaneous interaction between persons as they talk, joke and associate with one another (Huczynski & Buchanan, 2001). Huczynski and Buchanan define informal groups as a collection of individuals who become a group when members develop interdependencies, influence one another's behaviour and contribute to mutual needs satisfaction. According to Ackroyd and Thompson (1999) groups organise themselves around shared interests, through establishing autonomy by defining what their community is about and creating boundaries, and by establishing identities (individual identities through group membership and group identity by which groups can be distinct from each other). Barth (1981) argues that a group can be described in terms of how members imagine the community's boundaries. Some are core members; others participate more peripherally (Wenger, 1998).

In communities the intention to learn is based upon individuals who have a certain learning goal for themselves, but come together to learn as a group in order to help each other out. They share insights, and negotiate and create knowledge together. Over time a sense of belonging arises between the participants. Membership to a community is voluntary and people stay a member as long as they are interested in the theme that is discussed within the community. In this article we focus on the emergence of communities in two different aforementioned contexts. One is situated in a professional context; the other draws its attention to an organisational setting. When we speak of the professional context we refer to communities of learners. In work settings we refer to communities of practice.

First we will discuss communities of learners. We will thereby draw inspiration from Brown and Campione, who introduced the concept of communities of learners, and from Scardamalia and Bereiter, who introduced the concept knowledge building community.

The approach of communities of learners developed by Brown and Campione (1994) is a pedagogical model that is designed to take advantage of the distributed expertise and cognitive diversity. The

approach is focused on adopting the goals, values, beliefs, and forms of discourse characteristic to scientific practice. Conceptual advancement is made by cultivating each members' own expertise. The participants engage in a self-regulated and collaborative inquiry being responsible for the task as a group (Lehtinen et al., 1999).

The participants are apprentice learners, learning how to think and reason in a variety of domains (Brown, 1997). In a community of learners they try to foster support overlapping zones of proximal development that stimulates growth through mutual appropriation and negotiated meaning. Scardamalia and Bereiter (1994) speak of a knowledge-building community when there is a culture of learning that seeks to advance the collective knowledge and in that way that supports the growth of each of the individuals in the community. Organisations that adopt the knowledge-building approach have to shift from learning to construction of collective knowledge (Scardamalia & Bereiter, 1999). This shift involves treating students as participants in a learning organisation instead of as clients who receive knowledge. The students are therefore engaged in producing knowledge objects that also lend themselves to being discussed, tested, and so forth, without particular reference to the mental states of those involved, and where the students see their main job as producing and improving those objects (Scardamalia & Bereiter, 1996). By introducing the concept of knowledge building Scardamalia and Bereiter give form to the socio-constructivist perspective of learning, in which knowledge is situated and distributed, and that learning must be seen as a process of participating in various communities in which knowledge is being shared, negotiated, and advanced. They let go of the idea that knowledge is solely an asset residing in people's mind. The concept of knowledge as a resource, as a product, or as something that can be created and improved or found to have new uses is put to use in knowledge-building communities. The knowledge-building process can be characterised as follows (Scardamalia and Bereiter, 1994):

Focus on problems and depth of understanding – The focus is on problems, and to engage community members into producing an advanced theory to explain increasingly diverse and seemingly contrary ideas, that come to light trying to solve these problems.

Decentralizing, open knowledge building communities focusing on collective knowledge – Social interactions are expected to realise constructive responses to one another's work to ensure that the community is working at the forefront of their collective understanding.

In the context of learning-in-work practices people refer to the term 'communities of practice' (Brown & Duguid, 1991; Wenger, 1998). This is based on the notion of Lave and Wenger (1991) who describe learning as legitimate peripheral participation in various communities. According to Brown and Duguid (1991) workplace-learning can best be understood, then, in terms of the communities being formed or joined and personal identities being changed. Their central issue in learning is becoming a practitioner not learning about practice. In a community of practice, participants, who share a common interest for the field they work in, come together to help each other out, solve problems, and share and create knowledge collaboratively.

A community of practice therefore is a group of people informally bound by a shared practice related to a set of problems [...] they typically solve problems, discuss insights, share information, talk about their lives, and ambitions, mentor and coach on each other, make plans for community activities, and develop tools and frameworks that become part of the common knowledge of the community. Over time these mutual interactions and relationships build up a shared body of knowledge and a sense of identity. They constitute an informal, social structure initiated by members and reflecting on their collective learning (Wenger, 1999, p.4).

A community of practice defines itself along three dimensions (Wenger, 1999):

What it is about (domain)	A joint enterprise as understood and continually renegotiated by its members.
How it functions (community)	Mutual engagement that bind members together into a social entity.
What capability it has produced (practice)	The shared repertoire of communal recourses (routines, sensibilities, artefacts, vocabulary, styles, etc) that members have developed over time.

According to Wenger, McDermott, and Snyder (2002), these elements (domain, community and practice), when functioning well together, make a CoP an ideal knowledge structure – a social structure that can assume responsibility for developing and sharing knowledge. Developing and sustaining a community of practice is not a linear or planned activity (like we have, to some extent, seen with the teams). Communities go through several stages of development (see Figure 2). Teams as we have discussed are deliberately created to solve predefined problems and have a predefined agenda. Their coordination and membership is therefore clear and more organised. Communities on the other hand have a more spontaneous life cycle, varying from intense activity to periods of silence. Since communities are self-governed, often by volunteers (acting as core members of the community), they tend to have more of a 'bumpy ride' as they progress. The advantage of this is that activity is not pre-planned, providing all the members the opportunity to initiate, negotiate and plan shared activities. Communities continually evolve and have their own life cycle. Wenger et al. (2002) identified five stages of development, starting with identifying community potential, establishing connections, building contacts and inviting participants, gradually this somewhat loosely connected group of people coalesce into a tighter group where a sense of membership and belonging is being developed. Connectivity intensifies, creating an open space for members to share and negotiate their interests and beliefs. Over time, when successful, the community matures, defining its boundaries, role and focus. This is the stage where they advance their practice and domain through various kinds of activities within their community, taking stewardship of the knowledge and practices they share and consciously develop. However nothing is forever and over time, depending on how (long) the community succeeds in keeping the energy levels high due to certain events (drop in membership, shift in focus, changing roles of core members), a community might transform into a different social structure (like a network or social club) or simply fade out because of decreasing energy to undertake activities.

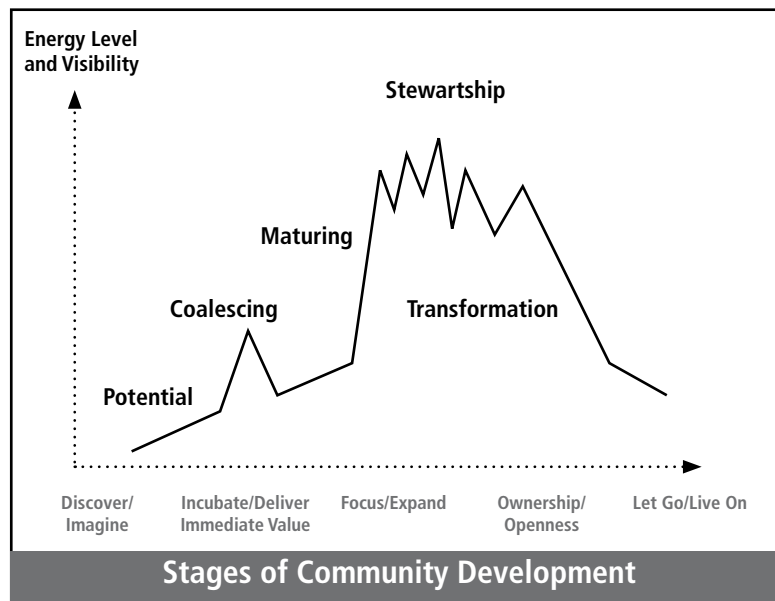


Figure 2. Stages of community development (source, Wenger, McDermott & Snyder, 2002)

In sum CoPs fulfil a number of functions with respect to the creation, accumulation, and diffusion of knowledge in an organisation (Wenger et al., 2002):

- They are nodes for the exchange and interpretation of information. Because members have a shared understanding, they know what is relevant to communicate and how to present information in useful ways. And because of the shared understanding and the interpersonal relationships, they feel trusted and valued. The members also know precisely which person in the group has the expertise that they need in case of a specific problem.
- They can retain knowledge in 'living' ways, unlike a database or a manual. A CoP preserves the tacit aspects of knowledge that formal systems cannot capture. For this reason, they are ideal for initiating newcomers into a practice.
- They can steward competencies to keep the organisation at the cutting edge. Members of these groups discuss novel ideas, work together on problems, and keep up with developments inside and outside a firm. They can easily keep up with or push new developments.
- They provide homes for identities. Identity is important because, in a sea of information, it helps us sort out what we pay attention to, what we participate in, and what we stay away from. Having a sense of identity is a crucial aspect of learning in organisations, and it entails a sense of belonging. The corporate world is full of displays of identity, that manifest themselves in the jargon people use, the clothes they wear, and the remarks they make. This identity also specifies the boundaries of the community.

Conclusion

In this paper we have made an attempt to conceptualise individual and collective learning processes and outcomes, and discussed various forms of collective learning in the workplace. All these different forms of collective learning can be present in an organisation at the same time.

We think that when organisations want to develop and support the practice of knowledge sharing and informal learning in the workplace these three forms can be a source of inspiration. Providing networking opportunities enables employees to build up social contacts inside (and outside) the organisation and participate in events that stimulate personal growth in the area of expertise required for optimal performance in the workplace. Networks are especially useful for solving personal (work-related) problems. Learning in this case is often self-directed. Learning in teams, on the other hand, is often initiated by the organisation, aimed at solving (work-related) problems or developing competencies needed by the organisation. A team, covering the expertise needed to study the problem, is carefully assembled and assigned to a pre-defined learning task. Learning in this case is explicit and to some extent guided by the organisation. Learning in communities is emergent, driven by the needs of its members. Communities provide an open space for learning where members can learn collectively solving work-related problems together, but they also provide opportunities for self-directed learning through participating in community events. The difference with team learning is that communities take charge of their own learning agenda driven by a shared interest for advancing the knowledge domain and their practice.

In the spirit of second generation knowledge management (Liebowitz, 1999; Ståhle, 2000) aimed at actively engaging employees in the act of sharing and creating knowledge strategic to the organisation, collective learning processes in organisations play an important role. Unfortunately knowledge management is often associated with the practice of capturing and storing explicit knowledge in large databases. This does not do justice to the recent interest in informal learning processes in the workplace (Bolhuis & Simons, 1999; Doornbos, 2005; Eraut, 2000; Onstenk, 1997; Van Woerkom, 2003), where workplace-learning is attributed to the professional development of the employee as well as organisational development. The literature on workplace-learning stresses the importance of implicit (or tacit) knowledge as part of the learning and knowledge creation process (Eraut, 2000; Nonaka & Takeuchi, 1995). Fostering communities of practice in organisation provides ideal opportunities for knowledge management to get participants engaged in knowledge sharing, develop both implicit and explicit knowledge, and more importantly, keeping organisational knowledge alive and passing it on to new members of the community. In future research it is our aim to further explore the learning processes in communities of practice and the role ICT tools can play to support collaborative interactions. ICT has an advantage in bringing people together without the time and place constraints. Organisations nowadays make use of knowledge management systems, stimulating its workers to share and create knowledge. These systems are being used with some enthusiasm, but its outcomes do not always meet the expectations. Brown & Duguid (2000) argue in their book, "The Social Life of Information", for more attention for the contextual and social processes that are present while using certain ICT-tools. In our view (De Laat, De Jong & Ter Huurne, 2000) it is important to support collective learning through ICT by focusing on the group dynamics that are needed to organise and coordinate learning and to support the clarification and the aim of the discourse by providing insight into how knowledge is constructed.

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Chapter 2

CoPs for Cops: Managing and Creating Knowledge Through Networked Expertise

Abstract

Managing knowledge in large organisations is a challenge in itself. Modern views on Knowledge Management (KM) focus not only on finding ways to capture and distribute corporate knowledge but also provide ways through which knowledge can be shared, discussed and created. Different types of organisations have different approaches to KM. From general descriptions of these approaches, parallels to the Dutch police will be presented. This chapter discusses how KM within the Dutch police is an integral part of the organisation and how explicit and tacit knowledge is shared to create new corporate knowledge. The authors present examples of how CoPs within the Dutch police play a role in both sustaining and developing their own practice, and how these communities are crucial to the learning organisation.

Keywords

Case study community of practice, electronic networks of practice, explicit knowledge, face-to-face meetings, innovation, knowledge base, knowledge exchange, knowledge management, knowledge reuse, knowledge sharing, legitimate peripheral participation, online community, organisational learning, public sector, social learning, social networks, tacit knowledge, virtual teams.

De Laat, M.F., & Broer, W. (2004). Cops for cops: Managing and creating knowledge through networked expertise. In P.Hildreth, & C. Kimble. (Eds.). *Knowledge Networks: Innovation through communities of practice*. (pp. 58-69). Hersley: Idea Group

Knowledge Management in a Learning Context

Organisations are increasingly confronted with the problem of managing and creating knowledge in order to respond flexibly to changes within their working environment. They realise that sharing and creating knowledge brings a competitive advantage. Organisations are transforming into learning organisations and expect their workers to become lifelong learners. According to Marsick and Watkins (1999, p.12), learning is “the process that makes the creation and use of knowledge meaningful”. Huysman (in press) observed that learning and working become interrelated when the practice of knowledge-sharing helps workers to perform their work better and with more efficiency. Providing space in the organisation for workers to establish networks can therefore be a powerful way to facilitate workplace learning. Workers tend to form networks of expertise spontaneously; to facilitate individual learning, collaboration and to discuss work-related problems together. Sometimes these networks transform into a Community of Practice (CoP). In a CoP, employees, who share a common interest for the field they work in, come together on a regular basis to help each other, solve problems and share and create knowledge collaboratively (Wenger, 1998). Knowledge sharing and meaning making are two of the core activities of CoPs. It is within this social community structure that workers learn from and develop their practice in a natural way and integrate it with their day-to-day work. Nursing and managing this process is one of the crucial conditions for fostering a learning organisation.

The notion of CoPs was first proposed by Lave and Wenger (1991) who described them as groups where learning takes place through a process of Legitimate Peripheral Participation. The central issue in learning is about becoming a practitioner, not about learning about practice. According to Brown and Duguid (1991) workplace learning can best be understood in terms of communities being formed and personal identities being changed. This approach draws attention away from abstract knowledge and situates it into the practices of the communities in which knowledge takes on significance. A CoP defines itself along three characteristics (see Wenger, 1999):

- *What it is about* - A joint enterprise as understood and continually renegotiated by its members.
- *How it functions* - Mutual engagement that binds members together into a social entity.
- *What capability it produces* - The shared repertoire of communal resources (routines, sensibilities, artefacts, vocabulary and styles) that the members develop over time.

These characteristics can be helpful to identify CoPs in organisations. However, what is more important is not the question as to whether a network is a CoP or not, but that it is the framework used to support learning and KM in the workplace. CoPs can be found in every organisation, but the way in which they operate and are rewarded differ.

Knowledge Management in Different Organisational Types

Not every organisation is the same – they vary in structure and how they manage their knowledge. We will use Mintzberg’s (1989) classification as a lens to illustrate different approaches to KM and organisational learning.

Machine Organisation

This type of organisation has a central bureaucracy with formalised procedures. There is a strong hierarchy in the organisation and the communication and change processes are top-down oriented. This type of organisation operates in a stable environment where work is standardised and repetitive. In this environment, according to Ståhle (2000), emphasis is placed on explicit knowledge ready to put in manuals and procedures. KM is focused on providing corporate knowledge throughout the organisation. Learning in this type is characterised by the acquisition of the organisational knowledge necessary to carry out the job (Huysman, in press).

Professional Organisation

A professional organisation is bureaucratic as in a machine organisation but the power is decentralised. It operates in a complex changing environment. It tries to understand the environmental changes aiming to create standardised work procedures. The key to the functioning of a professional organisation is to create domains or divisions within which professionals work autonomously. Changes are made through professional judgement and collective choice but with administrative approval. In this type, Ståhle (2000) points out that the organisation fosters continuous, self-directive development, which is mainly based on standardised work procedures. A lot of dialogue is needed and the flow of information has to be interactive. Learning in this situation is characterised by exchanging individual knowledge with the aim of re-using it throughout the organisation (Huysman, in press). KM is focused on establishing an interactive knowledge-base created through social networks.

Entrepreneurial Organisation

This structure is characterised by a simple, informal and flexible organisation. It operates in a dynamic environment ready to respond to external demands. The director controls the activities through direct supervision. Creating innovation and investment in networks is a way to interact with its environment. Knowledge is intuitive and potential; intensive networking, inside and outside the organisation, serves in the process of creating new knowledge (Ståhle, 2000). Learning in this type of organisation is focused around the social construction of knowledge by establishing networks through which workers can share their expertise and create new knowledge (Huysman, in press).

These three classifications are summarised in the table below. The classifications presented are ideal type descriptions, which help us understand the complexity in real organisational contexts. As organisations grow, they become more complex. They can be in crossover zones from one type to one other.

Table 1. Organisational structure and Knowledge Management

Organisational configuration (Mintzberg, 1989)	Knowledge Management Approach (Ståhle, 2000)	Organisational Learning (Huysman, In press)
Machine organisation		
Predictability	Explicit knowledge	Retrieve: individual acquisition of organisational knowledge
Manageability	Data-warehousing	
Professional organisation		
Continuous controlled development	Explicit and tacit knowledge	Exchange: sharing individual knowledge in order to re-use it
Autonomous domains/ divisions	Looking for shared meaning	
Entrepreneurial organisation		
Organic structure constantly changes. Roles constantly change creating innovation	Tacit knowledge	Create: community knowledge creation through sharing and co-construction of networked expertise
	Intense networking (in and outside the organisation)	

The Dutch Police Force

The Dutch police operate like many other organisations in a dynamic and rapidly changing environment. Police work has grown more complex – for instance, due to more and frequently changing laws and regulations. It is important to carefully manage these changes so that all police officers have the same up-to-date knowledge of their work. The police strive for controlled development through understanding the changes in the working environment. This organisation therefore has many features

in common with a professional organisation. The organisation can be described as a mock bureaucracy because of the well-developed occupational culture of the police officers. Due to the nature of their work, police officers are used to reacting immediately, taking responsibility and directing their work alone or together with their colleagues. Consequently, there exists a well-developed solidarity with each other. The police administration has overall responsibility for police work but, due to its nature, the work itself cannot be directly supervised. This creates space for some horizontal decentralisation. Within the police organisation there is a strong division between various domains. Within these domains, knowledge is shared with the aim to develop and create new standards to be implemented throughout the organisation. Because of this, the organisation relies on the skills and knowledge of their workers to produce standardised products and services.

In a professional organisation, it is important to make the flow of knowledge interactive. KM in these organisations needs to create opportunities for sharing knowledge by creating relationships between the workers. Networking serves the process of keeping up to date: to solve work-related problems and (in doing so) creating new knowledge that could be re-used throughout the organisation. Within these expertise networks, members share and appropriate tacit knowledge with the aim of sustaining and developing their own practice. To foster these relationships and to stimulate networked expertise the Police Education and Knowledge Centre created a nationwide intranet (see Figure 1). Its structure is based on three pillars, the Police Knowledge Net (PKN), the Police Discussion Net (PDN) and the E-Campus. This makes it possible for learning and working to meet and become integrated in the workplace.

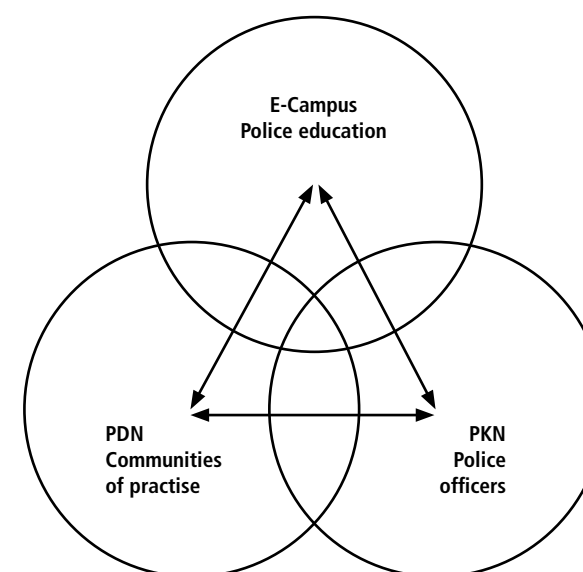


Figure 1. Relationship between PKN, PDN and the E-Campus

The interaction between PKN (presenting explicit or hard knowledge), PDN (sharing tacit or soft knowledge) and the E-Campus (online courses and personal development plans) offers a powerful basis for organisational learning.

Table 2. Organisational structure and knowledge management in the Dutch police

Police organisation		
Organisational configuration	Knowledge Management Approach	Organisational Learning
Rather decentralised, continuous and controlled development	PKN: Presenting explicit knowledge and looking for shared meaning	Exchange: PDN sharing knowledge with the aim to validate and standardise

Innovation Through CoPs

Large organisations, like the Dutch police force (50,000 employees), deal with a wide range of specialised knowledge, which needs to be updated and adapted frequently. However, police officers do not often work together in a physically shared space. They discuss work-related problems during ad hoc meetings, coffee breaks and by telephone. Police officers throughout the country tend to keep close contact with one another and this is how CoPs spontaneously emerge within certain areas of expertise. They acknowledge the need to share knowledge to solve shared problems and to generate new standards. Providing CoPs with ICT-tools like PDN and PKN can be an advantage in bringing officers together. PDN, for instance, facilitates communication between participants of (existing) CoPs and helps them to stay in touch. It offers the possibility of collaborating online over time and space. Due to these developments, there are a growing number of CoPs trying to manage their networked expertise. Recent developments are the existence of hybrid networks where both operational, as well as professional knowledge, is shared and discussed in CoPs. This interaction is of great value because integrating working and learning highlights the importance of tacit knowledge and recognises that work experience leads to organisational and educational innovation.

In the next section, three examples of CoPs within the Dutch police will be presented. The examples will address how police officers have established CoPs in which knowledge is shared, created and appropriated around problems and issues that matter in their work. The first example will be about a CoP where the members of which investigate the field of human trading and prostitution. It presents a good example of how CoPs can be organised in a face-to-face meetings using the PKN to present their knowledge domain. The second example will be of a CoP that works in drugs prevention by using the PDN to exchange and generate knowledge. The third example will be a CoP that concentrates on developing work-processes. In this example, the focus will be on discussing experiences of the members being engaged in online discourse.

Example 1: CoP Investigating Human Trading and Prostitution

In 2000, the prostitution industry was legalised in the Netherlands. This meant a significant change for the police. Work procedures and practice would differ radically from the previous situation. To prepare and manage this changeover, police officers working in this division gathered together to share knowledge about the new phenomenon. They established a CoP by inviting criminal investigators throughout the country that would have to deal with the change. What started off as a group of five grew to a community of 45 members. They arranged monthly meetings to exchange experiences, identify problems and try to solve them. Generally, these meetings had the following structure. First, the chairman presented new developments and provided feedback on previously developed practices. After that, all participants gave an update on their regional work experiences. This identified good practices, recognised problems and allowed everyone to help each other with concrete questions. Sometimes these problems needed more attention to find an appropriate solution. Small focus groups within the CoP were formed to study

these problems and present their findings during a subsequent meeting. These focus groups were carefully formed so that the outcomes would reflect the reality of the police practice throughout the country. The focus groups were a successful format for this community to learn from each other, to create knowledge and solutions for their reformed practice and to develop new educational offerings and online courses.

The second half of the meetings were either reserved for these focus groups to make arrangements and/or work together or were based on a presentation by a guest speaker. Due to high levels of commitment, engagement and their shared interest in developing their practice, this community was very successful in both learning from each other and developing their practice. Because of the monthly face-to-face meetings, the need for PDN was small and it was mainly used for distributing agendas and documents. The PKN was used to present explicit and validated knowledge. These web pages were updated frequently when new standards and general knowledge developed within the CoP became validated and therefore ready to be presented throughout the whole police force and E-Campus.

Example 2: CoP on Drug Prevention

The drug prevention CoP has a similar structure to the CoP in the previous example. This CoP consists of 46 members who are conducting drugs-related investigations throughout the country. Due to the need for fast communication around emerging questions within the field, they decided to use PDN to share knowledge and propose immediate questions.

The way members participate in CoPs provides insight into the process of knowledge sharing. A discussion space provides ideal possibilities to study interaction patterns between the members of a network. However, insight alone into communication patterns within a certain network is not enough. The content of the discourse must be taken into account. This way information can be gathered about the nature of the discourse. To visualise the interaction patterns a multi-dimensional scaling plot was created.

CoPs are relevant players in managing knowledge by critically questioning, innovating and assimilating corporate knowledge in a fast-changing working context. In this case, we see that the CoPs are formed by the workers themselves. They are not forced to create and participate in CoPs by the organisation, and membership is purely voluntary. This shows that CoPs emerge spontaneously around issues that matter in the organisation. Community members are willing to share information together as long as it helps them to do their work better. However, knowledge sharing in ICT-based environments is still relatively new. The first example, where the community that had regular face-to-face meetings, seemed to be most successful in organising its learning activities. However, the other two examples indicate that the willingness to share knowledge and learn together is not so much a hurdle, it is how to organise networked expertise in way that it will result in satisfying collective outcomes. The second example shows that in an online environment the commitment and interest can be satisfying, but that they have difficulties in creating knowledge together. In example three, this is further indicated by the fact that it seems to be difficult to structure and regulate an online discussion.

Discussion

The CoP literature discussed earlier in the chapter and the CoP examples that have been presented suggest that the focus of organisations in fostering KM should not only be understood from its context and structure. More attention needs to be given to the community and its social processes, instead of a limited focus on its practice. More investments on supporting group dynamics, social conferencing skills and problem-solving techniques in online discussion environments are necessary to facilitate CoPs in their pursuit of appropriating and creating new knowledge about their work. Learning behaviour has to be stimulated by stressing the importance of finding promising answers for new and existing problems. This endeavour can only be successful if combined programs are offered supported by sophisticated software and inspired by convincing leadership. Organisations should not only facilitate internal group processes but also support and reward the dissemination of community outputs. How this can be done is dependent on organisational structure and the approach to KM. In the case of the Dutch police validation, processes have to be followed carefully.

Supporting networked expertise stimulates the mixture of operational and professional knowledge. The more police officers experience the possibilities of online knowledge sharing, the more they feel the attractiveness of direct communication about operational cases. This allows them to benefit from the experience of their colleagues nationwide in their fight against criminals. One last question to address is how to assess the Dutch developments in relation to the theoretical schemes presented by Mintzberg, Ståhle and Huysman. The police organisation has a strong tendency to work pragmatically. So, the formal upper structure with its validation protocols and policy boards on the one hand is accompanied with more-or-less informal network arrangements on the other hand. Within the police, three occupational sub-cultures can be discerned: street cops, management cops and policy cops. While each sub-culture has its own set of conduct it can be questioned how these cultural arrangements are influenced by the emergence of network tools, which offer the possibility to make crossovers between these subcultures. So far, it seems that groups of specialists within the police are interested in using online possibilities for sharing their expertise with colleagues.

Supporting networked expertise throughout the organisation can bridge the gap between different sub-cultures and serve as a way to exchange and disseminate knowledge. CoPs provide a social structure in the organisation for an interactive approach to knowledge management. This way CoPs make a valuable contribution to the professional organisation.

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Introduction

In the previous section our focus was on collaborative learning in the workplace with a specific interest towards networked learning in communities of practice within the Dutch police. During a pilot-study we tried to locate some initial examples of networked learning in communities and followed an inductive approach through a process of observation, interviews and content analysis. In this way we developed an understanding of the way these communities used information and communication technology to interact with each other. Unfortunately we had to conclude that this usage was at a very experimental stage. The implementation of a police knowledge network in the workplace had only just started and most police officers had no clear conception of what this kind of technology had to offer or how it worked. The introduction of the police knowledge network (together with the reorganisation of the police academy) meant a cultural change, which raised both scepticism and enthusiasm amongst police officers. Some were keen to use the police knowledge network as a way to develop or support communities. It also became clear that most of the community members were not yet connected to the network or found it hard to participate in online discussions. The police knowledge network still needed to do a lot of advertising, and potential communities for our research were affected by this. Others were in very early stages of development, where community activity was overshadowed by a few core members trying to build up the community. The online discussions we saw were often unstructured and dissolved into monologues or two-way conversations that fail to involve the whole group (Wertsch, 2002).

The implementation of the police knowledge network had its own pace and it seemed practical to focus our attention on networked learning communities somewhere outside the police organisation, while keeping a close watch on their developments. This way research experience and methods could be developed in parallel and used to conduct studies within the Dutch police when possible or provide support to emerging communities like those on 'Work and Police' and 'Youth from the Antilles' on the police knowledge network.

During this period the collaboration with Vic Lally intensified. We met at a computer-supported collaborative learning conference and discovered a similar interest in networked learning and decided to develop an approach for studying networked learning processes and apply it to a course they were running at Sheffield University.

Previously research into NL was focused on directly observable but more superficial aspects of online communication and interaction; like number of messages exchanged (Harasim, 1993), length or word number of the messages, number and depth of the discussion threads (Hewitt, 1996). These studies however did not reveal much about the engagement of the participants with their collaborative learning tasks. Richer analysis on how and why people are learning collaboratively online became the focus research. This led at first to the development of coding schemes to conduct discourse or content analysis (Chi, 1997; Gunawardena, Lowe & Anderson, 1997; Henri, 1992; Newman, Johnson, Webb & Cochrane, 1999). One can say that currently another trend is emerging, which argues the need for multi-method approaches aiming to describe and understand the data using various perspectives or dimensions (De Laat, Lally, Lipponen & Simons, in press; Hakkinen, Jarvela & Makitalo, 2003; Lockhorst, 2004; Ravenscroft, 2003; Strijbos & Stahl, 2005; Weinberger & Fischer, in press).

One aspect that is not systematically addressed in most of these studies is the dimension of time. Re-

sults are often based on a summation of codes or an overall impression of networked learning processes over the entire course. Yet we like to think that group processes are dynamic and evolve over time. If we present general overviews, we are in danger of losing (or ignoring) detailed information of what learning and teaching processes actually took place, and what capability the group has developed to learn collaboratively. Especially when conducting educational research where the interest is in studying how people learn, a timeline approach could prove very useful. Learning is typically a process of gradual changes in performance and understanding. Understanding learning means focusing on how these changes take place.

There are at least two reasons for including timeline analysis in research designs for networked learning:

- Groups go through several stages of development and develop a way of working together.
- Learning-tasks require a variety of strategies depending on group progression to solve the problem at hand.

Using repeated measures by following a certain timeline approach allows us to describe a detailed account of the collaborative flow over time as well as develop an overall impression when taking an overview. When developing our multi-method approach we included the time dimension in research, through collecting data in the beginning, middle and end phase of the collaborative project.

During our thesis, like many others at the time, we used coding schemes (like, Gunawardena et al., 1997; Henri, 1992; Newman, Johnsons, Webb & Cochrane, 1999) to try to pattern out some of the learning activities participants were engaged in. Coding of the content shared between the participants seemed the first logical choice for investigation. However, coding learning activities alone does not provide enough insight into the collaborative processes. Through reading these messages it became clear that besides the teacher, the students are also actively engaged in managing the group processes and their learning agenda something we also noticed during one of the pilot-studies at the police (De Laat, De Jong & Ter Huurne, 2000). The learners are taking active control over the organisation of their learning processes and come to act as both learners and teachers. Managing and regulating group processes can be seen as an act of meta-cognition, but the extent to which participants were engaged exceeded the way we commonly think about meta-cognitive knowledge; i.e. as a way to reflect on one's own learning strategies (Flavell, 1979; Schraw, 1998). Feeling responsible for group learning and actively managing and regulating group processes and commitment seemed something that needed more attention in our research. During our research we tried to highlight this distinction by coding both learning and tutoring activities. As such we have interpreted peer tutoring as an act of meta-cognitive knowledge and skills, in the sphere of (developing) an awareness of other people's learning styles and strategies, and the capacity to use this knowledge to reflect on one's personal and other participants' learning. This is helpful in order to coordinate and regulate the collaborative learning activities. As such we have made a distinction between intra- and inter meta-cognitive (or inter personal meta-cognitive) knowledge. Together with the coding scheme developed by Veldhuis-Diermanse (2002) to code for 'on the task' learning activities, we decided to use the coding scheme developed by Anderson, Rourke, Garrison & Archer (2001) to highlight the tutoring activities conducted by the participants 'around the task'. Anderson et al. (2001) used the term teaching presence deliberately to indicate that not only the teacher, but all the participants are taking part in this process.

Coding provides us with data on *‘what the participants are talking about’* but it does not indicate clearly to what extent the members are participating in the collaborative learning task. In our attempt to further develop a method for describing networked learning processes, we decided to use social network analysis as an additional method to describe the connectivity, group cohesion and interaction patterns of this networked learning community. This way we could study *‘who is talking to whom’* and how these interaction patterns change over time. Together with the summary tables we could now also study the extent to which active participants were engaged in learning and teaching activities, and see if these activities were conducted by a few core members, constantly talking to each other, or if they were nicely spread over the entire group.

social network analysis) produced behavioural patterns and how they change over time, but as such did not provide an explanation for why the participants were acting this way. To explore *‘why they are talking as they do’*, we decided to conduct contextual analysis as a way to include participant experiences with networked learning. In our study we used critical event recall interviews as well as student peer assessment reports to conduct these analyses. The outcomes of content analysis and social network analysis were used in two ways. Firstly, as a way to select the participants for our contextual analysis. This way we tried to cover some interesting emerging patterns, like dynamics of central- versus peripheral-acting participants, and participants who showed increasing versus decreasing activity over time. Secondly, we used the summary tables, for example as a stimulus during the critical event recall interviews, and asked the participants to reflect on these patterns as a way to focus the interview.

Research Setting

This multi-method approach was used to study participants of networked learning communities that were undertaking a Master’s Programme in E-Learning. This programme has run successfully since 1996, where years of experience with networked learning communities has influenced course design and e-learning pedagogy. This context provides a rich environment for research into collaborative learning in networked learning communities. Also, although the research context is in higher education, there is some (potential) overlap with the Dutch police. First of all the Dutch police aims to offer online higher education in networked learning communities throughout their e-campus, using Blackboard (see Chapter 2). Secondly, the students of the M.Ed in E-Learning are all professionals themselves, working in organisations using or planning to use forms of e-learning in their own organisations. As a networked learning community they have a shared interest in the e-learning domain, with the aim to advance their own practice. Members of the communities in the police, as we have seen, are also working in different police stations dispersed over the country, sharing a similar interest for their domain and practice. Another connection is the way these communities are supposed to govern themselves. In the police organisation these communities are spontaneous and emerge around topics that matter to its members, and develop their own learning agenda, often through the support of a moderator. To some extent this is also the case in the M.Ed where the students are expected to actively take charge of developing and regulating their learning agenda, guided by a teacher on the course. The networked learning activities are connected to work-related experiences and problems. In both case studies, the communities worked on a similar task with the aim to develop a course design for online learning, making use of current learning theories and research findings.

The design of the M.Ed is based on the following principles (EQUEL Position Paper, 2004):

- The problems and issues studied by the groups are defined by the groups themselves through processes of negotiation.
- The problems and issues have a personal and professional focus. They are important to the members of the group, arising from concerns and interests they may have about their professional practice.
- Problems require negotiation and communication to understand them. Because the issues researched are complex and ill-defined, the members of each group have to engage in considerable communication in order to understand them and negotiate changes in their perception of the ‘problem’ and its resolution as their work progresses.
- Communication is both task-oriented and socially centred. The groups function as learning communities that have an interest in sharing, supporting and learning collaboratively in a social context, and constructing understandings of what it means to learn together in a networked environment.
- The groups are encouraged to view their research and learning as “action research”, and they are introduced to the concept of action research in an earlier e-seminar. This provides them with a model of how to work together, which helps guide them in their collaborations.
- They require a journey of learning. There are no specific pre-defined learning outcomes. Each group embarks on a learning journey which requires collaboration but which does not define in exact detail how they should work together or what the outcomes of their learning should be.
- They involve a high degree of reflexivity. Learning in these groups is highly experiential, and the groups are therefore encouraged to be reflective and to use this as a source of learning.

A means for achieving this is exposure to other participants’ development within the learning community. Members participate in developing the learning community perspective, which is based on participants and teachers taking collective responsibility for the (re)design and evaluation of the programme (EQUEL Position Paper, 2004).

Overview

In this part our focus is on developing a research method through the engagement with research in networked learning. The first three chapters provide a case study on describing networked learning and tutoring processes in one networked learning community during the M.Ed course in 2000. In these papers we focus on the use of content analysis, critical event recall and social network analysis as a way to explore and describe tutoring and learning processes in a networked learning community. In the first paper (Chapter 3), we present the university teacher’s experience, the second paper (Chapter 4) draws its attention to the students of this community and in the third paper (Chapter 5) we focus on the interaction patterns of this community, drawing more attention on the potential benefits of social network analysis as a method to be used for research in networked learning. Chapter 6 and 7 are part of a second case study, describing the networked learning processes of two other communities taking part in an M.Ed course in 2001. This is a way to replicate our previous research, with the aim to applying our research method in another setting and extend our understanding of collaborative learning processes in networked learning communities. Both the teacher’s and students’ experiences with tutoring and learning online are highlighted.

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Chapter 3

Complexity, Theory and Praxis:

Researching Collaborative Learning and Tutoring Processes in a Networked Learning Community

Abstract

This paper explores the complexity of researching networked learning and tutoring on two levels. Firstly, on the theoretical level, we argue that the nature of praxis in networked environments (that is, learning and tutoring) is so complex that no single theoretical model, among those currently available, is sufficiently powerful enough – descriptively, rhetorically, inferentially or in its application to real contexts – to provide a framework for a research agenda that takes into account the key aspects of human agency. Furthermore, we argue that this complexity of praxis requires a multi-method approach to empirical investigation, in order that theory and praxis may converse, with both being enriched by these investigations. Secondly, on an empirical level, and as an example that draws upon our theoretical argument about complexity, we present the findings of a multi-method analysis of the learning and tutoring processes occurring in an online community of professionals engaged in a Master's programme in E-Learning. This investigation is informed by two mainstream theoretical perspectives on learning, and employs computer-assisted content analysis and critical event recall as complementary methodologies. This study reveals the differentiated nature of participants' learning, and even within a highly structured collaborative learning environment, identifies some of the key functions and roles of participants. It also provides an indication of the value of such multi-method studies. Future prospects for this approach to research in the field are considered.

Keywords

Networked learning, tutoring, theory, praxis, content analysis, critical event recall, online communities.

Introduction

This paper is an attempt to address some of the complexities of researching networked learning (NL) in higher education contexts. Our wider set of concerns and interests in this work cluster around trying to research and illuminate how theory and praxis interact in a range of networked learning environments. One might view this 'interaction' as a kind of exploratory conversation between theory and praxis (in which workers in this field are engaged). In its creative phases this might develop from a mutual articulation of theoretical underpinnings and rich analytical descriptions of praxis, to a systematic and rigorous searching for ways in which each might deepen and enrich the other, leading to improvements in learning for participants in networked learning environments. This idea, of a theory-praxis conversation or interaction, was developed by Stenhouse (1983). He argued that the development of a theoretical understanding of educational action and doing educational research into the practical problems of education are inseparable. If educational research focuses on the problems which arise in trying to realise a form of educational praxis, then it will pose questions, both about which actions in the context are constitutive of such praxis and about the educational criteria employed in deciding this. To summarise, educational research, on Stenhouse's account, is a process which involves the joint development of educational praxis and theory in interaction (see Elliott, 2001 for a summary of Stenhouse's arguments).

Our approach in this paper is, firstly, to explore some of our general concerns about the complexity of the interactions of theory and praxis in the field of networked learning. We then go on to provide a specific example of this conversation and its difficulties through an account of some of our own recent research into learning and tutoring in a networked learning community.

Halverson (2002) has cogently articulated four ways in which theory might contribute to this conversation in the context of networked learning environments. These are through its:

- Descriptive power – providing a conceptual framework that helps us to make sense of and describe the phenomena in which we are engaged.
- Rhetorical power – helping us to talk about these phenomena and speculate about ways in which the theoretical ideas 'map' onto our experience of them.
- Inferential power – providing us with ways of advancing our understanding by helping us to ask new questions and intervene in creative ways, as educators, in the contexts that we are investigating and in which we are participating.
- Applicatory power – informing the ways in which we design and engage in pedagogy to support learning.

One of the themes of the present paper is complexity. We argue that this applies both to theory and praxis. Such is this complexity that, given the current state of the conversation between theory and praxis in the field of networked learning, we contest that no single theoretical framework is yet capable of offering us a sufficiently powerful articulation of description, rhetoric, inference or application. This point has been well argued by Paavola, Lipponen and Hakkarainen (2002) who describe the ways in which some of the theoretical models currently available to workers in this field may complement each other, while pointing out that there are many fundamental differences between these models in terms of both focus and power; yet, all the models they describe are currently in use by workers in the field. One explanation of this situation may be that, as a research community, we are still in the process of coming together to engage in theory-praxis conversations, still emerging from the fields that informed the genesis of our interests in networked learning. Furthermore, perhaps we have not yet, as a research community, fully and openly acknowledged the complexity of researching the central

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educational processes of learning and teaching. However, this complexity does not end with theoretical plurality, immaturity, and a reluctance to acknowledge this complexity in the field. The nature of our educational interactions (our praxis), as learners and educators, with each other, and with the artefacts (texts, computer systems, language) of our networked environments is also complex, consisting of multiple individual and group processes. More progress has been made in articulating a coherent synthesis that provides a framework for teaching (pedagogical) processes (Goodyear, 1999). However, as Goodyear acknowledges (2001, p.7-8), the task of analysing online texts and connecting this analysis to learning is troublesome because of the theoretical difficulties of linking language to learning. Parallel problems arise when analyses of online tutoring are undertaken. Our research context for this paper (see below for details) is a course in which participants engage in learning processes, tutoring processes and action research processes. All of these are located primarily in the overlap between their own individual professional contexts and the more formal shared context of the Master's programme. We acknowledge that this complexity of praxis requires further articulation than is possible in the present paper, and will form a focus for future work.

The learning and tutoring processes that form the focus of the research described in this paper are only one aspect of human agency in educational contexts (see Taylor, 1992 for a broad analysis of the philosophical scope and social evolution of human agency). As well as learning, tutoring, and research, this agency also includes processes of identity formation, motivation, intentionality and achievement.

While our ambitions for future work include our intention to address these processes in NL environments, they are also outside the scope of the study reported here. However, other workers have already begun to investigate these aspects of agency in NL. Mann (this volume), for example, has begun to investigate the implications for pedagogy of learner identity. Young, Depalma and Garrett have begun to explore the role of human intentionality in interactions between participants and learning environments (Young, Depalma & Garrett, 2002). Niven, Harris and Williams (2002) have investigated the significance of motivation in the development of an online learning community. Broader academic discussions about the interactions between individual characteristics of learners and web-based environments are now also beginning to emerge in mainstream educational research journals, albeit focused more on school level studies than higher education (see, for example, Hartley & Bendixen, 2001).

There is yet a further set of concerns, adding another layer to the complexity of the theory-praxis conversation. To develop the metaphor a little further, one might say that the language of this conversation is partly determined by the *syntax* of methodology. One requirement of the power of theory is that it should contribute to the conversation by indicating what we might focus on in real learning situations. But theory does not necessarily indicate by what means we should focus. Experience of praxis, for those engaged as learners or tutors in any NL context, leaves us with an awareness of the complexity of processes occurring between participants. What methods are best suited to systematic and rigorous analysis? How might these methods complement one another? Methodology assists the conversation between theory and praxis by providing the rules for their interaction. However, as a community of researchers, we are still confronted with the methodological challenge of agreeing the rules.

At the Fifth International Conference on Computer Support for Collaborative Learning, in Boulder, Colorado (Stahl, 2002), one of the stated aims was to articulate a new paradigm for "a distinctive form of learning research". However, a browse through the conference proceedings (CSCL, 2002) soon reveals that, despite this, only a small minority of the 50 long-papers focused on the methodological issues and practicalities of researching learning in networked environments. In some ways this was disappointing and perplexing, given the stated aim. At the same time it was understandable. The chal-

lenges to be faced in researching learning are at once attractive, but also formidable.

The analysis of the content of discourse within online communities provides a useful example of these methodological challenges. Here the processes of praxis are mediated by a virtual learning environment (VLE). This can create the comforting feeling, for unwary researchers interested in analysing educational praxis, that the transcripts of discussions taking place in the VLE contain easily accessible and potentially significant evidence of learning, tutoring, or research processes among the participants. There is no manual transcription to undertake, and it is clear who said what, and when. Initially then, the methodological challenge might, apparently, be easily resolved in terms of analytical tools through the employment of content analysis of the written messages (see Popping, 2000, for an extensive account of these procedures). However, content analysis is cumbersome and time consuming. The choice of coding categories is a complex issue in itself, and the application of complex coding schemas by co-workers may lead to further problems in resolving issues of validity and reliability, arising from subjectivity in the application of the schemas. More fundamentally, the available theoretical frameworks may not be sufficiently robust to enable valid inferences to be made about any of these processes from the textual traces. Furthermore, what does one do about those aspects of learning that are not expressed in, and therefore not amenable to, content analysis? This difficulty has been acknowledged and articulated by a few workers in the field (notably, for example, Jones & Cawood, 1998). However, there are very few studies that attempt to triangulate content analysis with other robust qualitative approaches that might offer access to evidence of the processes under discussion (see, for example, Hara, Bonk & Angeli, 2000, for one of the few studies in the field to articulate these methodological difficulties).

The emerging reality of our own recent work in this area, is that the nature of interactions among participants in online educational communities is sometimes very complex and multi-dimensional. It is not easy to research the processes of these interactions using any single method. This has stimulated us to explore a multi-method approach to understanding interactions among members of these communities and, in so doing, attempt to reveal and understand the richness of processes beyond the capability of any one of the methods, when used by itself.

In this paper we share some of our findings from the application of computer-assisted content analysis (Popping, 2000) to asynchronous discussion transcripts of the E-Learning M.Ed at the University of Sheffield (formerly the M.Ed. in Networked Collaborative Learning). Specifically, the empirical findings in this paper arise from our focus on the content analysis of individual contributions and differences in learning and tutoring processes. This is integrated with the use of Critical Event Recall (CER) to probe learning and tutoring processes that may not be expressed in the actual text records used as data for the content analysis. Elsewhere (see, for example, De Laat, 2002) we are exploring a combined approach using social network analysis and content analysis to relate patterns of group interaction to learning and tutoring processes. In future reports we will explore the dynamics of group learning and tutoring processes over time, and relate these to the individual patterns described in this paper. In methodological terms we aim to move towards a more coherent synthesis of content analysis, critical event recall and social network analysis. However, this is a longer-term aim of our research programme.

Theoretical Complexity as a Basis for Understanding Learning and Tutoring Processes

Arising from our earlier argument about the complexity of the theory-praxis conversation, we contest that there is a need to draw on a plurality of theoretical perspectives in order to develop both theory and praxis through a conversation between them, mediated by multi-method analysis. In this section, we briefly outline some of the key theoretical ideas upon which our recent work and the present paper are based. We also indicate how the overall direction of the work draws upon each of these

ideas, and the kinds of analysis to which each perspective has led us. In this work (for example Barrett & Lally, 1999; De Laat, De Jong & Simons, 2001; De Laat, De Jong & Ter Huurne, 2000; Lally & De Laat, 2002; Lally & Barrett, 1999) we have attempted to explore a range of aspects of collaborative learning and begun to develop analytical frameworks in order to understand the complex tutoring and learning processes that are occurring in learning communities. We contend that the interaction between tutoring and learning processes is of central importance in all educational endeavours. Therefore, one of our central aims is to enquire systematically into this key educational interaction. Unless we make rich links between tutoring processes and students' learning processes, it is difficult to fully understand or improve these processes. In some senses, this is not a new idea: teachers will naturally claim responsibility if their students are successful in examinations. In their attribution, their tutoring acts have brought about learning in their students as measured by the output, usually examination performance. But it may be a rather bold and unhelpful assertion. It offers no detailed insight into what 'worked' and what 'didn't'. Therefore, it provides no local evidence base on which the individual teacher can act about the details of his or her tutoring. Nor does it provide any systematic basis for communicating the effective and efficient aspects of praxis to others. Learning and tutoring, as ongoing sets of processes, happening in time and space, within an individual or a group, do not feature in detail in this general analysis. Sotto (1996) has argued this point very cogently: that good tutoring in higher education is far from self-evident, and that its connection to learning is complex, both in terms of learning outcomes at the end of an event, and learning processes occurring during that event.

Constructivism, Situativity and Group Learning

We have premised the analysis and theorising in the present paper by drawing on several theoretical perspectives about learning. One of these is a social-constructivist view of learning that also considers the situativity of learning processes. This leads us to focus on a search for evidence, in the online discussions, of cognitive processes in which participants link new knowledge to their prior knowledge, and actively construct new internal representations of the ideas being presented (Boekaerts & Simons, 1995). We also draw on ideas about the meaningfulness and situativity of learning. That is, we view learning as a set of processes by which the learner personalises new ideas by giving meaning to them, based upon earlier experiences. However, meaning is also rooted in, and indexed by experience (Brown, Collins & Duguid, 1989). Therefore, each experience with an idea, and the environment of which that idea is part, becomes part of the meaning of that idea (Duffy & Jonassen, 1992). Learning is therefore understood and viewed by us as situated by the activity in which it takes place (Brown et al., 1989; Lave & Wenger, 1991). This view has also led us to seek evidence in the online texts, for the cognitive, social and affective processes in which participants engage in, trying to make meaning of the ideas presented to them by the tasks they are undertaking. We have also used Critical Event Recall (CER) to try to access the meaning making, and awareness of context, that participants use to make judgements and engage in activities in their course of study.

In our thinking we have also drawn on a wide body of work that has focused more explicitly on the social or group dimensions of learning. Influenced principally by the work of Vygotsky (1962; 1978) many authors (Dillenbourg, 1999; Goldstein, 1999; Lave, 1988; Lave, 1996; Lave & Wenger, 1991; Levine, Resnick & Higgins, 1996; Moll, Tapia & Whitmore, 1993; Resnick, 1991; Salomon & Perkins, 1998; Smith, 1994; Wegerif, Mercer & Dawes, 1999; Wertsch, 1991), have focused on the role of the group in shaping and driving individual cognitive (i.e. learning and tutoring) processes (group-mediated cognition or GMC). Key aspects of this view include the suggestion that, in a group meeting, the situation itself may exert a strong mediating effect on individual cognitive and conceptual processes: the thinking of individuals is influenced by the group in which they are working. Furthermore, the merger of intellectual and social processes may be another fundamental feature of group-mediated cognition. A third key feature is the tension between the conceptual structure or understanding (of the problem or ideas un-

der discussion) of the group and that of the individuals within it. These individual understandings may vary from each other as well as from the group. This tension may be the driving force for the collective processing of the group. So, for example, when an individual member of the group expresses his or her opinion in relation to the shared public understanding of the group, this may be based on an attempt to synthesise this understanding with the public (that is group or shared) one. The other members of the group might compare this new synthesis with their own understandings of the group-accepted version and their own disagreements with it. Depending on the outcome of this process there may be further interaction and negotiation until a new meaning or understanding is accepted by the group. In this way interaction between individuals, as well as their shared and individual cognitions, can be viewed as key aspects of the co-construction of knowledge, meaning and understanding. Our interest in the cogency of these ideas has led us towards a parallel focus on individual processes and group processes, as well as the interactions between them, in the group activities that are the focus of our empirical work. However, in this study we report on our work with individual processes within the group. Our work on group processes and interactions will be reported later, and synthesised with the present study.

Socio-Cultural Theory

The other perspective that we have drawn upon is socio-cultural theory. Whereas the social-constructivist perspectives make a distinction between the individual cognitive activities and the environment in which the individual is present, the socio-cultural perspective regards the individual as being part of that environment. Accordingly, learning cannot be understood as a process that is solely in the mind of the learner (Van Boxtel, Van der Linden & Kanselaar, 2000). Knowledge, according to this perspective, is constructed in settings of joint activity (Koschmann, 1999). Learning is a process of participating in cultural practices, a process that structures and shapes cognitive activity (Lave & Wenger, 1991). The socio-cultural perspective gives prominence to the aspect of mutuality of the relations between members and emphasises the dialectic nature of the learning interaction (Sfard, 1998). Construction of knowledge takes place in a social context, such as might be found in collaborative activities of the MED in E-Learning featured in this paper (see McConnell, 2000 for a much more detailed exploration of collaborative learning). In addition, Lehtinen, Hakkarainen, Lipponen, Rahikainen and Muukkonen (1999) argue that conceptual understanding is fostered through explaining a problem to other students. Therefore, in collaborative learning it is necessary to formulate learning objectives, to make learning plans, to share information, to negotiate about knowledge and to take decisions (Veldhuis-Diermanse, 2002). In a setting of collaborative learning, students can criticise their own and other students' contributions, they can ask for explanations, they can give counter arguments and, in this way, they will stimulate themselves and the other students. Additionally, they can motivate and help each other to finish the task. Arising from our interest in these ideas is a need to focus on tutoring processes, that is the processes of interaction by which participants guide, facilitate and structure the contributions of others, and in doing so modify and develop their own learning processes. To probe the online texts for evidence of these processes we have employed a second coding schema for content analysis, which we will describe below. In conclusion, we contend that this complex collection of theoretical ideas, drawing on social-constructivist and socio-cultural theory, and ideas about situativity, is necessary to take account of the real complexities of individual and group processes in the networked learning context, which is the focus of our study. Furthermore, we have tried to indicate how, together, they direct us towards a focus on individual and group processes, towards the interactions between these, and towards learning and tutoring. They also suggest the kinds of methodological tools that might help us understand and investigate collaborative learning in our networked community.

Analysing Individual Learning and Tutoring Processes in a Master's Programme

The students featured in this analysis are undertaking a Master's Programme in E-Learning that is based upon an action research approach to professional development. It is an advanced part-time programme designed to provide participants with opportunities to engage with theory and praxis of collaborative networked tutoring and learning. The programme is based upon the establishment of a 'research learning community' among the participants and tutors. In this community activities are undertaken around five workshops over a two-year period. The programme is hosted in the electronic learning environment WebCT. Some course resources are provided to participants in printed format. Students also communicate with each other, and the designated university tutor, informally and outside the course environment. The students are a sophisticated group of professionals, in several senses. Many are mature learners who bring more than one established and relevant body of expertise to the course with them. They often already have extensive postgraduate experience of higher education, are themselves professionally engaged with teaching responsibilities within their organisations, and are charged with developing e-learning within that organisation. Some also have research experience in the natural or social sciences. In the course they become engaged in collaborative learning and tutoring processes (McConnell, 2000) as they support each other and the group as a whole in a range of structured activities. Tutoring processes in this course are not the exclusive domain of the designated tutors. They may be undertaken by any of the participants in this course environment. This kind of integration of learning and tutoring processes has been documented in other networked learning settings (Gartner & Riessman, 2000). The more traditional role of the 'teacher', with its central position, may be transformed within such collaborative structures, towards fostering an online learning culture in which participants take charge of their own learning and tutoring (Collinson, Elbaum, Haavind & Tinker, 2000).

Methods

Our analysis is based upon work conducted by seven students and one tutor in the first workshop of this programme (approximately 10 weeks' duration). We were particularly interested to explore the relationship between knowledge construction (learning) and tutoring processes as these evolved over time within the workshop.

Content Analysis

In the process of analysing tutoring and learning processes of the participants in our group, messages from the workshop had to be coded and analysed. The central purpose of coding, for us, was to extract, generalise and abstract from the complexity of the original messages in order to look for evidence of these processes, and use this to interrogate the theories about the situation that we had used to direct our investigation. This is a balance between oversimplification, resulting in the loss of subtlety and insight into complex processes, and over-coding where the themes and trends are still obscured by too many sub-categories. We used computer assisted data analysis software (CAQDAS) to achieve this. The main advantages of such an approach include: partial automation of the coding process, with increased speed of coding, and a wider range of ways to search, re-code and interrogate the coded data (in this case messages), including visual coding. We used NVivo 1.1-3 (Qualitative Solutions and Research, 1999) for this work, and set up the categories in our two schemas as 'nodes' within the NVivo system. Each message was imported as a text file and given a 'time-stamp' to indicate when it was posted in the original discussions in WebCT. It was also given other 'descriptors' including who authored the message, and the gender of the author. Once all the messages had been coded and described, we used the search facility in NVivo to carry out two analyses. The results in this paper are based on one of these analyses: a search, by individual participant, for his or her contributions within each category of the learning and tutoring coding schemas. In a second analysis, reported elsewhere (Lally & De Laat, 2002), we looked at tutoring and learning processes for the whole group over time, in

order to try to understand how the relative proportions of learning and tutoring processes changed over the lifetime of the group's work.

In order to probe collaborative knowledge construction and tutoring in this learning environment we 'coded' the contributions made to a 10-week discussion using two coding schemas. The coding process consisted of two steps: (1) dividing the messages into meaningful units (Creswell, 1998; Henri, 1992) and (2) assigning a code to each unit. We decided to segment messages into units of meaning by using semantic features such as ideas, argument chains, topics of discussion (for further details of this approach to the definition of units of meaning, see Chi, 1997; Ericsson & Simon, 1984) or by regulative activities such as making a plan or explaining unclear information. Thus, the content of the messages had to be read for meaning to determine segment boundaries. Although it may be considerably easier to use syntactic boundaries to segment messages (such as sentences), we followed the semantic boundary approach to attempt to obtain a more finely grained analysis that more closely reflected the meaning of the phrase or paragraph.

The first coding schema (based on Veldhuis-Diermanse, 2002) was used to investigate knowledge construction processes (see Appendix 1 for details and examples of indicator phrases). This included four main categories: cognitive activities used to process the learning content and to attain learning goals; metacognitive knowledge and metacognitive skills used to regulate the cognitive activities; affective activities (used to cope with feelings occurring during learning), and miscellaneous (used to score all other units). Our intention was to try to reveal something of the participants' thinking, as expressed in their message contributions, while they were undertaking the collaborative task. This coding schema was used to code units of meaning that we regarded as 'on the task', focusing on the learning processes used to carry out the course assignment. Although some codes of this schema are designed to identify cognitive expressions of the learning processes of individuals, some of the codes are targeted on processes that are social, and occur between individuals. Examples of these types of code include the metacognitive codes used to mark expressive, questioning, explaining, and sharing of ideas. The second schema focuses on units of meaning that are 'around the task'. We have called these 'tutoring processes' and to probe them we adapted another published coding schema (Anderson, Rourke, Garrison & Archer, 2000). This includes three main sub-categories: design and organisation, facilitation of discourse (Lipman, 1991; Scardamalia & Bereiter, 1994) and direct instruction. The work on cognitive apprenticeship by Collins & Brown (1991), Rogoff's (1995) model of apprenticeship in thinking, and Vygotsky's (1978) scaffolding analogies provide some of the theoretical basis for these categories. The intention here was to reveal something of the ways in which the participants were supporting each other's learning, and learning together, while undertaking the task. The choice of coding schemas is an important one for this type of work. It could be argued that a more 'grounded' approach, using categories that emerge from a reading of the messages, would provide a more 'authentic' summary of the intentions of the participants. In our view this is a valid and important way of approaching the analysis. However, we wanted to connect with some of the conceptual and theoretical ideas about learning and tutoring in the literature using schemas that were already in use, rather than create *de novo* categories. At the same time we hope to be able to share our analyses with colleagues in other contexts by supporting the use of publicly available schemas as a basis for comparison within the research community. Both of these schemas have been used extensively by their originators, and we shall address the comparative aim of our work in future studies.

Critical Event Recall (CER)

This method is a form of 'stimulated' event recall (Interpersonal Process Recall - IPR) to which one of the authors (Lally) was introduced by Jon Scaife at the University of Sheffield (UK). IPR is a process developed by Norman Kagan, commencing at Michigan State University in the early 1960s (Kagan, 1984; Kagan & Kagan, 1991). A broader theoretical and practical overview has been provided by Tuckwell (1980). The basis of IPR, as it was developed by Kagan and others, is the realisation that humans store vast amounts of information, feeling, impressions and ideas about the events, or 'interpersonal processes', in which they have participated. Because of the speed at which human interactions occur much of the detail of these processes is soon 'forgotten', and not available for subsequent reflection. One of the present authors has used IPR extensively to help schoolteachers analyse the teaching and learning processes occurring among the pupils in their classrooms (Lally & Scaife, 1995). When groups of participants engage in mutual or shared recall of events in which they have been present together, they can gain insight into their behaviour and learning processes. In a sensitively guided recall this can be of benefit for the future learning of the group, as well as the individuals within it. The recall enables the articulation of many previously unexpressed aspects of learning.

In networked collaborative learning environments such as the Sheffield E-Learning M.Ed. Programme (University of Sheffield, 2001), students and tutors are working in learning communities with many complex learning interactions occurring simultaneously. The use of the records of these interactions as a stimulus to recall of critical learning events occurring during the programme workshops, suggests itself as a way of investigating those aspects of these processes not actively expressed during the events. We have termed this 'critical event recall', and adopted two approaches to undertaking it. In the first approach the participant is presented with summary analyses of the group and individual learning events. These give an overview of the patterns of learning and tutoring within the event (as presented in tables 1-6 of this paper). In the second approach we use the full text of learning events. In both approaches the participant was presented with these items in advance of the recall sessions so that they might familiarise themselves with the summary analyses and full text of the events. In this paper we include the recall event of one participant (the university tutor) using summary analyses and full texts from which he was able to choose what, for him, were the *critical events* of the workshop. In future studies we will present the results for all of the participants.

Results and Discussion

Content Analysis

The following tables (1-6) give the results of our analyses of individual and group (i.e. total) contributions to the workshop, using the two coding schemas. In the first analysis we coded learning processes, on the basis that we considered these to be the primary processes of the workshop activity. Tables 1-3 show the units of meaning coded for learning processes for eight individuals, including the tutor (Brian, denoted by * in the tables). This coding represents a sample from three phases of the activity. The total number of messages from the workshop was approximately 1000. Our sample consisted of 10% of these messages, spread equally between the beginning, middle and end phases of online activity (each phase was a time sample of ten days duration). In a second coding analysis we coded for tutoring processes in the message sample. Tables 4-6 show the units of meaning coded for tutoring processes for the same individuals during the same time samples.

In this section we would like to offer some analysis of the results of the coding of learning processes (Tables 1-3). Firstly, however, it is important to add a general note of caution about this analysis. Clearly, learning processes are occurring within and between individuals in the group. However, all coding techniques are based on indicator phrases for each of the processes that are coded. We are assuming that the (internal) learning processes are actually represented by the expressions we are coding. This

may not always be the case. The problem arises because linguistic expression of thinking is a conscious process in which a person is making active choices based upon

Table 1. Units of Meaning Coded for Learning Processes During the Beginning Phase

Beginning phase									
Type of learning process	Learning Processes of Individual Community Members								Total
	Bill	Katie	Brian*	Pauline	Andrea	Felicity	Charles	Margaret	
Cognitive	0	2	4	1	17	5	11	6	46
Affective	0	2	1	0	4	1	3	0	11
Metacognitive	0	1	1	1	4	3	4	1	15
Miscellaneous	1	0	1	0	2	0	1	0	5
Total	1	5	7	2	27	9	19	7	77

Table 2. Units of Meaning Coded for Learning Processes During the Middle Phase

Middle phase									
Type of learning process	Learning Processes of Individual Community Members								Total
	Bill	Katie	Brian*	Pauline	Andrea	Felicity	Charles	Margaret	
Cognitive	5	1	0	7	8	9	14	18	62
Affective	2	0	0	0	0	0	0	1	3
Metacognitive	0	0	0	1	1	2	5	2	11
Miscellaneous	0	0	0	0	0	0	0	1	1
Total	7	1	0	8	9	11	19	22	77

his or her intentions and motivation. What he or she chooses to say may be an approximately accurate account of his or her thinking. This is a limitation of the coding process that must be borne in mind when evaluating the results of coding. Having said this, the codings do seem to suggest some clear patterns, over the three phases of the activity.

Table 3. Units of Meaning Coded for Learning Processes in the Ending Phase

Ending phase									
Type of learning process	Learning Processes of Individual Community Members								Total
	Bill	Katie	Brian*	Pauline	Andrea	Felicity	Charles	Margaret	
Cognitive	4	0	2	0	6	2	2	3	19
Affective	0	0	1	1	2	0	0	0	4
Metacognitive	2	0	0	0	1	2	2	2	9
Miscellaneous	5	0	1	1	3	2	0	1	13
Total	11	0	4	2	12	6	4	6	45

In the beginning phase, we coded 42 units of meaning (60% of the total), from the expressions of learning processes in the text, as cognitive, and 15 units (20% of the total) as metacognitive (Table 1). This is the phase of activity when the task of carrying through a collaborative project, on an aspect of networked learning, is being conceptualised for the first time by the group. Also the coding of affective activity produced highest number of units of meaning in this phase (11 units, or 14% of the total).

In the middle phase, however, this relationship changes. Units of meaning coded for cognitive activity rise to 62 (81% of the total) while units coded for metacognitive and affective processes drop to 11 (14% of the total) and 3 (4% of the total) respectively. At this point in the workshop, participants are often thinking, and discussing the concepts of the task itself (Table 2). In our sample, this is the phase in which Charles and Margaret were most involved. By the ending phase (Table 3) the units of meaning coding for cognitive processes have dropped back to 19 (42% of all units). The affective activity, as indicated by coded units, remains low (4 units or 8.9% of the total), but units coding metacognitive processes have risen; in this case to 9 (20% of all coded units). Also, coding for miscellaneous discussion has increased considerably, from 1 unit (1.3%) in the middle phase, to 13 units (28.8%) in this concluding phase. This suggests to us that as the group members complete their project they may be moving away from thinking 'on the task' and starting to discuss other matters that are not directly related to it. At the same time, individual profiles are discernible in these coding values. For example, Andrea is a student participant who makes extensive contributions to learning processes (as represented by the number of coded units) throughout the activity, although at lower levels in the middle phase. Katie, on the other hand, makes very few explicit contributions to any learning process. Charles has been active in both beginning and middle phases but is much less so at the end. Margaret (and Pauline to some extent) make extensive contributions during the middle phase, but much less at other times. Bill, on the other hand, seems to grow in confidence during the learning event, with few explicit contributions in the beginning phase, and then rising to almost 25% of all contributions by the ending phase. During this activity the university tutor (Brian) contributes at a low level in the beginning phase; makes no expressed contribution at all in the middle phase, and a low level of contribution at the end of the activity.

In our second coding analysis we focused on attempting to code the text for tutoring processes occurring in the discussions (Tables 4, 5 and 6).

Table 4. Units of Meaning Coded for Tutoring Processes in the Beginning Phase

Beginning phase									
Type of tutoring process	Tutoring Processes of Individual Community Members								Total
	Bill	Katie	Brian*	Pauline	Andrea	Felicity	Charles	Margaret	
Direct Instruction	0	0	2	2	0	0	0	0	4
Facilitation	1	3	8	1	5	0	5	2	25
Instructional Design	2	1	8	4	4	3	8	1	31
Total	3	4	18	7	9	3	13	3	60

Table 5. Units of Meaning Coded for Tutoring Processes in the Middle Phase

Middle phase									
Type of tutoring Process	Tutoring Processes of Individual Community Members								Total
	Bill	Katie	Brian*	Pauline	Andrea	Felicity	Charles	Margaret	
Direct Instruction	0	0	0	0	2	0	0	0	2
Facilitation	3	3	2	4	24	5	6	7	54
Instructional Design	2	1	3	2	5	0	1	2	16
Total	5	4	5	6	31	5	7	9	72

In this programme, based upon a learning community of professionals, the activities that we have described as tutoring include: direct instruction, facilitation, and curriculum organisation (see Appendix 2 for details of the schema and examples of indicator phrases). It is important to note that these are not the exclusive domain of the designated (*) university tutor. They are activities used and employed by all members of the group at different times. Our decision to try and probe these processes using a second coding schema was based on our own awareness of the strong inter-relationship between 'tutoring' and 'learning' that may occur in such groups, arising from the socio-cultural framework outlined above. It is an important feature of this kind of collaborative online work on the E-Learning programme. The results of these tutoring codings are shown in tables 4-6.

Table 6. Units of Meaning Coded for Tutoring Processes in the Ending Phase

Ending phase									
Type of tutoring Process	Tutoring Processes of Individual Community Members								Total
	Bill	Katie	Brian*	Pauline	Andrea	Felicity	Charles	Margaret	
Direct Instruction	0	0	1	0	0	0	0	0	1
Facilitation	4	0	9	1	9	3	2	1	29
Instructional Design	3	0	8	1	1	1	1	0	15
Total	7	0	18	2	10	4	3	1	45

Once again, and within the limitations outlined above, some patterns are discernible. In terms of group totals firstly, the level of units of meaning coded for direct instruction remains at a low level throughout the entire activity. This is not surprising given that the group was engaged in a collaborative activity that drew on members' own professional resources and other material to which they were directed before the activity commenced. Therefore, there was little need for anyone to provide this during the period of work that we analysed. On the other hand, the level of units coded for instructional design in the beginning phase is high, at 31 (51% of the total) (Table 4). One interpretation of this is that it may arise from the group's need to help each other to get organised for the activity to come. In the middle phase (Table 5) coding for instructional design decreases to 16 units (22%) as coding for facilitation by group members increases from 25 to 54 units (41% in the beginning phase to 75% in this phase). Coding of units for facilitation continues at a high level into the ending phase, with 29 (64%), where instructional design units increases again, with 15 units (33%) as the group members plan and prepare to review their work. Brian's (the tutor, denoted by * in the tables) contributions are coded at high levels for tutor processes in the early and ending phases (Table 6), but less so in the middle phase. Some of the students, for example Andrea, make contributions that are coded at high levels for tutor processes. Indeed, Andrea sustains these units in the middle phase when Brian's contributions are relatively low. Margaret shows the same pattern to a lesser extent. The role undertaken by Charles is interesting because his coded tutor contributions are highest in the beginning phase and then decline in the middle phase and remain low in the ending phase. During this change evidence from coded units of his engagement in learning processes remains steady in the beginning and middle phase and decreases at the end. Bill again shows a growth in engagement, whereas Felicity seems to be a stable participant in the workshop as a whole.

Critical Event Recall Interview

The learning and tutoring patterns that have emerged from this coding analysis provide some insights into the dynamics of individual and group behaviour in a virtual professional development environment. Group learning is dependent on the individual contributions. These individuals have different interests, agendas, and abilities in regulating the individual as well the group learning processes. The critical event recall interview with the tutor involved with the guidance of this group, may help us understand some of these differences. The interview with Brian, using all six tables of summary analyses, occupied approximately 45 minutes. Time was spent at the beginning helping Brian to clarify the meaning of the numbers in the tables and the way in which they had been calculated from the coding. The interview was loosely structured, and tended to follow a natural pattern arising from the structure of the six tables we were using. After articulating patterns of individual behaviour, gleaned from the summary tables, he began to recall his impressions, at the time of the event, of the learning and tutoring behaviours of the participants.

Starting with himself, Brian commented that the tables showed him to be much more active at the start and end of the workshop, and much less so in the middle phase:

“That was certainly an active conscious decision. Because I knew that throughout, I had that as a sort of personal policy, to be there at the start and give them the space in the middle, and to come back in the end.”

“I am not surprised with that because I not only had that personal policy of starting with the profile and ending with a higher profile, but I also had a personal policy of explaining that policy to them as part of my personal philosophy. So I said to them that I’d try to be there at the start to clarify the task and everything, left it to them in the middle and then be here again at the end, talking about ‘how was it for you’ kind of thing.”

These excerpts illustrate the decision he made to be much more visible to the other participants at both the beginning and ending phase of the event, but to withdraw, to a large extent, in the middle phase of work. He went on to explain his thinking behind this strategy, and how it related to the way in which he wanted to give space to participants to work together and express their own ideas, not dominated by him. This revealed strategic pedagogic thinking about his role as a tutor and facilitator with special responsibilities (he represented the university in the group). It was clearly intended to support the learning processes of other group members, but was not expressed in the discussions of this particular group.

Brian expressed his role as a tutor and facilitator during this recall in two ways. In one way Brian was concerned with the learning process of the group and how to facilitate or mediate that. On the other hand he was constantly aware of the dynamics of the group:

“Of the things I remember, looking back at this, are two things really. One is Charles’ role, his sort of ‘if you like’ behaviour, and the other is trying to contain Charles, from my own perspective, while others had a chance to come in and have their say. Because Charles came forward, he was very strong really, very clear. And I remember thinking ‘well it’s really valuable to have that early sense of direction’, but the concern was that the rest of the people would not have a voice.”

“Now the other strong figure, and possible counter-figure, to it was Andrea; the great thing about her was that she was not only participating, but she was offering help as well, still being supportive and considerate of Charles’ view, but offering a wider possibility.”

“So I remember being particularly grateful that Andrea was there, and feeling at that point that there were two key figures in the group, and that it was these two figures I was (if you like) containing, or just working with and trying to hold and trying to avoid them making any decisions until the rest of the group appeared, because the rest of the group was slower in appearing.”

Meanwhile Brian was not contributing much himself, but trying to keep a feeling of where the discussion was going to, ready to facilitate whenever he thought necessary. This is illustrated through the following excerpts:

“The other thing was that I felt that Charles was concerned to get the task done, to get the group on board, and to get everybody active. And as the project went on I was conscious that we weren’t really thinking about the processes but acting on completing the thing. Rather than making decisions about a project topic.”

“I really felt like Andrea was almost doing a holding thing on Charles as well. Saying that, there are other possibilities. With my own message here I was trying to comfort and support Andrea a bit, as she was trying to hold back Charles eagerness and enthusiasm. Partly as a slight counter against Charles strong direction, and again just to buy time for the others to come in.”

“And although I have had put message in, I was staying as neutral as I could and trying to keep a small footprint on the thing.”

As the discussion proceeded Brian felt he needed to act more directly to give the group some more support to help them to learn in this context:

“I was just concerned that we did not have a lot of ideas for the project and that the whole thing might take a lot of time if they were going to succeed in completing it.”

“I did two things in this thread, if you like. One was to offer a model of how to organise as a group, and the other was to try and summarise all that had been said. This one was definitely an attempt to facilitate some progression.”

Later on in the project when the group’s thoughts and aims were more or less crystallised, Brian decided to withdraw:

“I did not make many comments here compared to the starting phase, because the first phase was the preparatory thing and I was conscious of ‘it’s got to happen and I have to get them there’. By the time it got to this [middle phase] they have taken over, so I was conscious of sitting back.”

“There were not many things that really caused thought in my mind, as it were. But I was tracking it, like a hawk really, but I was in a more relaxed mode.”

This is the point where Brian started to focus more on the dynamics within the group:

“I was beginning to have a slight sense of two groups forming, one was Andrea and Charles, as they were working quite closely together, and the other was Katie and Pauline, in the background, and Bill as well. Bill was trying to attach himself to Charles, I felt. Bill was struggling to find a place where he could contribute and talk.”

“I was conscious of Pauline supporting Katie at that time. Katie seemed to be someone who was

struggling to hang on. They also seemed to become some sort of a subgroup and I was aware of that at the time, maybe Felicity was a member of it. Katie, I felt, was struggling to engage; the others seemed to be talking over her head. So there was a group Andrea and Charles who were really cracking on. They talked in models. Margaret also was able to join in that, although she wasn't very 'present'. But Pauline, Katie and Felicity seemed to be more shadowy figures, and Bill too."

"Bill approached Charles to say: 'Is this something we could collaborate on?'; Katie expressed, instead, a problem that she was having. This struck me as a similar problem but obtained different responses. Bill was looking for somewhere to make an input. He found a niche in which he could do that, whereas the opposite happened for Katie. She did not try to establish a niche. She just simply said 'I am really struggling', and the response came from Pauline to say 'don't worry'. Andrea gave a more academic response whereas Pauline gave a more emotional response, I felt. It just seemed to be a different level of response, even though Andrea's was more comprehensive, Pauline's tone and style seemed to be more useful. Andrea was saying 'I will help you but I am up here doing this clever stuff', (not expressed like that, but sort of the summary of it). Whereas Pauline spoke to her as a person."

After recalling his own behaviour in the group Brian started to elaborate on the behaviours of others. According to Brian, Andrea was a significant participant in the event:

"She was an ever-present person, she had quite a high profile because of her personality, she was generally present in the social area."

"And she also discussed her personal online tutoring practice. She was already familiar with such a role. So it is not surprising that she took on that role. [In the middle phase, when the tutor withdrew.]"

"She is very facilitative in all her communications."

"She already had a strong model of how these things would play out and so she engaged in it, whereas Bill was struggling to understand it."

Brian realised at the time of the event that Andrea had considerable experience of working in the medium, and was able to recall this from seeing the summaries. He observed her facilitating others in the group, and her relatively high presence in the summaries caused him to comment that this was his strong recollection of the way she worked for much of the time in the 10-week event. She was the biggest contributor of learning-coded messages at the beginning and end of the event, and replaced Brian as the biggest contributor of tutoring-coded messages in the middle phase, when Brian had deliberately withdrawn.

Charles was also very active (especially in the beginning) but seemed to have a strong personal idea about the task:

"Yeah, well, Charles seemed to me very task-oriented. He seemed to be a do-er. He seemed really like he didn't want to think about it or talk about it: 'I have got this idea and I really want to try and implement it together'. And he really struck me as that; he was very active but as soon as it came to the discursive side of it he disappeared."

"He is a very procedural person, and he had lots of clear ideas and experiences but he did not

want to get into the dialogue overtly, apart from 'how do we get this done?'"

This matches the individual coding patterns for Charles: high involvement in the beginning, to start up the project. Later on, when the community was in 'motion' and started to reflect more on their task, as Brian recalls it, Charles became less involved.

Bill was another participant in the group. According to Brian this way of learning was quite new to Bill:

"My idea is that he was a sort of local person sent to do the course on behalf of the university or whatever; I thought it was a business school. So it would not surprise me that he did not have a clear idea about what to do and how to do it. But he was motivated and interested and talking about it locally. At the end he came in to say: 'right, well, based on that I think this is how it could be used for us locally'. So he was ready to contribute, but did not know how to, in the task."

"[In the beginning] Bill was struggling to understand it."

For this reason, according to Brian's recall, Bill's level of participation, as reflected in coding for both learning and tutoring processes, was low. However, as he clarified his own purposes for being involved, Bill's participation increased. He was the second highest participant (by learning units) by the end [having been the lowest at the beginning], and third highest for tutoring units [having been equal lowest at the beginning].

Brian also recalled some of his thinking about the low level of participation of Katie:

"It doesn't surprise me in some time senses, because she had difficult personal circumstances. So that could have contributed to it."

"Her model of the experience to come was possibly of a more directive nature, so it was a struggle then to accept a new mind-set, of knowledge being distributed amongst themselves."

Brian also commented on Felicity, another active participant, as measured by units coded for learning processes. He thought she felt more comfortable thinking about the task than providing tutoring support for others. This is also supported by the coding analyses in tables 1-6.

"It will be interesting to be thinking about her because she was very communicative, good sense of humour and a very willing person."

"She seems initially more a little bit like a procedural person. But later on she was ready to engage the reflective activity."

"She was quite a strong person but did not dominate."

The recollections presented here indicate that the tutor engaged in many reflective and analytical observations about his own facilitation of the group and the behaviours of individuals within it. Yet much of this thinking was not directly observable in the transcripts of the group's work. The teacher was making careful judgements about when and how to intervene based upon his interpretations of the needs and behaviours of individuals, the needs of the group, and his own largely unarticulated (in the

group forum) values about the nature and purposes of collaborative learning. In summary, Brian was, as Jones and Asensio have articulated in detail elsewhere (Jones & Asensio, 2002), engaged in a social process of actively designing his involvement through his interaction, with a view to enhancing the learning of the group members. He was concerned, it would seem, to maintain balance and integration within the group, assist socially oriented processes of learning and tutoring, and foster collaboration among group members.

Conclusions

This paper has attempted to address some of the complexities of researching networked learning (NL) in a higher education context on both theoretical and empirical levels, by linking a theoretical discussion with an example of our recent work. Specifically, we are concerned to illuminate how theory and praxis interact in a range of networked learning environments with a view to enriching both. We describe this interaction as a kind of exploratory conversation between theory and praxis that may be mediated by methodology. We argue that there are several complexities in this endeavour. Firstly, while acknowledging the power of theory as a framework for both pedagogy and research, we suggest that the complexity of praxis in networked collaborative learning environments is such that the models of social-constructivism, situated learning and socio-cultural theory are not, separately, capable of providing an account of the role of meaning making, the function of context or the power of the interaction between tutoring processes and learning processes. We have therefore drawn on all of these frameworks in this account of individual learning and tutoring, that is, we have used them as a means of thinking about the kinds of processes that might form a meaningful focus for our enquiry. Secondly, we acknowledge that the complexity of praxis is such that the empirical work reported here can focus only on a sub-set of the aspects of human agency that are pertinent to a holistic understanding of collaborative educational contexts. In this study we have chosen learning and tutoring processes as the focus of our research because we think that they are central to the pedagogical endeavour (a view informed by the theoretical perspectives upon which we have drawn in this study). However, it is also clear that richer theoretical descriptions than those we have employed may be required to take account simultaneously of more aspects of agency. For example, we have taken into account little of the individual and group motivation, although some features of the tutor's motivations are apparent in the CER interview. Thirdly, we argue that the complexity of the tutoring and learning processes we encountered in the E-Learning MEd are such that a multi-method approach is required to mediate the conversation between theory and praxis. This complexity has been reported in other online programmes (for example Hara et al., 2000). We note that our use of content analysis and CER (using summary analyses as a stimulus), is only one step in the development of a more sophisticated approach to the research of this complexity across these contexts.

Empirically, this paper reports part of an attempt to study both learning processes and tutoring processes within a group of collaborating professionals in an online learning community. We have presented the results of an approach to content analysis of messages exchanged during a single professional development activity of approximately ten weeks duration. This analysis has enabled the tentative identification of patterns of individual and group learning during the activity. It has also allowed us to discern different individual roles in tutoring processes among these professionals (as revealed through coding of units of meaning and a CER interview). We have tentatively attempted to relate these to learning processes. We suggest that these analyses have added to our understanding of tutoring and learning processes by professionals in a learning community within an online Master's programme. They show, for example, how participants may operate quite differently, and yet within discernible patterns, some being strong facilitators, while others offer little support to their collaborators. There are many other implications in terms of differentiated patterns of working that we hope to articulate

in future work. Through this approach we contend that it may be possible to gain deeper insights into how professionals collaborate successfully to develop their own practice, and into the complexity of the interactions between individual and group processes during these collaborations.

At the same time, we have indicated that the analysis of such complex interactions in learning communities presents a strong methodological challenge for researchers. The use of coding schemas, for example, is beset with difficulties. Their use to 'code' the messages is an attempt to 'categorise', and to some extent quantify, the meanings embedded in the exchanges between participants. However, this is a considerable task. Because the total number of messages was around 1000 we had to 'sample' these in order to make the coding manageable. Hence the exchanges were sampled during the first ten days of the group's work, during the middle ten days and for a further ten days at the end (the three phases in tables 1-6). This sampling approach was used in an attempt to retain meaning and coherence over time in the sampled episodes of work. We analysed all the messages in selected threads rather than sampling across all threads. This was important to us because we wanted to look at the development of tutoring and learning processes in the group, over time, as well as at individual totals. We are aware that this approach still fragments the contextual meaning of the coded content to some extent, and further work is required to refine this methodology so that the relations of the coded units to its neighbours in the text can be seen. Furthermore, the coding schemas required to capture the complexity of the activities were necessarily complex in themselves. There was a total of 42 categories and sub-categories. Some passages of text could have been coded using more than one category, because of the multiplicity of meanings that could be inferred from the text. At these points we had to make judgements about this and agree them in 'coding conversations' between the two researchers. Given these difficulties, the use of coding in this way is still only a partial solution to the methodological challenges we identified at the beginning of this paper. Furthermore, coding of discussions in the social space that was created in WebCT, for use during the workshop, was not undertaken. Yet this space was a place where ideas were discussed, and relationships built that supported the group's work in the more formal group space (or forum).

Of course coding provides little insight into a key aspect of the individual and group processes: those that were not expressed in text messages. We have argued for the need to complement coding analyses with several complementary forms of analysis in order to understand more fully the richness of these learning interactions. In this study we have combined coding analysis with critical event recall which is based upon the research of Kagan and others into the stimulation of recall of learning events using video records of those events. The recall episode used here is based on a single recall interview with the tutor in the featured group. Summary content analyses of the texts of the learning event were used as a basis for the stimulation of recall of critical events in the work of the group. This was then followed by recall based on the full transcripts of the workshop in which the tutor selected critical episodes upon which to focus his recollections. A significant finding of this study is that recall of important details of the tutor's thinking *at the time* of the original event is possible using summary analyses of this kind. This is enhanced further by the selection of critical events from the full transcripts. The recollections presented here suggest that the tutor engaged in many reflective and analytical observations about his own facilitation of the group and the behaviours of individuals within it. Yet much of this thinking was not directly observable in the transcripts of the group's work. The tutor was making careful judgements about when and how to intervene based upon his interpretations of the needs and behaviours of individuals, the needs of the group, and his own largely unarticulated (in the group forum) values about the nature and purposes of collaborative learning. However, these were not all tacit understandings of the processes, as he articulated his design processes to himself, both at the time and subsequently. Critical event recall has the potential to access aspects of learning and tutoring processes that are not directly available in discussion transcripts. Furthermore, this tool can complement content

analysis in an important way by using its results to probe 'the thinking behind the text' in collaborative work within learning communities in networked environments. In future studies we will report on the use of critical event recall among all the participants in an online workshop, and on the combination of content analysis, critical event recall and social network analysis (not used in the present study) to the same workshop. The aim of this work is to move towards a more complete understanding of the complexities of praxis in online learning communities through a conversation with theory. It is our hope, in this task, to contribute to the development of praxis, and to the enriching of our theoretical and methodological tools. This paper does not report a theoretical synthesis of the frameworks upon which we have drawn. This is a communal endeavour that will require many more conversations.

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Appendix 1. Veldhuis-Diermanse Schema for Learning Processes Coding

Code	Cognitive Learning Activities
	<i>Debating</i>
CDPF	<ul style="list-style-type: none"> A problem, solution or idea is presented. This contribution is followed by an illustration or argumentation: <p>"These crops are very suitable for the field. One restriction is that these crops (certainly potatoes) can be grown only once every 4 or more years, because of diseases. It is not good to grow potatoes and sugar beet in a sequence, either. So they should be separated by another crop."</p>
CDPNF	<ul style="list-style-type: none"> A problem, solution or idea is presented. This contribution is <i>not</i> followed by an illustration or argumentation: <p>"The best research procedure would be watershed level (i + 3) with the use of simple comprehensive methods."</p>
CDAF	<ul style="list-style-type: none"> A student does or does not agree with the opinion or idea contributed by another student or author. This viewpoint is followed by a backing, refutation or restriction: <p>"I agree that Income Optimization is not an easy term, though I think it's quite right here. A cognitive map only gives an overview of the problems to make things clearer. All influences concerning agriculture will affect the income of the farmers".</p>
CDANF	<ul style="list-style-type: none"> A student does or does not agree with the opinion or idea contributed by another student or author. This viewpoint is <i>not</i> followed by a backing, refutation or restriction: <p>"I like the idea!"</p>
CDAQ	<ul style="list-style-type: none"> Asking a content-directed question: <p>"In that school the aim is diagnostic testing. What does that mean to the students? Is it not necessary for them to be coached? And what sort of coaching? Are these tests serious?"</p>
	<i>Using external information and experiences</i>
CCEI	<ul style="list-style-type: none"> Contributing new information found in other information sources (mentioned or not) than the discourse: <p>"Yields according to Wofost when using sowing dates as mentioned in the CIM: potatoes - very high (15,847 kg/acre), winter wheat - low (7,653 kg/acre), sugar beets - very high (14,293 kg/acre)."</p>
CREI	<ul style="list-style-type: none"> Referring to information found in other information sources (mentioned or not) than the discourse:
CSEI	<p>"I found an interesting site: http://www.sainsbury.co.uk/gm/."</p> <ul style="list-style-type: none"> Summarizing or evaluating the information found in other information sources (mentioned or not) than the discourse:
CREE	<p>"Summarizing: A LUT is sustainable if it is ecologically possible, economically viable and socially acceptable. The three characteristics of a LUT distinguished in the article are..."</p> <ul style="list-style-type: none"> Referring to earlier experiences (scholastic or daily)/referring to outcomes of running a model: <p>"In Germany farmers told me that rapeseed is grown on fallow fields. The legislation (15 % fallow) allows rapeseed."</p>
	<i>Linking or repeating internal information</i>
CIL	<ul style="list-style-type: none"> Linking facts, ideas or remarks presented in the discourse/referring explicitly to a contribution in the discourse: <p>"I found results similar to those of Eesge and Ries."</p>
CIR	<ul style="list-style-type: none"> Repeating information without drawing a conclusion or interpreting that information: <p>"In approach 1 land units are derived from extensive soil sampling and Remote Sensing. Four functional layers are distinguished and combined to soil profiles. Two land units are distinguished: one with a mainly sandy texture, one more clayey." (= note 34)</p>

	Affective Learning Activities
AM	<ul style="list-style-type: none"> General: reacting emotionally to notes of fellow-students, without directly reacting to the content of that note. This reaction can be <i>positive</i>, <i>negative</i> or <i>neutral</i>: <p>"It is a very interesting and mainly correct map..."</p>
AA	<ul style="list-style-type: none"> Asking for (general) feedback, responses or opinions by fellow students: <p>"What is your opinion about my minor case?"</p>
AC	<ul style="list-style-type: none"> 'Chatting' or 'social talks'; contributions that are not relevant to solve the case/task: <p>"Anton, Happy birthday!"</p>
	<i>Metacognitive Learning Activities</i>
	<i>Planning</i>
MPA	<ul style="list-style-type: none"> Presenting an approach or procedure to carry out the task: <p>"I think we can take the report as point of departure to write our policy note."</p>
MAA	<ul style="list-style-type: none"> Asking for an approach or procedure to carry out the task: <p>"I read a lot of articles, but I do not know if it was useful. Summarised: it is non-organic and better to the milieu. It is possible to acquire it synthetically, but it can also be found in nature. Is this wasting time or shall I search for more information?"</p>
MEA	<ul style="list-style-type: none"> Explaining or summarizing the approach already adopted: <p>"After reading the article 'Dewey's Problem' I went back to my notes on the online document given above. There are several comments that Dewey makes there that bear on CSILE, and I thought that I would share them. I'll post my thoughts on the article separately."</p>
	<i>Keeping clarity</i>
MSD	<ul style="list-style-type: none"> Structuring the contributions in the database: <p>"I think note 45 is related strongly to note 67 and 89. So, I replaced the note."</p>
MAC	<ul style="list-style-type: none"> Asking for an explanation, clarification or illustration as a reaction to a certain note: <p>"I don't understand how you are able to discriminate sandy and clayey soil from the CESAR image. Can you explain how to do that?"</p>
MGE	<ul style="list-style-type: none"> Explaining unclear information in notes; answering a question asked by another participant: <p>"Legislation and the farming policy have a positive influence on the problem of leaching. That is what is meant with the +."</p>
	<i>Monitoring</i>
MKW	<ul style="list-style-type: none"> Monitoring the original planning, aim etc: <p>"It is very unclear to me. What is the aim of this course? What do have we to do?"</p>
MRP	<ul style="list-style-type: none"> Reflecting on one's own actions or on certain contributions to the database <p>"I notice some confusion about the meaning of + and - in the cognitive map."</p>
	<i>Rest Activities</i>
RNE	<p>Units that cannot be decoded by using the categories above:</p> <p>"*\$#@%#&#@! My computer crashed again and I was just going to save my note! I will stop, tomorrow try again..."</p>

Source : Veldhuis-Diermanse (2002)

Appendix 2. Anderson Schema for Tutoring Processes Coding

Instructional Design and Organisation	
Indicators	Examples
<ul style="list-style-type: none">• Setting curriculum• Designing methods	<ul style="list-style-type: none">• "This week we will be discussing..."• "I am going to divide you into groups, and you will debate..."
<ul style="list-style-type: none">• Establishing time parameters• Utilising medium effectively	<ul style="list-style-type: none">• "Please post a message by Friday..."• "Try to address issues that others have raised when you post"
<ul style="list-style-type: none">• Establishing 'netiquette'• Making macro-level comments about course content	<ul style="list-style-type: none">• "Keep your messages short"• "This discussion is intended to give you a broad set of tools/skills which you will be able to use in deciding when and how to use different research techniques"
Facilitating Discourse	
Indicators	Examples
<ul style="list-style-type: none">• Identifying areas of agreement/disagreement	<ul style="list-style-type: none">• "Joe, Mary has provided a compelling counter-example to your hypothesis. Would you care to respond?"
<ul style="list-style-type: none">• Seeking to reach consensus/understanding• Encouraging, acknowledging, or reinforcing student contributions• Setting climate for learning	<ul style="list-style-type: none">• "I think Joe and Mary are saying essentially the same thing"• "Thank you for your insightful comments"• "Don't feel self-conscious about thinking out loud on the forum. This is a place to try out ideas after all"
<ul style="list-style-type: none">• Drawing in participants, prompting discussion• Assess the efficacy of the process	<ul style="list-style-type: none">• "Any thoughts on this issue?"• " I think we're getting a little off track here"
Direct Instruction	
Indicators	Examples
<ul style="list-style-type: none">• Present content/questions• Focus the discussion on specific issues	<ul style="list-style-type: none">• "Bates says...what do you think"• "I think that's a dead end. I would ask you to consider..."
<ul style="list-style-type: none">• Summarise the discussion	<ul style="list-style-type: none">• "The original question was ...Joe said...Mary said...We concluded that....We still haven't addressed"
<ul style="list-style-type: none">• Confirm understanding through assessment and explanatory feedback• Diagnose misconceptions	<ul style="list-style-type: none">• "You're close, but you didn't account for...this is important because"• "Remember, Bates is speaking from an administrative perspective, so be careful when you say..."
<ul style="list-style-type: none">• Inject knowledge from diverse sources, e.g., textbook, articles, internet, personal experiences	<ul style="list-style-type: none">• "I was at a conference with Bates once, and he said...You can find the proceedings from the conference at http://www...."
<ul style="list-style-type: none">• Responding to technical concerns	<ul style="list-style-type: none">• "If you want to include a hyperlink in your message, you have to..."

Source: Anderson et al. (2000)

Chapter 4

It's Not So Easy:

Researching the Complexity of Emergent Participant Roles and Awareness in Asynchronous Networked Learning Discussions

Abstract

In this paper we explore some of the complexities of emergent role development and group awareness among participants in an asynchronous networked learning discussion in a higher education context. We used content analysis (CA) to provide participant profiles for learning and tutoring processes within a group of collaborating professionals. Using these we selected three distinct student participants with whom we then conducted critical event recall (CER). Our findings suggest how distinct roles emerge, and how they effect the group dynamics. They show the importance of group process awareness, and how this may be used and developed by participants. Some implications for pedagogical and software design are discussed.

Keywords

Asynchronous discussion, collaborative learning, content analysis, critical event recall, CSCL, networked learning, online communities.

Introduction

Discussion between participants is a central feature of Networked Learning (NL). By NL we mean the use of internet-based information and communication technologies to promote collaborative and co-operative connections: between one learner and other learners; between learners and tutors; between a learning community and its learning resources, so that participants can extend and develop their understanding and capabilities in ways that are important to them, and over which they have significant control (Banks, Goodyear, Hodgson & McConnell, 2003, p1). During NL participants are stimulated to interact and collaborate with each other to fulfil and coordinate their learning needs. In research terms, much is still unclear about the most effective forms of NL. For example, there is a need for research and development of new understandings that will provide guidance on the design and moderation of NL. Stahl (2003) takes this point further by explicitly arguing for a more appropriate conceptual framework and analytic perspective to guide this work. At present, he suggests, we are witnessing an emerging conceptualisation where concepts borrowed from other theories and philosophies are being adapted, but as yet we still lack a sufficiently powerful theoretical base to guide our research and our praxis. This is increasingly acknowledged as a concern among researchers in the field, and was clearly expressed during the CSCL 2003 conference in Bergen (Beuschel, 2003; Hakkinen, Jarvela & Makitalo, 2003; Stahl, 2003; Wasson, Ludvigsen & Hoppe, 2003). The need for more empirical research to provide an evidence base for this emerging conceptual framework is clear. We think it is important that this research is focused on the central processes of NL, that is: learning and tutoring. We believe that these understandings will contribute to the development of better pedagogical frameworks and software, which will more effectively support learning and tutoring by design.

This study is a continuation of our investigation into learning and tutoring processes occurring in an online-community of professionals engaged in a Master's Programme in E-Learning (see De Laat & Lally, 2003, for a more detailed description). Previously we focused, informed by constructivist and socio-cultural perspectives, on content analysis (CA) of learning and tutoring behaviour, in combination with the use of critical event recall (CER) to probe the university tutor's account of his management and facilitation of the processes involved. In this paper we focus on the students' behaviour, using the same research method, in order to provide a more holistic and complimentary description of this particular NL community. In particular, we are interested in understanding and analysing the development of emergent roles, tasks and strategies as the NL collaborators shape their collective endeavours through an online discussion. This work is guided by our previous argument: that both the university tutor and the learners contribute fully to the organisation and regulation of their learning event. As such, every member of this community may be seen as both learner and tutor. Of course, the designated tutor continues to have a *status apart*, being responsible for the overall coordination of the workshop and its educational goals. But during the learning tasks the tutor operates more as a 'guide on the side', moderating, stimulating and learning by taking part as a co-participant in the online discussions.

Effective participation in NL requires the development of appropriate communication, coordination and regulation skills. At the same time, we must be cognisant that other aspects of individual human agency, such as motivation, identity, and social presence and awareness, are significant variables in any educational context, and affect the possibility of meaningful and balanced online discussions. Constructive group interaction and dynamics also involve positive interdependence (group belonging and the awareness that each member's effort is important for the group success; see Johnson & Johnson, 1999), and individual accountability (each participant's contribution is valued and balanced in the collaborative learning process, see Slavin, 1995). It is clear that in an educational setting the development of these complimentary and necessary dynamics cannot be left to chance. Awareness of key role behaviours and strategies is important for the tutor to manage and sustain healthy group dynamics. Participating in NL is also demanding for the learner, requiring the development of awareness of his

De Laat, M.F., & Lally, V. (2004). It's not so easy: Researching the complexity of emergent participant roles and awareness in asynchronous networked learning discussions. *Journal of Computer Assisted Learning*, 20, 165-171

or her role in the instructional process (Reiser, 2001) and, in more advanced educational contexts, to take over some of the managerial responsibilities for the development of the discussion (Pilkington & Walker, 2003). In this study we focus specifically on the question of how the learner co-participants develop this role awareness in asynchronous NL, how they deploy it to assist in the management of the discussion, and how they perceive the behaviour of the other participants as they work together.

Using content analysis (CA) and critical event recall (CER) interviews with the learner co-participants (see below), we attempt to provide relatively rich descriptions of how NL processes are coordinated and regulated among them. Hakkinen et al. (2003) suggested a multi-method approach that is process-oriented and takes into account different contextual aspects of NL. They argue that research is needed that captures the process and organisation of collaborative interaction and its contribution to learning:

‘Methods should be developed not only for capturing processes and outcomes of learning, but also experienced effects and individual interpretations of participation in CSCL settings.’ (Hakkinen et al., 2003, p.402).

The aim of this kind of research is to provide a more complete picture of NL processes and to contribute to more profound analysis of virtual interaction. In the title of this paper we suggest that this is in no way an ‘easy’ task; NL is a complex domain of educational endeavour, for researchers and participants.

Methods and Sample

The participants featuring in this study were undertaking a Master’s Programme in E-Learning. This M.Ed. programme is based upon the establishment of a ‘research learning community’ among the participants and the university tutor. It is fully virtual; there is no scheduled face-to-face contact in the two years of the part-time programme. In this community, activities are undertaken around five ‘workshops’ over a two-year period. The programme is hosted in the virtual learning environment WebCT. The students are mainly mid-career professionals, many of whom have post-graduate experience of higher education. They are themselves professionally engaged with teaching responsibilities, and are often charged with developing e-learning within their own organisation. Our analysis is based upon collaborative project work conducted by seven students and one tutor in the first workshop of this programme (approximately ten weeks’ duration).

Content Analysis

The central purpose of content analysis (CA) is to generalise and abstract from the complexity of the original messages in order to look for evidence of learning and tutoring activities. In order to probe collaborative NL (learning and tutoring) we ‘coded’ the contributions using two coding schemas. The first coding schema, developed by Veldhuis-Diermanse (2002), was used to investigate the learning activities in the group. This schema includes four main categories: cognitive activities used to process the learning content and to attain learning goals; metacognitive knowledge and metacognitive skills used to regulate the cognitive activities; affective activities, used to cope with feelings occurring during learning, and miscellaneous activities. We decided to exclude the miscellaneous category in our analysis since we are interested in the evidence of learning activities. To focus on tutoring activities in the group we used another coding schema (Anderson, Rourke, Garrison & Archer, 2000). This schema includes three main sub-categories: design and organisation, facilitation of discourse and direct instruction. Our intention here was to attempt to reveal the ways in which the participants were facilitating and regulating each other’s learning, while undertaking the workshop project task. In order to make the CA task manageable we sampled the message data from the workshop (approximately 1000 messages were posted during the task). We divided the 10-week period into three

sections: beginning, middle and end. From each period we took a 10-day message sample to form our data set. In each sample we analysed messages in selected threads rather than sampling across threads. This was important to enable us to follow and code the development of learning and tutoring within an ongoing discussion rather than across unrelated messages. This resulted in a selection of 160 messages. Codes were assigned to parts of messages based on semantic features such as ideas, argument chains, and topics of discussion (Chi, 1997). Capturing these activities using strict syntactic rules was not possible because of the elaborate nature of much of the discussion. We chose to use NVivo software to help us partially automate this process: to highlight segments of the text with coding that we claim represents a particular learning or tutoring activity. In effect, these coded segments were our units of meaning. NVivo was also used to conduct searches of the coded data, in order to produce summary tables (see Table 1). We used the following procedure to determine inter-coder reliability. Firstly, for each coded message, we checked to see if the codes assigned by the two coders referred to the same parts of the message (i.e. the same units of meaning). Secondly, we checked to see if the two coders had assigned the same codes to each unit. Based on a 10% sample of all the messages coded by the two researchers, a Cohen’s Kappa of 0,86 was established.

Critical Event Recall Interviews

Content analysis has provided us with evidence of learning and tutoring process patterns that were occurring in this group during the workshop task. To understand these patterns further we used the summary results of the CA as a stimulus for critical event recall (CER) interviews with the participants. This was done to gain feedback from them about their own understandings of the patterns that emerged, and to help us understand the context in which these patterns were emerging. The CER interviews enable the articulation of many previously unexpressed aspects of learning and help to contextualise and elucidate individual behaviour, based on personal motives and perceptions in relation to the task and the other participants. Therefore, we pursued those situational and contextual aspects of NL that were identified by participants during these recall interviews. The interview layout contains two parts. The first part is based on stimulated recall of the learning event (CER). During the second half of the session the opportunity for post-hoc reflections is provided, with additional follow-up questions to help probe and understand the group processes. We have adopted two approaches guiding the CER interviews. Firstly, the participant is presented with a summary table of individual learning and tutoring results for all phases of the discussion (see Table 1). Secondly the full text of the workshop discussions, available in WebCT, were used to recall learning events. The results of the recall then provide the base for the post-hoc reflections interview. The selection of the participants for the recall interviews was based on the patterns represented in Table 1. The recall interviews, (with an average time of 75 minutes) were transcribed and analysed by the researchers together.

Results

Content Analysis

Table 1 provides a summary, for each participant, of the units of meaning coded for learning and tutoring processes in the three message samples of workshop 1. We have reported in detail on our analysis of these results in previous work (De Laat & Lally, 2003). However, it is helpful to summarise here that Brian, the university tutor, had a strategy of being present at the beginning and end of workshops because he was concerned about providing an appropriate structure for the learning process and the group dynamics to start with. At the end he was there to provide feedback on what was done, and give additional facilitation. In the middle phase he gave the ‘floor’ to the participants. Throughout he was still following the discussion, very much in the background, and ready to facilitate when needed. He made contributions whenever he felt necessary. He was supporting, moderating and comforting

both individual participants as well as the group. In this paper we will focus on three students in the group: Bill, Andrea and Charles. Each showed a distinct learning and tutoring profile, as evidenced in Table 1. We summarise these profiles as a prelude to each of the CER analyses (see below).

Table 1. Units of Meaning Coded for Learning and Tutoring Processes in the Three Phase Samples for Workshop One (Brian* was the designated university tutor in this group)

	Bill	Katie	Brian*	Pauline	Andrea	Felicity	Charles	Margaret	Total
Beginning Phase Sample (57 messages)									
Learning Processes	0	5	6	2	25	9	18	7	72
Tutoring Processes	3	4	18	7	9	3	13	3	60
Middle Phase Sample (70 messages)									
Learning Processes	7	1	0	8	9	11	19	21	76
Tutoring Processes	5	4	5	6	31	5	7	9	72
End Phase Sample (33 messages)									
Learning Processes	6	0	3	1	9	4	4	5	32
Tutoring Processes	7	0	18	2	10	4	3	1	45

Critical Event Recall

In this section we focus on the emerging roles, strategies, task activities (learning) and awareness as they emerge among the participants during the collaborative work in the group.

Bill’s CER

Bill was the member of this group who appeared, from the CA data, to have the lowest contribution profile in the beginning phase of the workshop. He slowly increased his level of contribution to both learning and tutoring processes within the group (Table 1). Bill commented on his early feelings about the workshop (which was the first of five in the two-year programme):

- “I had a number of concerns about whether I could handle it. I thought my colleagues might know more than me.”
- “I was looking and listening, and taking tentative steps, and asking myself: ‘Am I on par with my colleagues?’”
- “I had to go through two huge learning curves: using the technology, and using the technology for learning.”

However, towards the middle phase of the workshop task Bill’s sense of himself in the group was changing (see also Table 1):

- “I had become much more confident with WebCT and the group members. I started to see them as peers. I felt more comfortable at engaging.”

With this confidence came a developing awareness of the group’s task, his role in that, and a clear perception of what needed to be done:

- “I think I’m a ‘completer/finisher’ [Bill had previously explained that he was knowledgeable about group roles and tasks]. I was keen for the debate to get on.”

At this point Bill recalled feeling:

- “We needed to get sorted out and get on to deliver.”

As the group moved on into the concluding phase of their ten-week workshop task, Bill had developed a strong sense of the dynamics of the group and the urgency of the task to be completed:

- “Towards the last ten days it was hectic...we were making very good progress. I felt I needed some clarity on some issues.”

Bill recalled that this need to get things completed became stronger in him, and combined with some frustration at the situation in the group at this point:

- “I felt frustrated because I thought we had agreed certain things, yet people were still saying: ‘Why are we doing this [referring to specific sub-tasks in the work]?’”
- “I set out what the contents page [of the project] would be. I wasn’t organising it all, but felt a need for some people to be organised.”

At the same time Bill recalls developing a stronger sense that in order to move on, and despite his frustration and need to complete, further discussion was required in the group:

- “I needed to facilitate discussion, and knock ideas around.”

He had a clear sense of the source of support for his acquisition of this new role:

- “I was picking up this facilitation approach from Brian [the university tutor], but also from Andrea [another student in the group], she was very good at facilitating, and from Charles [another student]. Their pattern of message construction was more group-focused, and involving the group. I was thinking about it from my own perspective...Brian, Andrea and Charles struck me as collaborators, and are very comfortable with that.”

Bill was also showing an increasing awareness of other participants:

- “Brian [the university tutor] was very laid back as an individual. He was into asking questions. On reflection that’s a really good way to get people to open up and think.”
- “Andrea struck me as someone who had a lot to offer: facilitation, pushing things forward, very focused, task-focused, and people-focused. Margaret, too, was a good team-player, and someone who wanted to support the group all the way through.”

Andrea’s CER

The CA analysis for Andrea suggests a very different participation profile to Bill. She was the most prolific contributor to the group discussion. Her messages were concerned with learning (i.e. the group’s task and her own learning) and with tutoring (i.e. facilitation of group processes). Table 1 shows that as the workshop progressed Andrea made most of the tutoring contributions to the group. Yet she was a self-effacing group member:

- “I was very much surprised at my cognitive contributions. If you had asked me I would have

put them much lower. At the time I didn't think I knew what I was doing. I was very much in new territory. I was surprised that I had made the biggest contributions overall to learning at this point. [But] during the workshop I was conscious that I was putting up a lot of messages."

She showed a rapidly developing awareness of the characteristics, contributions and needs of others in the group, and recalled:

"I was constantly checking."

"Charles offered a lot of technical assistance."

"Pauline needed time to think."

"Katie was struggling to find a voice online, and was struggling with the technology and family responsibilities."

"I was aware that we were pulling it together with Bill's help."

Andrea was also very conscious of her own learning and online behaviour:

"At first I wasn't sure where I was going, then I became comfortable and sat back."

"I learned to just 'go with the flow' and trust the group, and I learned this from watching the group process, to let it happen and go along. I think we learned to work together and listen to each other, and take ideas from each other. Each contributed in different ways."

"I was aware that I was online more than others."

Andrea's skill at managing her own needs was sophisticated and sensitive. In one instance, she was trying to bring in her own interests in the task into a conversation with Charles:

"I felt that Charles hadn't heard what I was interested in; I decided not to pursue this, but waited until the review period [to raise it]. I couldn't have put it across constructively at the time."

"I understood that Charles was a real ideas person, and I was beginning to appreciate him."

Charles' CER

The CA profile for Charles (see Table 1) suggested a student who was more focused on the learning issues and tasks than on group processes. His learning contributions were the second highest in the group in the early sample phase. At this point he was also facilitating group processes significantly. However Charles' facilitation had reduced considerably by the middle phase. By the end phase of the task period he had a low contribution profile in the group.

Charles was apprehensive at the beginning, but keen to have his ideas taken up by the group:

"At the very beginning of the project I was apprehensive about how it might take off. I was quite pleased that my proposal about the intranet resources was taken up. It received a positive reaction from the rest of the group. Now we had something on the table. I enjoyed this workshop enormously."

He was hesitant, but had a sense that his own suggestions and expertise had contributed to the progress of his group. However Charles was also conscious of the academic abilities of other members in the group, and what this brought to the task:

"I was very conscious of people who were closer to the academic world than I was; people who had a lot more to say and contribute, to lead as the project moved on. I remember, particularly, Andrea, who was throwing in the Belbin concept, and so on. This was exactly the right thing at exactly the right time."

Charles was also adjusting his own sense of himself, as a practitioner, so that he could also undertake what he perceived as more 'academic' tasks being undertaken in the workshop:

"I really had to re-invent myself as a learner, if you like, for all the project, but particularly in the early stages."

He showed a very strong task focus throughout the workshop:

"I wanted the process in Workshop 1 to create the solution to the problem I was having in my work."

Discussion and Conclusions

In this short paper we have attempted to explore some of the complexities of emergent role development and group awareness among participants in an asynchronous Networked Learning discussion in a higher education context. In order to undertake this we used content analysis (CA) to provide participant profiles for individual learning and tutoring processes within a group of seven collaborating professionals and a university tutor. Using these profiles we selected three distinct student participants with whom we then conducted critical event recall (CER) using the summary CA tables and full message transcripts as recall stimuli. Looking at the overall patterns first, the units of meaning coded using the learning schema relate to task-focused activity within the group. This is the largest category in all three-phase samples of the workshop, with a peak (76 units of meaning) in the middle phase. The units of meaning coded using the tutoring schema relate to those processes that support the group's work, including facilitation, organisation and the provision of additional information and ideas. This category also peaks in the middle phase of activity, but is never higher than task-focused activity.

The CA analysis enabled the tentative identification of distinct and emergent individual roles among these participants. The three students we selected were: Bill the task-focused completer/finisher; Andrea – the group-focused facilitator, and Charles – the task-focused ideas contributor. Although the task framework, timescale and general pedagogical design of the workshop (collaborative task followed by peer review and group reflection) were provided in advance by the M.Ed. team, these roles emerged during the activity. During our analysis of the subsequent CER interviews with these students we focused on general, individual and group remarks regarding learning and tutoring processes, and possibilities for change and innovation within the pedagogical design.

All three students commenced by expressing some uncertainty about themselves and their role in the group collaboration. Bill was slow to become involved in the group, but he watched group processes carefully. He was initially concerned with his own need to complete the task, but developed an increasing awareness that this could be enhanced by a more careful management of group processes. This was a skill he watched others using, especially Andrea. She watched the group very carefully from the beginning, bringing her deeper understanding of group processes to bear on her observations. This

quickly led her to develop a clear understanding of the needs and behaviours of the other group members. She used this to facilitate her own learning goals, sometimes in sophisticated and indirect ways, as well as the goals of the group. Charles was very driven by his own professional agenda. This led him to bring ideas and focus to the group, but also to overlook the contributions of others as he strove to solve his own (external) professional problem. Andrea saw this, and tried to integrate Charles more effectively into the group, its needs and processes. However, Charles eventually withdrew and contributed little at the end of the task. In these emerging role behaviours we can see evidence of positive interdependency, individual accountability, and a varied awareness of the need for management.

We suggest that these analyses have added to our understanding of tutoring and learning processes by professionals in a learning community within an online Master's Programme. They show, for example, how roles and strategies emerge amongst the participants, and how these may be very beneficial for the group dynamics. They show the importance of group process awareness, and how this may be used and developed by participants. Through this approach we contend that it may be possible to gain deeper insights into how professionals collaborate to develop their own practice, and into the complexity of the interactions between individual and group processes during these collaborations. This in turn, may inform pedagogical and software design to better support the emergence and development of these roles. This is one of the directions of our continuing work, and on which we hope to report in future papers.

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Chapter 5

Patterns of Interaction in a Networked Learning Community: Squaring the Circle

Abstract

The study reports empirical work using content analysis (CA), critical event recall (CER) and social network analysis (SNA). The aim is to use these methods to study the nature of the interaction patterns within a networked learning community (NLC), and the way its members share and construct knowledge together. An important focus of this study is to explore the advances that Social Network Analysis (SNA) can bring, in combination with other methods, when studying Networked Learning (NL). We present a general overview of how SNA is applied in NL research; we then go on to illustrate how this research method can be integrated with existing studies on NL, using our own data, as a way to synthesise and extend our understanding of teaching and learning processes in NLCs. The paper also examines some of the current findings of SNA analysis work elsewhere in the literature, and discusses future prospects for SNA. This paper is part of a continuing international study that is investigating NL among a community of learners engaged in a Master's program in e-learning.

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Introduction

Studies in Networked Learning (NL)¹ are often concerned with analysing the processes and procedures of online learning and teaching practices (Banks, Goodyear, Hodgson & McConnell, 2003, p.1). In order to study these NL practices many researchers, ourselves included, have drawn upon methods such as content analysis, interviews, observations, questionnaires, etc (Anderson et al., 2001; Chi, 1997; Crook, 1994; Dillenbourg, 1999; Gunawardena et al., 1997; Henri, 1992; Light & Light, 1999; McConnell, 1999; Newman et al., 1999; Pilkington & Walker, 2003; Strijbos, 2004; Veldhuis-Diermanse, 2002; Wegerif et al., 1999). These methods are very useful to increase our understanding of the kinds of activities in which online learners and teachers are engaged, and of their motives, experiences and desires. However, these methods do not help us to systematically 'pattern' the interactions between the participants and elicit the connections made among them. For this we need to draw on relational data, based on how the participants have used the computer network to interact.

When computer networks are used to connect people, the computer network becomes a social network (Wellman, 2001), and the computer system log files (containing information about the activity of the participants) can be used to study aspects of the social interaction structure of members of the network (Nurmela et al., 1999).

As Barry Wellman indicated in the magazine *Science*, "human computer interaction has become socialised. Much of the discussion [...] is about how people use computers to relate to each other... [and] has slowly moved from the lone computer user to dealing with (i) how two people relate to each other online, (ii) how small groups interact, and (iii) how large unbounded systems operate." (Wellman, 2001, p.2031).

When it comes to participation in NL, it is difficult to see at first glance (for both teachers and learners) who is involved with the collaborative learning task, who are the active participants and who is participating peripherally. There is also the additional dimension of understanding how these participatory patterns change over time. Social network analysis (SNA) may be able to assist in describing and understanding these patterns. SNA is a research methodology that seeks to identify underlying patterns of social relations based on the way actors are connected with each other (Scott, 1991; Wasserman & Faust, 1997). Interactions among participants in NL communities can be relatively easily mapped out and explored using SNA, and this provides us with information about the activity and relationship of the NL members. As such, SNA does not necessarily provide us with all the answers but it may help us ask further questions about the nature of NL activities; it can also be of help to confirm or contextualise previous conclusions or interpretations about NL behaviour.

In this paper we will first discuss how SNA can be used when studying NL before applying this method to our own case study on teaching and learning processes in a networked learning community (NLC).

¹ NL is a U.K. and European term that is used in place of CSCL. We think it is, for practical purposes, synonymous with CSCL and henceforth will refer to them both as NL. By NL we mean the use of internet-based information and communication technologies to promote collaborative and cooperative connections: between one learner and other learners; between learners and tutors; between a learning community and its learning resources, so that participants can extend and develop their understanding and capabilities in ways that are important to them, and over which they have significant control (Banks et al., 2003, p.1).

Social Network Analysis and NL

SNA is aimed at identifying patterns of relationships between people who are connected, and to analyse the structure of these patterns by tracing the flow of information and/or other resources that are exchanged among them. It produces data that may be used to investigate aspects of the effects that these relationships have on the people that are part of the network. The network patterns generated by SNA are thus the basis of these investigations, and participation in social networks can be used to build an understanding of participants' behaviour: to find out, for example, who are the central and peripheral participants. Using SNA the social environment can be mapped as patterns in relationships among interacting members (Wasserman & Faust, 1997). SNA offers a method to focus on relational data, as distinct from data or attributions where the focus is on the characteristics of the individual. The unit of analysis, therefore, is not the individual but the interaction that occurs between members of the network. The exchange of messages in a discussion forum is our primary focus for SNA in this paper. The attributes of these messages (for example, the author, its content or the roles that they express, is secondary to SNA but very central to the interpretation of the 'nature' of the relationships.

A Networked Learning Community (NLC) such as we see in higher education, is of a kind that is potentially heavily connected and has clear boundaries with respect to who is a member and who is not. Membership is based on a shared interest for a specific subject, but is fixed for an arranged period of time, mostly moderated by a teacher/tutor and aimed at collaborative learning or problem solving. Based on these criteria an NLC can be studied as a 'whole' network (as opposed to an ego-network where the network is viewed from the perspective of the person at the centre of their network) and allows us to visualise the network based on the presence and absence of connections between its members.

This whole network perspective, may be complemented by studying the content that has been exchanged between the participants. In NL this will be related to the kind of collaborative task that members have set out to achieve. The use of content analysis (Gunawardena et al., 1997; Hara et al., 2000; Henri, 1992) can provide insight into these different kinds of communication amongst the participants. This augments the perspective gained by using SNA to focus on network connections. These may vary in content, direction (indicating the direction of the flow of information), and in strength (network connections can be weak or strong, based on the number of exchanges of a similar type).

When applying a whole network perspective, SNA can be used to analyse the cohesion of a network. Common measurements are density and centrality. Density measures are used to describe the overall connections between the participants. Density of a network is defined as the number of ties observed in a network divided by the maximum number of expected (possible) connections (Scott, 1991). This varies between 0 and 100%. The more actors that are connected to one another, the denser the network will be (Borgatti et al., 1996; Scott, 1991). Centrality measures provide us with information about individual participants within a network. Centrality indicates how well positioned an individual is to receive and disseminate information or other resources to other members in the network (Wasserman & Faust, 1997). Using this we can examine, for instance, who is a central (or isolated) member of a particular network. This can be done for each participant by measuring the number of connections with the other members, using in- and out-degree. SNA can also be used to visualise the network connections in a sociogram. A sociogram is a graphical representation of the connections of the participants of the network. The participants are represented as nodes and the connections are visualised with lines between the nodes. In this way one can examine the way in which resources circulate within the network, and how individuals are positioned within the network to play central or peripheral roles in the movement of resources. Visualisations of social networks can show whether information is circulating to all members of a class, or whether some group members are communicating more (or less) with

other specific individuals (Haythornthwaite, 2002).

The social network approach offers a method for mapping group interactions, visualising connectedness and quantifying some characteristics of these processes within a community. This technique is used commonly in sociology and organisational studies, but there is a growing interest among researchers in NL to apply SNA into studying group interaction, communication and dynamics. Haythornthwaite (2001) showed that during class communication in an NL environment there is a tendency to interact more exclusively within teams. Martinez et al. (2003) found that the density of a network was affected by teacher's presence. Reffay & Chanier (2003) illustrated that SNA can help to study the cohesion of small groups engaged in collaborative distance learning as a way to locate isolated people, active subgroups and various roles of the participants in the interaction structure. Reuven et al. (2003) found that in a structured asynchronous learning network (as opposed to an unstructured open discussion forum) the knowledge construction process reached a high level of critical thinking and the participants developed cohesive cliques. Nurmela, Lehtinen and Palonen (1999) used SNA to study participation in collaborative learning activities such as knowledge building and acquisition. Cho, Stefano and Gay (2002) uses SNA techniques in an educational context to identify central, influential actors in a group or class. They found, similarly to (Beck et al., 2003) that participants, using a discussion board, were more likely to follow recommendations made by highly central actors than those by peripheral actors. Daradoumis, Martinez-Mones, and Xhafa (2004) used SNA to assess participatory aspects, identify the most effective groups and most prominent actors to monitor and assess the performance of virtual learning groups.

In our own study we will attempt to use SNA to explore group cohesion and interaction patterns within a networked learning community, to describe how these patterns evolve over time, and attempt to synthesise these outcomes with the change of teaching and learning processes conducted earlier. To our knowledge this is the first time that SNA has been used in this way and, as a consequence, there is little comparative data available to relate to our findings. However, the notion of following interaction patterns over time within NLC has been implemented in several studies. Hara, Bonk & Angeli (2000) provide a study in which they conduct a timeline analysis to study computer-mediated communication. They created (Howell-Richardson & Mellor, 1996) weekly visual representations of conference activity, based on direct or indirect connections based on comments made by the students in their messages. Their analysis was focused on describing interaction patterns when students are assigned to particular roles and if these patterns change over time. Daradoumis, Martinez-Mones, and Xhafa (2004) implemented the time factor in their research design to track the changes in student participation and group cohesion over time, but they did not relate these findings with their additional analysis on student productivity and qualitative coding of collaborative learning processes. Haythornthwaite (2001) and Martinez et al. (2003) also concluded that network patterns change and that it is important to study these changes over time.

The study presented in this paper is part of an ongoing academic collaboration in which we are studying a networked learning community following a higher education course for an M.Ed at Sheffield University (UK). In our previous studies within this project our focus was on describing teaching and learning processes through content analysis and interviews (De Laat & Lally, 2003; De Laat & Lally, 2004). As such we were objectifying this community by trying to give an account for their teaching and learning behaviour. This provided us with an insight as to 'what they were talking about' and 'why they were talking as they do', but we lacked insight into how the participants in this community were connected to each other. General information about 'who is talking to whom?' and participatory aspects of this community were still missing, making it difficult to assess or make claims about their overall performance as an NLC. Questions about how equally their activities were distributed over the community (levels of participation), the progress they made over time in interacting as a balanced

community (transformation of membership), and the growth and decay of relationships between the members were largely ignored by these earlier methods. During these previous studies we have developed some expectations and knowledge about the nature of participation of some of the participants. With the use of SNA we would like to shine a light on these issues more systematically, and extend our analysis by synthesising these findings with the other studies that are part of this research project. We do this by drawing on the relational data available to us, and make the 'interaction' the unit of analysis. In this study we will focus on the interaction patterns between the members of this community and study its dynamics over time. We will use SNA to complement and contextualise our previous findings; as such we would like to take the opportunity to 'square the circle' of this particular research project and make suggestions for further research.

In this study we were particularly interested in exploring the interactions and relationships between the members of this NLC and how these group dynamics change as the collaborative project progresses. The aim of this research is to describe network structures and the connections between the members in the network; we will focus on the positions participants take in their network and how these structures and positions change over time.

In this study we focus on the following questions:

1. *How dense is participation within the network and how does this change over time?*
2. *To what extent are members participating in the discourse and how does this change over time?*

Method

The participants featuring in this study were undertaking a Master's programme in E-Learning. This M.Ed. programme is based upon the establishment of a 'research learning community' among the participants and the university teacher. It is fully online; there is no scheduled face-to-face contact in the two years of the part-time programme. In this community, activities are undertaken around five 'workshops' over a two-year period. The programme is hosted in the virtual learning environment WebCT. The students are mainly mid-career professionals, many of whom have post-graduate experience of higher education, and they are themselves professionally engaged with teaching responsibilities, and often charged with developing e-learning within their own organisation. Our analysis is based upon collaborative project work conducted by seven students and one tutor in the first workshop of this programme (approximately ten weeks' duration). In order to make the analysis manageable we sampled the message data from the workshop (approximately 1000 messages were posted during the task). We divided the 10-week period into three sections: beginning, middle and end. From each period we took a 10-day message sample to form our data set. In each sample we analysed messages in selected threads rather than sampling across threads. This was important to enable us to follow and code the development of learning and tutoring within an ongoing discussion rather than across unrelated messages. This resulted in a selection of 160 messages.

In our previous research we focused on the learning and tutoring behaviour in this particular networked learning community, and how certain roles and strategies emerge during their collaboration. Previously we held CER interviews and produced CA summary tables based on units of meaning taken from the messages produced by the participants.

The central purpose of content analysis (CA) is to generalise and abstract from the complexity of the original messages in order to look for evidence of learning and tutoring activities. In order to probe collaborative NL (learning and tutoring) we 'coded' the contributions using two coding schemas. The first coding schema, developed by Veldhuis-Diermanse (2002), was used to code units of meaning that

were regarded as 'on the task', focusing on the learning processes used to carry out the task. This schema includes four main categories: cognitive activities used to process the learning content and to attain learning goals; metacognitive knowledge and metacognitive skills used to regulate the cognitive activities; affective activities, used to cope with feelings occurring during learning, and miscellaneous activities. We decided to exclude miscellaneous category in our analysis since we are interested in the evidence of learning activities. The second schema is used to code units of meaning that are 'around the task' where the focus is on tutoring (Anderson, Rourke, Garrison & Archer, 2000). This schema includes three main sub-categories: design and organisation, facilitation of discourse and direct instruction. Our intention here was to attempt to reveal the ways in which the participants were facilitating and regulating each other's learning, while undertaking the workshop project task.

Codes were assigned to parts of messages based on semantic features such as ideas, argument chains, and topics of discussion (Chi, 1997). Capturing these activities using strict syntactic rules was not possible because of the elaborate nature of a discussion. We chose to use NVivo software to help us to partially automate this process: to highlight segments of the text with coding that we claim represents a particular learning or tutoring activity. In effect, these coded segments were our units of meaning. NVivo was also used to conduct searches of the coded data, in order to produce summary tables (see tables, below). To determine our inter-coder reliability we firstly, for each coded message, checked to see if the codes assigned by the two coders referred to the same parts of the message (i.e. the same units of meaning). Secondly, we checked to see if the two coders had assigned the same codes to each unit. Based on a 10% sample of all the messages coded by the two researchers, a Cohen's Kappa of 0,86 was established, indicating an acceptable level of agreement.

Content analysis has provided us with evidence of learning and tutoring process patterns that were occurring in this group during the workshop task. To understand these patterns further we used the summary results of the CA as a stimulus for critical event recall (CER) interviews with the participants. This was done to gain feedback from them about their own understandings of the patterns that emerged, and to help us to understand the context in which these patterns were emerging. The CER interviews enable the articulation of many previously unexpressed aspects of learning and help to contextualise and elucidate individual behaviour, based on personal motives and perceptions in relation to the task and the other participants. Therefore, we pursued those situational and contextual aspects of NL that were identified by participants during these recall interviews. The interview layout contains two parts. The first part is based on stimulated recall of the learning event (CER). During the second half of the session the opportunity for post-hoc reflections is provided, with additional follow-up questions to help probe and understand the group processes.

A shortened version of the summary table is included in this paper (see Table 3). For a full description of the coding and CER process and outcomes see De Laat & Lally (2003 & 2004). The present study seeks to extend these studies by using SNA as a third method to analyse and contextualise our findings on learning and tutoring process in an NLC. Triangulation is a process through which more than one approach is used in the investigation of a research question, in order to enhance confidence in the ensuing findings (Bryman, 2004). Triangulation in this research project is done in several ways. First by integrating the outcomes of one (or more) method into the next method. In our study, for example, we used notions of student participation, and teaching and learning activities, to strategically select the participants for the CER interviews. In this way we tried to cover some interesting emergent patterns, like dynamics of central versus peripheral acting participants, and participants who showed increasing versus decreasing activity over time. Secondly we used the summary tables produced during the CA (for example) as a stimulus during the CER interviews, and asked the participants to reflect on these patterns as a way to focus the interview. Thirdly, by using the outcomes of one method to inter-

pret and contextualise the outcomes of another method. For example by relating participants' position on the sociograms with the outcomes of the CA table. It's the expectation that central participants will also have engaged more frequently in learning and teaching activities. The forms of triangulation we are using are referred to as data (gathering data at different times) and methodological (using more than one method to gather data) triangulation (Denzin & Lincoln, 2000).

During this study the unit of analysis was not the individual or the content of the messages (as was the case in our previous studies). In this study we use the relationship between the members as the central object of study. The relationships amongst the participants is based on the 160 messages exchanged and analysed according to the period (beginning, middle and end of the workshop) in which they were written.

WebCT generates log-files through which information about the activity of the members can be obtained. The information retrieved from WebCT can be treated as relational data and stored away in a case-by-case matrix (based on writing and responding activities) to analyse interaction patterns. UCINET, an SNA package, is used to analyse the social structure of the community. For this purpose we focused on the cohesion of the network (Scott, 1991; Wasserman & Faust, 1997). In this study we will conduct density and centrality measures and sociograms based on the same data set, to probe the nature of the relationships in this NLC. We use these outcomes to interpret the nature of the discourse by relating these findings to our previous studies in the particular NLC.

To get a first indication of the cohesion of the network we calculated the density of the network. Density is a property of a whole network and describes the general level of linkage among the nodes in a network. The density is at a maximum (100%) when all the nodes are connected to each other.

Secondly, we conducted centrality measures to find the central participants within the network. For each participant this has been done using Freeman's degree. Freeman's degree calculates the activity of individual members in the community. With this the network activity of individual members can be indicated. Since we know the nature of the relationship between the participants, i.e. who interacts with whom, we can work with directional relationships. Directed ties, called arcs, specify the orientation of the relationship (Wasserman & Faust, 1997). This is of special interest regarding to the centrality measures and the creation of the sociograms. In a directed case-by-case matrix, a participant can be either adjacent to, or adjacent from another node, depending on the direction of the arc (Wasserman & Faust, 1997). This means that we can consider these cases separately by differentiating between in- and outgoing connections. This is done by calculating the in-degree and out-degree centrality measures. In-degree centrality is a form of centrality that counts only those relations with a focal individual reported by other group members and is therefore not based on self reports as is out-degree centrality (Borgatti et al., 2000). In this study in-degree measures provide information about the number of people who respond to a message from a certain participant. Out-degree gives an indication of the number of messages a person has sent to other individual members of network. Finally we use the network degree centralisation as a group-level measure based on the participants' degree centrality. This way we will get an idea of the way the whole network is dependent upon the activity of a few participants, i.e. how balanced the participation is with the overall NLC.

UCINET, the program we used to carry out the analysis, also allows one to make different kinds of visualisations of the relationships within the network. For this study we chose a sociogram representing the connections between the participants and its direction, in a way that it includes the actual number of ingoing and outgoing messages (Wasserman & Faust, 1997).

Results

The density values show that the overall connection between the participants, especially in the beginning and the middle phase, is reasonably high (see Table 1), suggesting that the members of this community are closely collaborating together on their group task. In the beginning phase, the density is 48%, and for the middle phase the value is 46% which is roughly the same. In the last phase of their collaboration it seems to have dropped somewhat, to 36%. One has to keep in mind that density values tend to be higher in smaller networks; it is, of course, much easier to maintain many connections with a few participants than with very many participants.

Table 1. Density and out-degree centralisation for each phase of this network.

	Beginning	Middle	End
Density %	48	46	36
Out-degree centralisation %	88	109	52

To find out about how balanced the participation is within this community we have to look at the out-degree centralisation measures. A high out-degree centralisation index indicates that the communication is dominated by some central participants; a low index means that communication is distributed more equally over all the participants. It is interesting to see that while the density drops slightly in the middle, the out-degree centralisation goes up. This means that some members have become more central compared to the beginning phase. The same holds for the ending phase, where both indexes dropped but still the out-degree centralisation is leaning towards a domination of the interaction of a few participants. In general, this imbalance does not necessarily mean that some participants control the communication, by excluding others. It might also mean that some participants choose to make low contributions to the community.

Table 2. Out- and In-degree of the Participants and Initiated Threads in the Three Phase Samples for Workshop One (Brian* was the designated university tutor in this group).

	Bill	Katie	Brian*	Pauline	Andrea	Felicity	Charles	Margaret	Total
Beginning Phase Sample (57 messages)									
Out-degree	2	1	9	2	14	2	13	6	49
In-degree	4	1	11	2	10	4	12	5	49
Initiated Threads	0	1	1	1	1	1	1	2	8
Middle Phase Sample (70 messages)									
Out-degree	5	3	2	6	21	2	11	11	61
In-degree	8	5	2	6	17	0	11	12	61
Initiated Threads	1	1	0	1	3	0	2	1	9
End Phase Sample (33 messages)									
Out-degree	5	0	6	1	8	4	2	2	28
In-degree	11	0	3	0	4	5	2	3	28
Initiated Threads	2	0	0	0	2	0	0	1	5

To find an answer for the second question we start with presenting the findings of the in- and out-degree (see Table 2) values for each participant, and the visual representation of the interaction patterns (see Figure 1) for each phase of this NLC as they emerged from the discussion threads in WebCT. The high values (in bold) in Table 1 clearly show who are the more active participants during this collaborative work project. Overall one can say that there seems to be quite a difference between active and more passive members. In the beginning phase Brian (the university teacher), Andrea and Charles are

responsible for almost 75% (36 messages) of all the written messages and receive about 65% of all the responses. This probably indicates that they must be mostly communicating amongst themselves. Using SNA alone at this point is not enough, it will be useful to synthesise these findings with the outcomes of content analysis to interpret whether central participants are also central to the learning and teaching activity within this groups. If they are not, they are probably chatting about issues that are not central to their learning task. Therefore we need to compare these SNA findings with the learning and teaching activities (see Table 3) found during our previous studies. By doing so it seems that only Andrea and Charles are responsible for 60% and that the others (except Bill) are also making a reasonable learning input. With respect to making tutoring remarks, it seems that Brian and Charles (50%) responsible for most of this, but all the participants were involved to some extent as well. This leads to the conclusion that although Brian, Andrea and Charles appear to be active participants, they are not entirely dominating the teaching and learning activities of the NLC during this phase. In the middle phase where the network out-degree centralisation went up we see a shift in participation. Andrea, Charles and Margaret are the strongest contributors (70%) and receivers (65%) in this phase. Charles and Margaret are mainly focused on learning contributions (50%), while Andrea has taken a strong interest in trying to tutor the activities of this community (43%). Brian besides a modest tutoring input has made a little contribution during this phase. His in- and out-degree dropped to 2. During the ending phase, where the density of the network dropped, we see that general participation went down and that there is a difference between the in- and outgoing degrees. In fact there is one participant (Bill) who receives 40% of all the comments made. The relatively active contributors here are Bill, Brian and Andrea (67%) and Charles' and Margaret' has dropped quite extensively. Though Table 3 shows that both Charles and Margaret are still making an average learning contribution to the community, where mostly Brian, Andrea and to some extent Bill, tutor the last phase of their collaborative project.

These general network properties will now be studied more closely using the sociograms. In this way we can visualise all the connections each participant has with the other members of this NLC. Figures 1-3 also show how the communication between the participants evolves over time as they work collaboratively on the learning task. Each phase (beginning [B], middle [M] and end [E]) has its own focus and dynamic in the community. In these figures the numbers associated with the network ties represent the volume of communication between participants.

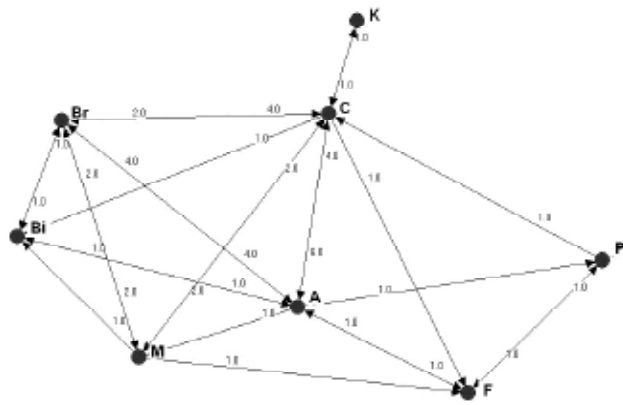


Figure 1. Interaction Patterns Between Eight Participants in the Beginning Phase of a Learning Task

In the beginning phase, the strong presence of Charles (C) is evident in the community. He is the only one who is connected to all the other members of this community. This position was to some extent

already suggested by his relatively high in- and out-degree scores as shown in Table 2, but we had no information about the nature of his connections with the other participants. At the beginning of the learning task Charles has initiated most of the discussion and this is the reason why he appears as a central figure in this graph. He acts as a central member in this community by actively taking the lead in discussing where this project should be heading. Andrea (A) also is a very central member in the community. But she has a different way of contributing. Our previous research showed that she took a more 'learning' interest in the project at this stage (L-25/T-9, see Table 3) whereas Charles (L-18/T-13) was active as a learner and a tutor trying to get things going. Andrea indicated previously (during the CER when she was asked to reflect on her behaviour in this NLC) that she was surprised by the way she contributed to the group. For her this way of working was very new but she was conscious that she made a high contribution to the groups' discussion, while Charles thought it was important for the NLC to keep task-focused. He saw his role as contributing ideas to the group. He was not surprised by his central position during this phase of the collaboration. In this phase Brian (Br) (the university teacher) is also a participant; his concerns were mostly towards moderating this community (T-18, see Table 3), making sure everybody is participating and getting on with the project.

Another interesting feature we can read in this graph is how tightly knit this community is and nobody is left out completely. Although there are different levels of contribution everybody is engaged in actually writing messages and one can see that the participants get responses from almost all the members. This finding is consistent with the relatively high density of this network as reported earlier. This is also reflected by the in-degree values of Felicity (4) and Bill (4), who only made minor contributions to the discussion in this phase but are still connected to four other members of this community. Only Katie (K) and Charles seem to have been writing (exclusively) to each other.

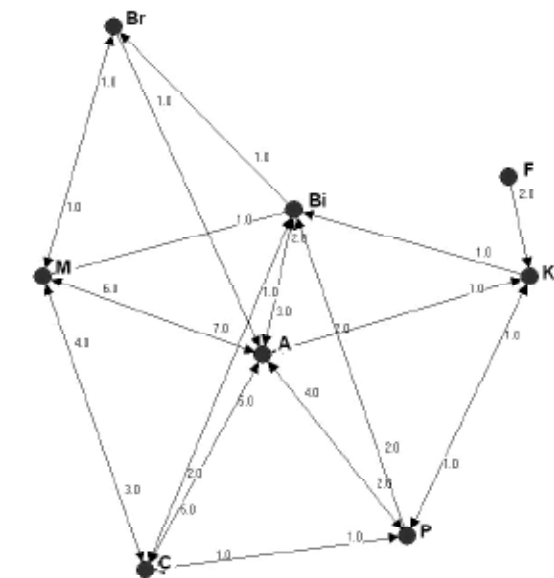


Figure 2. Interaction Patterns Between Eight Participants in the Middle Phase of a Learning Task

In the middle phase (see Figure 2) the interaction pattern seems to have changed. One might say that the starting-up phase, where everybody gets to know each other, is now passed and the discussion has become more exclusively focused on working on the project. There is an increase in learning and tutoring activities, yet the network density remained mostly the same. The more active participants in

this phase are again Andrea (A), Margaret (M), and Charles (C). On the other hand the contributions Bill, Pauline and Katie have made to the discussion have gone slightly as well. However, the shape of the interaction pattern has taken roughly the form of a square (between M, Bi, P and C, with A in the middle). Where, in the previous phase, messages were sent out to almost every member in the community (as was indicated by its circular shape), here the connections between all the participants are less strong and has become more centralised. Felicity seems to have left the discussion during this phase and Pauline and Bill are making contributions more peripherally. However, based upon how the arrows are pointing, it seems that the community has not split up into different subgroups who ignore each other. If we compare these interactions with our previous findings (see Table 3), we can see that Andrea's active interest is mostly towards tutoring (L-9/T-31) instead of making learning contributions as she did in the previous phase (L-25/T-9). When asked to reflect on group participation Andrea was thought of by some of the other members as a group facilitator and really people-focused, which explains her position in the middle. She indicated she was constantly checking and watching the group process. According to the teacher (Brian) she was very facilitative in all her communications. Where Andrea developed a more tutoring role, Charles did the opposite. He continued to stay focused on the task. The teacher labelled him as a do-er and was very active putting in ideas and experience. But apart from dialogue about how to get things done he did not want to talk or think about it. Margaret's active participation during this phase shows an increase in learning activities L-7 in the beginning/ L-21 in the middle phase).

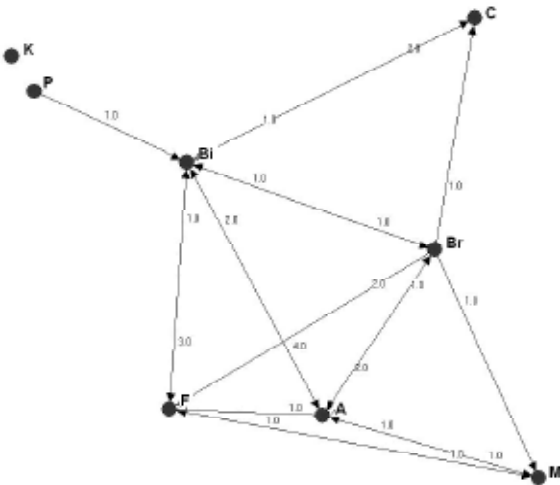


Figure 3. Interaction Patterns Between Eight Participants in the End Phase of a Learning Task

The final phase shows a very strong shift in the interaction pattern (see Figure 3). This finding is supported by the earlier reported decrease in density and drop in in- and out-degrees. Bill however has now become a full member in this community, reflected by his relatively high in- and out-degree values, and is actively moving the discussion forward, acting as both a learner and tutor in the community (L-6/T-7, see Table 2), and Felicity has made a 'come-back'. According to the teacher, Bill was motivated throughout the entire workshop. But he was new to this way of working and used the beginning and middle period to familiarise himself with it and at the end he was ready to make an active contribution. When asked to reflect on the way he participated in this NLC, Bill said of himself that he had to go through a huge learning curve but as he became more confident he started to see his fellow participants as peers and felt more comfortable to engage. He sees himself as a finisher and

felt, in part, responsible for bringing this collaborative project to a good end. Also Brian (the teacher) has moved more towards the centre again, sending out messages to most of the other participants and being mainly concerned with moderating the community (L-3/T-18). Pauline and Katie have made no contribution to the community at this stage and Charles has moved away from the centre completely. Margaret's learning interest, as she showed in the middle phase, has dropped, but she remains an active member and also Andrea, together with Bill, is still actively regulating the community discussion.

	Bill	Katie	Brian*	Pauline	Andrea	Felicity	Charles	Margaret	Total
Beginning Phase Sample (57 messages)									
Learning Processes	0	5	6	2	25	9	18	7	77
Tutoring Processes	3	4	18	7	9	3	13	3	60
Middle Phase Sample (70 messages)									
Learning Processes	7	1	0	8	9	11	19	21	77
Tutoring Processes	5	4	5	6	31	5	7	9	72
End Phase Sample (33 messages)									
Learning Processes	6	0	3	1	9	4	4	5	45
Tutoring Processes	7	0	18	2	10	4	3	1	45

Table 3. Units of Meaning Coded for Learning and Tutoring Processes in the Three Phase Samples for Workshop One (Brian* was the designated university tutor in this group).

Conclusion and discussion

In this study we were particularly interested in exploring the interaction and relationship patterns between members of an NLC and how these group dynamics change as the collaborative project progresses. The aim of this research is to analyse connections between the members in a networked learning community. We focused on the positions participants take in their network and how these change over time. Overall we found that the group density was quite stable, and only dropped somewhat at the end of their collaborative project. This means that the levels of connectivity and engagement in this community is relatively equally spread, though the in- and out-degree measures have indicated that some participants are more central than others. These positive findings on group cohesion are, we think, very promising for NL research because they indicate that NLC members in this course are able to sustain productive collaborative relationships over time without showing large dropout effects, or without individual participants being pushed to the side by more dominant participants.

Figures 1-3 represent the interaction patterns for this learning community over three phases of a learning task of ten weeks' duration, and show how these patterns evolve. Some participants (like Andrea and Margaret) remain active all the way. However, when synthesising these findings with the outcomes of the content analysis, it became clear that although the position of these participants in the network remained the same, the nature or focus of their contributions had changed. This means that participants develop different roles or interests during their collaborative work (Reuven et al., 2003), or take different interests as their project develops. We think, therefore, that it is important when studying NL to not only focus on overall patterns of participation, collaboration and knowledge construction during NL, but to take into account the evolution of these processes over time. The group behaviour is not stable, and as researchers in NL we are interested in studying how participants learn and develop their competencies as networked learners in the first place, and also how to design pedagogical support for them as they progress. The fact that participants gain or lose interest during their collaborative project is made visible using SNA. The interaction patterns clearly showed transformation

of membership; some participants were gradually moving more towards the centre of the network, or were moving away from the core activity to become more peripherally engaged. We also found that it (Reuven et al., 2003) is not necessarily the case that the most active members always regulate and dominate the discussion throughout (Tables 2 and 3 combined). Some participants simply take a strong interest in debating and putting forward new ideas into the project, while others are more concerned with managing the overall group activity. The group seems to use the different qualities that the participants bring to their collaborative project, as a way of getting things done collectively. Hara, Bonk & Angeli (2000) found similar participation characteristics in their study; they noted that some participants were more socially engaged while others displayed extensive metacognitive skill.

At the present time the number of studies available that adopt a research agenda similar to the one outlined here is relatively small. Based on existing studies that implement some kind of timeline analysis we would like to offer the following observations:

Hara, Bonk & Angeli (2000) established that group interaction patterns change over time and that pre-assigned student roles (a starter and a wrapper role were distributed over the group) have an impact on the interaction patterns at various stages in the collaborative project. In the patterns that emerged, they could identify the starter and wrapper roles by the way the messages were pointing (directly or indirectly), and also they indicated that the interaction patterns was scattered when one of these roles was not executed. Another finding was that halfway through the course all the messages were connected either directly or indirectly resulting in a synergistic pattern; some students started to act as a wrapper spontaneously. However from this pattern they also concluded that most messages are still pointing towards the starter, suggesting a strong influence of the starter throughout this discussion. Later on the interaction pattern became more explicit, and there were fewer indirect connections between the messages. In the study of Martinez et al. (2003), the density of the networks decreased over time but went up in the last period, when the participants needed to develop a collaborative product. Daradoumis et al. (2004) also described a study in which the density values remained stable over time, with only a slight drop in the last period. The prominent participants showed a regular participation throughout the course. The teachers, in spite of their high level of activity, are never in a top position, which means that the students are actively involved in the classroom activities. They used SNA, in combination with other qualitative and quantitative techniques, to evaluate student performance in virtual learning groups. Though they did not relate their changes in density over time with their other findings, one can assume that where density is higher the group is collaborating more closely, suggesting that they also found that groups working on collaborative tasks are able to develop a relatively stable group structure to see their collaboration through to the end.

SNA provides interesting insights into the mechanisms by which these participants are engaged with their collaborative group work. It seems to hold promise as a method that enables researchers to quickly analyse group properties of online networked learning communities. We have seen that the density of the network (over all) remains relatively stable, especially in the beginning and middle period. Similar density values have been found by other researchers studying network learning ties in discussion forums of groups of similar size (Daradoumis et al., 2004; De Laat, 2002; Martinez et al., 2003; Palonen & Hakkarainen, 2000; Reuven et al., 2003).

Our research suggests that these patterns may change dramatically over time, providing opportunities for every member of the community to become a full or peripheral member. Full participation during one phase may involve active learning as well as regulating or coordinating the discourse. It is therefore crucial to use a combination of content analysis, interviews and social network analysis to understand the teaching and learning processes that are present during NL. This approach also

enables researchers to track the changing relationships between the group members, the nature of their contributions and the participants' experiences. We suggest that research into NL would benefit from a multi-method approach in which analysis of data in complimentary ways is used to draw a more complete picture and deepen our understanding of NLCs.

In summary, what do these social network analysis diagrams and network properties add to what we already know, from previous research (De Laat & Lally, 2003; De Laat & Lally, 2004), about this community? The overall patterns of communication are illustrated in a way that shows the social nature of group learning and tutoring. This dimension was not revealed in content analysis of messages (Table 3) and CER. The diagrams show how people connect to the members in the group, the patterns of collaboration (one-to-one or many-to-many) are revealed, and the diagrams show the involvement of individuals in each phase. The findings may be used to seek further explanation for this behaviour or can be used to contextualise previous findings about the NL activities. For example, the decrease in the active participation of Brian, as we have seen by the drop in in- and out-degree numbers, was also pointed up by the CA and CER analysis. Brian as a teacher had a deliberate strategy to be active in the beginning (to set the stage), giving the floor to the group in the middle, and coming back again in the ending phase of the project. His behaviour in this way is made visible using the SNA method. The same is true for Charles and Andrea (and Margaret to some extent) whose strong appearances in this community are easily identified using SNA, making them obvious participants for researchers (and teachers) to seek further understanding of the central behaviour (how they contribute as a learner and teacher, as well as the nature of their intentions). However, only by combining SNA with CER and CA can we understand the process and intentions of the participants at the level of individual agency: what they claim they are doing, why they are doing it and how it occurs through messages posted. By using a timeline analysis when studying learning and teaching processes we can also see how certain participants become gradually more active and become central figures in their community.

We conclude that SNA is a valuable complimentary analytical tool in our search for richer understandings of the processes occurring in Networked Learning Communities. SNA can provide a useful window for teachers and students to see how they act as a group. Information can then be used by them to reflect strategically on their collective performance and to make decisions on how to move forward.

To summarise, SNA provides added value within a multi-method approach and meets the need for triangulation of data. First of all, SNA provides a quick way to build up a clear understanding of group activities and its cohesion. A Networked Learning Community (NLC) such as we see in higher education, is of a kind that is potentially heavily connected and has clear boundaries with respect to who is a member and who is not. For researchers (but also for both teachers and students) it is valuable to know more about the engagement of participants in particular NLC activities. SNA can be used as a selection method, and as such will assist in selecting the appropriate groups to study. For instance if one is interested in studying teacher-student interaction one will need to know if there was any teacher-student interaction in the first place. But SNA will also provide teachers with the information on how the students are engaged in the project. In this way the teacher is able to target isolated participants and offer some kind of support.

SNA may be used to interpret outcomes of other methods – SNA provides information about the overall group's functioning and the strength and direction of their interactions. CA and CER outcomes will be viewed differently when knowing if the group was heavily connected with equally distributed in- and out-degrees, or (for example) if there was a relatively low level of connection between the whole group, with only two participants being responsible for most of the interaction that took place. Furthermore, CA coding results of participants can be mapped against their position in the group as

identified by SNA. We have demonstrated that it is important to assess the relationship between CA scores and position in the group. Statements made by the participants about their own and others' engagement in group activity can then be contextualised from their own position in the network

SNA may be used as an input for other methods of analysis, for example, using the data on group interactivity and participation to reflect upon with the participants during interviews (or CER in our case). Or, using SNA to check current understandings and expectations. Our work with SNA increases our confidence that NL participants interviewed during CER sessions have a good understanding of how the community interacts. They seem to have built up a mental picture of the interaction patterns and have an impression of who is active and who is not, and also who, to some extent, is related to whom. They also show awareness of who acts as a central figure; trying to move the learning or teaching activities of the community forward.

According to Daradoumis et al. (2004) 'evaluation of a real collaborative learning situation is a very complex task, since one has to consider a variety of aspects and thus to integrate several analysis techniques, data and tools into a mixed evaluation method'. They used a mixture of methods to complement their findings to 'unfold the group's internal workings and achieve a more objective interpretation'.

This paper is the concluding contribution to an extensive case study, looking at learning and tutoring processes in a networked learning community. We have seen that both the teacher and the learners develop strategies to learn together in a group, as well as developing strategies to regulate their group learning. We think it is important to systematically describe these activities as a way to develop an evidence base of NL processes and procedures that can be used to develop hypotheses to study particular aspects of NL in more detail. In the title of this paper we suggested that we would attempt to 'square the circle' by focusing on NL processes from different perspectives. We have argued elsewhere that researching NL is complex, and not 'easy', and that a multi-method approach is needed to study the complexities of NL practices. In this paper we discussed SNA techniques that can be used to visualise and describe patterns of relationships present in social networks. This may have value for NL research when complemented with other research methods. NL is a complex reality where multiple variables interact and influence each other, in rich empirical and 'ecological' settings. We suggest that multi-method research can contribute to our understandings of this complexity and create an evidence base of networked learning practices based on user experiences and interpretations of participation (Hakkinen et al., 2003; Strijbos, 2004). Throughout this case study we have developed a multi-method approach and we have also uncovered the added value of a timeline analysis when describing student and teacher participation in learning and tutoring activities. However, this research is based on one NLC and systematic descriptive research in other NLCs is needed to contextualise these findings. Research in NL is often based on small-scale studies and is, as a consequence, in need of meta-analysis and synthesis. Research in NL will benefit from a synthesis of findings drawn from a wider range of studies, as a way to relate results and generate a more coherent body of work. It is our hope the present paper, and the series of which it is a part, makes a helpful contribution to that endeavour.

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Chapter 6

Online Teaching in Networked Learning Communities:

A Multi-method Approach to Studying the Role of the Teacher

Abstract

The aim of this paper is to study the online teaching styles of two teachers who each tutor a networked learning community (NLC), within the same workshop. The study is undertaking empirical work using a multi-method approach in order to triangulate and contextualise our findings and enrich our understanding of the teacher participation in these NLCs. We apply social network analysis (SNA) to visualise the social structure of the NLC, content analysis (CA) to identify learning and teaching processes, critical event recall (CER) to gather the teacher's personal experiences and intentions. This paper reports some of the current findings of our work and discusses future prospects. This study is part of a continuing international study that is investigating networked collaborative learning as a way to develop a rich descriptive body of evidence of tutoring and learning processes in e-learning.

Keywords

Networked learning, online tutoring, multi-method, triangulation, computer-mediated-communication.

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Introduction

The aim of this paper is to study the nature of online teaching within a networked learning community (NLC). By NL we mean the use of internet-based information and communication technologies to promote collaborative and co-operative connections: between one learner and other learners; between learners and tutors; between a learning community and its learning resources, so that participants can extend and develop their understanding and capabilities in ways that are important to them, and over which they have significant control (Banks, Goodyear, Hodgson & McConnell, 2003, p1). The notion of learning in communities (Lave & Wenger, 1991) has changed the way we experience teaching and learning in education. The teacher is no longer in full control and learners are actively taking responsibility and starting to coordinate and regulate their own (collaborative) learning (Anderson, Rourke, Garrison & Archer, 2001; De Laat & Lally, 2004; Jones, Asensio & Goodyear, 2000). While, in educational practice, there is still a strong (and much needed) focus on the role of the teacher; researchers are pointing out a changing teacher-student relationship (Mazzolini & Maddison, 2003; McConnell, 1999; Rimmershaw, 1999; Vonderwell, 2003). The teacher increasingly becomes a 'guide on the side', which implies that students are stimulated to take active control over their own and collaborative learning processes. This allows them to fulfil their particular learning intentions and needs (Gustafson, Hodgson, Mann & Olsen, 2004), and coordinate their learning by agreeing on rules and deadlines (Vonderwell, 2003). It allows students to actively schedule their activities and assign roles within the group, instead of just exploring the content in order to finish their learning task (Hammond & Wiriapinit, 2004; Strijbos, Martens, Jochems & Broers, 2004). As such, every member of this community may be seen as both a learner and a tutor (De Laat & Lally, 2003). Of course, the designated teacher continues to have a *status apart*, being responsible for the overall coordination of the workshop and its educational goals. This changing relationship emphasises the need to articulate new pedagogies that require teachers to design and facilitate this more student-oriented approach to learning. Teaching online requires different, and often new, skills for the teacher, as well as a different attitude towards teaching or being a teacher. This is partly due to the open learning environment and the use of constructivist and community-based learning principles in the design of NL courses (see De Laat, Lally, Lipponen & Simons, in press, for a description of the design principles of this particular course).

This article is part of a continuing study in NL where the focus is on developing an evidence-base for learning and teaching in NL as a way of informing both theory and praxis. This project will enable us to increase our understanding of what is actually happening when participants are engaged in networked teaching and learning activities. In this article we present teachers' experiences with NL, where our previous paper (De Laat et al., in press) is concerned with the students' experiences and activities while working in the same NLCs. This previous study presented findings of how these two groups, under similar circumstances, were engaged in teaching and learning processes. Content analysis on learning and teaching activities revealed that both groups developed a similar pattern, where most of the activity (both learning and tutoring contributions) is found in the middle phase of the project and in both groups there are a lot of cognitive, metacognitive and facilitative contributions. However participation patterns (based on social network analysis) between the two groups seemed rather different, group one acted more as a stable group throughout, whereas in group two, participation differed from phase to phase, and the involvement the learning task, in particular, was not equally spread among the participants. The second group (based on contextual analysis) worked out an explicit framework of roles and responsibilities, to support their way of working together, suggesting that this group was dealing with a lot with procedural issues.

In this current paper we turn our attention to the role of the online teacher in the previously discussed NLCs. For this purpose we had chosen to study two NLCs. NLC 1 is assigned to an experienced teacher and NLC 2 involves a teacher who is teaching this course for the first time. In particular, we are inter-

ested in the teachers' behaviour and experiences to describe how they develop their online teaching styles to interact with the students in this open learning environment.

Online Teaching

In this section we look at online teaching more closely. First we will discuss some general pedagogical approaches to online teaching found in the literature. Secondly we would like to present some research findings that discuss the role of the teacher in asynchronous networked learning practices, similar to our own research setting.

In the literature there is a growing understanding that teaching online is different from teaching face-to-face and as such needs its own set of pedagogies to guide the online teacher (Goodyear, 2002). Teaching styles developed during face-to-face teaching cannot simply be transferred to an online learning environment and it is important to develop an insight into the complex online teaching processes and strategies to build the necessary skills and competencies to teach online (Harasim, Hiltz, Teles & Turoff, 1997; Stephenson, 2001). In general, online teaching activities design, facilitate and direct the cognitive and social process for the purpose of realising personally meaningful and educationally worthwhile learning outcomes (Anderson et al., 2001). As such, this sounds like nothing new, but the way these tasks are embodied and executed in a networked learning environment bids for a re-orientation. Following these three main activities, Goodyear et al. (2001) suggest eight roles of online teaching (see Table 1). Not all of these roles have equal importance and some might not even be used in every situation but in general they describe a wide range of competencies and skills online teachers need. When it comes to the design and organisation of a networked learning comes, Goodyear et al. (2001) suggest that the teacher has to be able to specify the right online learning activities to fit the course needs and have knowledge of the appropriate pedagogies to create and support the online activities. The teacher has to be able to show the relevance between the activities and its desired outcomes, and select the appropriate media accordingly. During the course, the teacher has to be able to manage student enrolment and participation, and use online techniques to monitor learning processes to be able to ensure the authenticity of students' work. To facilitate the networked learning event the teacher needs to demonstrate self-confidence and a willingness to be open. They need to challenge all the students to participate, but support them individually and as group at the same time. Here, a certain ambiguity needs to be tolerated. The teacher must help the students articulate their learning concerns and needs in order to make them responsible for their own learning and that of others. This way a student-centered environment can be created and supported, and a sense of community can be established. Working with appropriate group dynamics to support the community is a particular relevant competency. The teacher should help to pace the learning process and reinforce students' contributions. Also, they should make summaries of key points in the discussion and guide the discussion to keep it within the course goals and objectives. This way the teacher can intervene to provide direction, give information, and manage disagreement. The instructional part of online teaching is concerned with providing the appropriate knowledge and resources needed to generate and offer course content. The teacher should therefore also act as a researcher to stay up to date, not only with the development of the subject matter of the course, but also with new teaching models and pedagogies to improve one's own teaching.

Harasim et al. (1997) suggest that an online teacher plans the upcoming activities, follows the flow of the conversation, and offers guidance when needed. The teacher provides a set of group structures that enable students to work out a problem or undertake a task, develop strategies to regulate and coordinate their own (collaborative) learning; and the teacher needs to be present, but play a background role. Typical activities are: setting the stage by developing a warm environment and providing clear directions and support structures; monitoring and encouraging participation by following stu-

dent activity, making expectations clear and modelling responsiveness; forming groups and assigning role responsibilities using appropriate pedagogical (collaborative) models; moderating and facilitating group processes by coordinating interaction, scheduling and organising the structure of the interaction, providing social and emotional support); and establishing norms and grade performance. Mason (2001) states that for successful facilitation the following categories need to be considered: the setting must be appropriate for online learning; course design needs to be well structured to avoid overload and assist navigation through resources; the teacher needs to develop facilitation skills to be successful online and provide access to extended online resources. Similar competencies are mentioned by Salmon (2003). Teaching online involves having an understanding of online processes and technologies to be able to design and organise the activities. The teacher should have online communication skills and be able to diagnose and solve problems and opportunities online, as well as be able to use emotions and solve conflicts constructively. The online teacher should have content expertise and knowledge about valuable resources, give creative feedback and build on participants' ideas. They should also demonstrate a positive attitude, commitment and enthusiasm for online learning.

Table 1. Summary of online teaching roles and competencies.

(Anderson et al., 2001)	(Goodyear et al., 2001)	(Harasim et al., 1997)	(Mason, 2001)	(Salmon, 2003)
Instructional design and organisation is concerned with thinking through the process, structure, evaluation and interaction components of the course	Designer is concerned with designing worthwhile online learning tasks Manager-administrator is concerned with issues of learner registration, security, record keeping, and so on Assessor is concerned with providing grades, feedback, and validation of learners' work	Set the stage Forming groups and assigning role responsibilities Establish norms and grade performance	Appropriate setting Structured course design	Understanding of online processes and technologies to be able to design and organise the activities
Facilitating discourse is critical to maintaining the interest, motivation and engagement of students in active learning	Process facilitator is concerned with facilitating the range of online activities that are supportive of student learning Advisor-counsellor works with learners on an individual or private basis, offering advice or counselling to help them get the most out of their engagement in a course Technologist is concerned with making or helping make technological choices that improve the environment available to learners	Monitor and encourage participation Moderate and facilitate group processes	Online facilitation skills	Online communication skills and be able to diagnose and solve problems and opportunities online Use emotions and solve conflicts constructively
Direct instruction is concerned with providing intellectual and scholarly leadership and sharing their subject matter knowledge with students.	Content facilitator is concerned directly with facilitating the learners' growing understanding of course content Researcher is concerned with engagement in production of new knowledge or relevance to the content areas being taught		Provide content and access to online resources	Content expertise and knowledge about valuable resources, give creative feedback and build on participants' ideas Positive attitude, commitment and enthusiasm for online learning

Research in Online Teaching

In general there seems to be a consensus about the online teachers' role and competencies in the literature. It is therefore interesting to discuss some recent studies in networked learning that focus on the role of the teacher.

With respect to the teachers' overall presence during networked learning activities, recent studies report that students perceive the communication with the teacher as constructive and encouraging, and they like the tutor to be involved throughout the course and not just at the beginning (Browne, 2003; Clouder & Deepwell, 2004; Vonderwell, 2003). Also Rimmershaw (1999) concludes that the teacher's active participation might have been critical in setting the right tone for the more successful courses and Rovai (2002) stresses that it is the teacher's challenge to create appropriate conditions by developing a sense of community in the group. According to Lim & Cheah (2003) there are a number of roles that teachers should play during asynchronous learning, these are: setting meaningful tasks; providing technical guidance; participating actively; keeping the discussion focused; drawing conclusions; providing content expertise; and recommending resources for extension of learning. At the same time they argue that teachers need more specific guidelines on how to execute their roles in asynchronous discussion boards. Levy (2003) reports that at the early stages of the course there was a need for more intensive and direct personal contact between teachers and participants, in particular to monitor and support individual participants' awareness of specific features of the learning design and more general understanding of learning issues. Ferry et al. (2000) concluded that it is the task of the teacher to set the scene at the beginning of the course, and to keep the conference constructive throughout. Teachers constantly need to monitor the discussion and provide input at appropriate moments (Ferry et al., 2000). At the same time research points out that the students themselves started to develop leadership roles within their group. These roles emerged from the strong feeling that a leader was needed to actively monitor and pull the reins from time to time, and to keep the discussion more focused (Light, Nesbitt, Light & Burns, 2000; Strijbos et al., 2004). However most important is that the teacher needs to tune in-during the collaboration process to find out what kind of moderation behaviour a specific group needs. "The social and pedagogical presence of the instructor is essential for improved communication and learning. Yet, online instructors need to be careful in structuring a feedback mechanism to encourage students inquiry and collaboration rather than a quick, immediate answer to a question that can itself be a barrier for effective student learning." (Vonderwell, 2003, p.88).

The studies in general seem to support the pedagogical approaches to online teaching as articulated in the presented literature. Research shows that teacher involvement and active participation is appreciated by the students. The students find communication with the teacher constructive and encouraging, and the teacher can support the students by setting the right tone for the discussion and contributing to develop a sense of community. With respect to the roles that teachers should play, the studies point out that in the beginning students seem to need or appreciate active pedagogical guidance from the teacher, which can gradually transform into a more facilitative role in the middle and end stage of the discussion. However a constant monitoring (even if only from a distance) by the teacher throughout is required to be able to tune in when needed. There is some evidence of students picking up some roles or leadership tasks to compensate for the 'lack' or absence of the teacher's input.

In this study, it is our aim to explore the teacher's online behaviour. The aim of this paper is to study the online teaching styles of two teachers, who each tutor a networked learning community (NLC), within the same workshop. We will use the empirical data to reflect upon the presented discussion of the research literature and discuss our current understanding of teaching online.

Methods

Sample

The Master's programme in E-Learning is based upon the establishment of a 'research learning community' among the participants and the university teacher. Activities are undertaken around five 'workshops' over a two-year period. The programme is entirely online and hosted in the virtual learning environment WebCT. The students are mainly mid-career professionals, many of whom have post-graduate experience of higher education, are engaged with teaching responsibilities, and often charged with developing e-learning within their own organisation.

The analysis is based upon collaborative project work conducted by two NLCs. We included two NLCs in this study to contrast the online teaching styles. NLC1 consists of seven students and one teacher. NLC2 consists of nine students plus one teacher. We divided the 10-week period into three sections: beginning, middle and end. This allowed us to take a timeline analysis approach. From each period we took a 10-day sample to form our data set. In each sample we analysed messages in selected threads rather than sampling across threads. This was important to enable us to follow and code the development of learning and tutoring within an ongoing discussion rather than across unrelated messages. This resulted in a selection of 235 messages in NLC1 and 215 messages in NLC2.

A Multi-method Approach

In order to provide a more holistic and complimentary description of teachers' engagement in NLCs, we developed a multi-method research approach and we studied a beginner teacher and an experienced teacher to contrast their teaching styles. In research terms, much is still unclear about the effective forms of networked learning (NL) and there is a need for more empirical descriptive research to provide an evidence-base for the pedagogical processes both teachers and students are engaged in. Hakkinen et al. (2003) suggested a multi-method approach that is process-oriented and takes into account different contextual aspects of NL. They argue that research is needed that captures the process and organisation of collaborative interaction and its contribution to learning:

'Methods should be developed not only for capturing processes and outcomes of learning, but also experienced effects and individual interpretations of participation in CSCL settings.'
(Hakkinen et al., 2003, p.402)

The aim of this kind of research is to provide a more complete picture of NL processes. We think it is important that this research is focused on the central processes of NL, that is: learning and teaching. We believe that these understandings will contribute to the development of better pedagogical frameworks and software that more effectively support learning and tutoring by design. We have developed a multi-method research framework to study NL processes by making use of social network analysis (SNA) to find out 'who is talking to whom', content analysis (CA) through coding teaching and learning activities as a way to find out 'what they are talking about', and context analysis (CxA) focusing on the experiences of the participants to find out 'why they are talking as they do'.

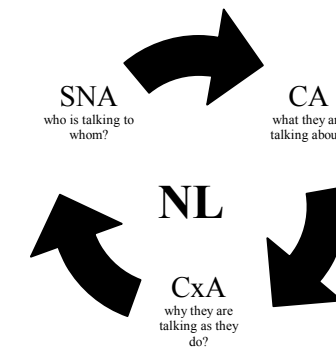


Figure 1. Multi-method research framework for studying networked learning.

These three methods are used to triangulate and contextualise our findings and to stay close or connected to the first-hand experiences of the participants themselves (De Laat, Lally & Lipponen, 2004). To find out *who is talking to whom* we used SNA to study the way people participated and interacted with each other. This provides information about the activities of such a community and the way they learn collaboratively. WebCT generates log-files through which information about the activity of the members can be obtained. The information retrieved from WebCT can be treated as relational data and stored away in a case-by-case matrix to analyse interaction patterns. For this purpose we focused on the cohesion of the network (Scott, 1991; Wasserman & Faust, 1997), based on writing and responding to messages.

To get a first indication of the cohesion of the network we calculated the density of the network. Density is a property of a whole network and describes the general level of linkage among the nodes in a network. The density is at a maximum (100%) when all the nodes are connected to each other.

Then we conducted centrality measures to find the central participants within the network. For each participant this has been done using Freeman's degree. Freeman's degree calculates the activity of individual members in the community. With this the network activity of individual members can be indicated. Since we know the nature of the relationship between the participants, i.e. who interacts with whom, we can work with directional relationships. Directed ties, called arcs, specify the orientation of the relationship (Wasserman & Faust, 1997). This is of special interest for the centrality measures and the creation of the sociograms. In a directed case-by-case matrix, a participant can be either adjacent to, or adjacent from another node, depending on the direction of the arc (Wasserman & Faust, 1997). This means that we can consider these cases separately by differentiating between in- and outgoing connections. This is done by calculating the in-degree and out-degree centrality measures. In-degree centrality is a form of centrality that counts only those relations with a focal individual reported by other group members, and is therefore not based on self reports as is out-degree centrality (Borgatti, Everett & Freeman, 2000). In this study, in-degree measures provide information about the number of people who respond to a message from a certain participant. Out-degree gives an indication of the number of messages a person has sent to other individual members of a network.

UCINET, the program that we used to carry out the analysis, also allows one to make different kinds of visualisations of the relationships within the network. For this study we chose a sociogram representing the connections between the participants and its direction in a way that it includes the actual number of ingoing and outgoing messages (Wasserman & Faust, 1997).

The following step of our analysis was concerned with finding out *what they are talking about*. The central purpose of content analysis (CA) is to generalise and abstract the complexity of the original messages in order to look for evidence of learning and tutoring activities. In order to probe collaborative NL (learning and tutoring) we ‘coded’ the contributions using two coding schemas (De Laat & Lally, 2003).

The first coding schema, developed by Veldhuis-Diermanse (2002), was used to code units of meaning that were regarded as ‘on the task’, focusing on the learning processes used to carry out the task. This schema includes four main categories: cognitive activities used to process the learning content and to attain learning goals; metacognitive knowledge and metacognitive skills used to regulate the cognitive activities; affective activities, used to cope with feelings occurring during learning, and miscellaneous activities. We decided to exclude miscellaneous category in our analysis since we are interested in the evidence of learning activities. The second schema is used to code units of meaning that are ‘around the task’, where the focus is on tutoring (Anderson, Rourke, Garrison & Archer, 2000). This schema includes three main sub-categories: design and organisation, facilitation of discourse and direct instruction. Our intention here was to attempt to reveal the ways in which the participants were facilitating and regulating each other’s learning, while undertaking the workshop project task. Codes were assigned to parts of messages based on semantic features such as ideas, argument chains, and topics of discussion (Chi, 1997). Capturing these activities using strict syntactic rules was not possible because of the elaborate nature of a discussion. We chose to use NVivo software to help us to partially automate this process: to highlight segments of the text with coding that we claim represents a particular learning or tutoring activity. In effect, these coded segments were our units of meaning. NVivo was also used to conduct searches of the coded data, in order to produce summary tables (see Tables, below). To determine our inter-coder reliability we firstly, for each coded message, checked to see if the codes assigned by the two coders referred to the same parts of the message (i.e. the same units of meaning). Secondly, we checked to see if the two coders had assigned the same codes to each unit. Based on a 10% sample of all the messages coded by the two researchers, a Cohen’s Kappa of 0,86 was established.

Content analysis has provided us with evidence of learning and tutoring process patterns that were occurring in this group during the workshop task. To understand these patterns further we need to find out *why they are talking as they do*. Contextual analysis (CxA) can be done using several techniques, like interviews, critical event recall (CER), thinking out loud (TOL), course evaluation forms, student diaries, etc. In this particular study we applied CER using the summary results of the CA and the messages exchanged during the project as a stimulus for CER interviews with the participants. This was done to gain feedback from them about their own understandings of the patterns that emerged, and to help us to understand the context in which these patterns were emerging. The CER interviews enable the articulation of many previously unexpressed aspects of learning and help to contextualise and elucidate individual behaviour, based on personal motives and perceptions in relation to the task and the other participants. Therefore, we pursued those situational and contextual aspects of NL that were identified by participants during these recall interviews. The interview layout contains two parts. The first part is based on stimulated recall of the learning event (CER). During the second half of the session the opportunity for post-hoc reflections was provided, with additional follow-up questions to help probe and understand the group processes.

Findings

Firstly we will analyse the findings of the SNA by presenting density, centrality (degree) measures, and interaction patterns, as a way to explore the interactivity of the community members.

Table 2. Density values for NLC1 and NLC2 in the Beginning, Middle and Ending phases of Workshop 1.

Density	Beginning	Middle	End
NLC1	0,46	0,48	0,48
NLC2	0,34	0,36	0,26

The density values of NLC1 and NLC2 show the overall connection between the participants. There seems to be a clear difference between group 1 and 2. First of all, the density values of group 1 are higher, indicating that the participants have more connections amongst each other. Secondly the density values of the first group remain stable throughout the entire project. In group 2, the values remain stable between the beginning and middle phase but in the last period the value drops from 36% to 26%, indicating that the number of connections between the participants has gone down. Similar density values have been found by other researchers studying network learning ties in discussion boards and studying groups of similar size and asynchronous learning settings (De Laat, 2002; Martinez, Dimitriadis, Rubia, Gomez & de la Fuente, 2003; Palonen & Hakkarainen, 2000; Reuven, Zippy, Gilad & Aviva, 2003). Although 26% can be considered as rather low for a group of this size.

Table 3. Out- and In-degree Centrality Measures of the Participants in the Three Phase Samples for NLC1, Workshop 1 (Brian* was the designated university tutor in this group).

	Brian*	Ryan	Mary	Danton	Anka	Aimi	Neem	Mort
Beginning Phase Sample (57 messages)								
Out-degree	9	8	9	7	14	7	3	0
In-degree	9	12	8	6	12	8	2	0
Middle Phase Sample (91 messages)								
Out-degree	5	15	18	11	14	14	11	3
In-degree	2	16	20	12	12	14	13	2
Ending Phase Sample (87messages)								
Out-degree	7	6	13	3	26	24	5	3
In-degree	3	3	13	3	24	26	11	4

To have a closer look at participation in these NLCs we present the findings of the in- and out-degree values for each participant (see Tables 2 and 3) and the visual representation of the interaction patterns (see Figures 2-7) for each phase of these NLCs as they emerged from the discussion threads in WebCT. NLC 1 shows a rather even spread contribution by all its members when compared with NLC2. In NLC2 some participants have a high in- and out degree number while participation of other members is either low or seems to go up and down at various stages of the project. Amani seem to be the consistent participant in this group, Monique seems to get heavily involved in the middle phase while Alan’s participation seems to increase as the project develops.

Table 4. Out- and In-degree Centrality Measures of the Participants in the Three Phase Samples for NLC2, Workshop 1 (Seline* was the designated university tutor in this group).

	Seline*	Sabine	Calvin	Monique	Pierre	Amani	Johan	Kiel	Jaquita	Alan
Beginning Phase Sample (59 messages)										
Out-degree	6	5	13	8	4	10	6	7	0	0
In-degree	6	5	14	2	2	16	6	8	0	0
Middle Phase Sample (94 messages)										
Out-degree	2	5	4	20	2	41	7	8	2	3
In-degree	2	8	4	19	2	37	8	9	2	3
Ending Phase Sample (62 messages)										
Out-degree	0	2	14	8	2	15	11	1	0	9
In-degree	0	2	11	7	2	15	11	1	0	13

The presented numbers on their participation will now be used to further interpret the interaction patterns between the participants of both NLCs. Overall we notice that within NLC1 the participants, including the teacher, are acting as one group over the entire period (see Figures 2-4). In the beginning there is only one participant who is not engaging, but this changes in the middle and ending phase of their collaboration. Everybody is involved in the communication and there are no sub-groups or cliques being formed. The teacher has, in the beginning phase (Figure 2), a somewhat central position, although this is not a dominant one. Together with Danton and Anka they are the most connected and central participants in this phase.

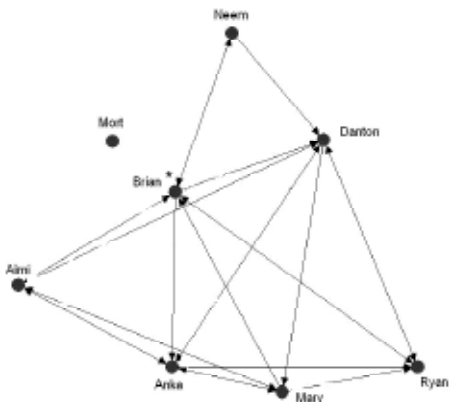


Figure 2. NLC 1, interaction patterns of beginning phase. (Note: pseudonyms are used here and in the rest of this paper. An * symbol denotes the university-designated tutor in all figures and tables).

This dynamic has somewhat changed in the middle phase where the teacher has moved more towards the side (periphery), while Mary (who was more peripheral in the beginning) moved to the centre of the NLC, making active contributions to the groups task. Danton is also still quite active and Anka has moved more to the side as well.

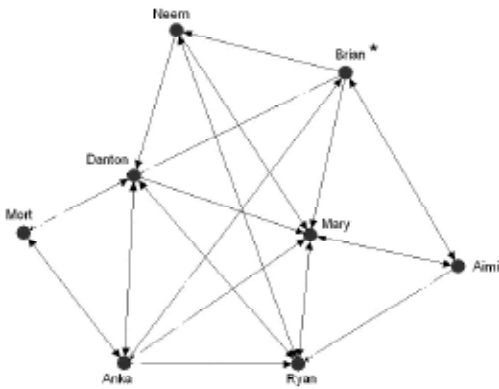


Figure 3. NLC 1, interaction patterns of middle phase.

In the last phase of their 10-week collaboration, the group structure has changed again. There appears to be less connection between all the participants, and all the communication seems to be focused around Anka (and Aimi) to some extent. The teacher is still making contributions to the conversation from the sidelines.

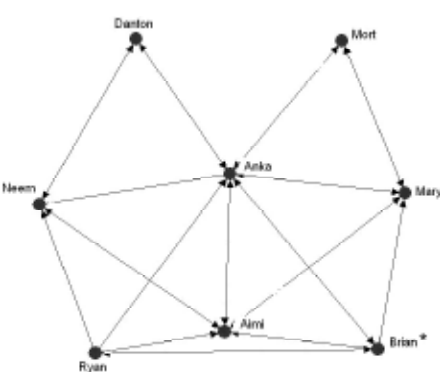


Figure 4. NLC 1, interaction patterns of end phase.

Now that we know more about the individual in- and out-degree measures and interactions patterns of this NLC, we can start to look at their teaching and learning activities (see Table 5). This table reflects the tutoring and learning activities that all the participants were engaged in while writing their messages to the group. The changing teacher-student relationship (as mentioned before) is quite visible, since we can now see that all the participants, including the teacher, are covering both learning and tutoring statements. The teacher's style is to act as a learner, which might suggest he is trying to participate in this community on an equal basis. The teacher's involvement reduces somewhat in the middle and ending phase (as was supported by the SNA findings) and is concentrated on tutoring. This is most noticeable in the middle phase where the group is making a large number of contributions to their collaborative task. It is interesting to see for example that in the beginning Mary makes a large contribution to both tutoring and learning, even though in the SNA pattern (see Figure 2) she did not appear as a central person. This might mean that she wrote large messages touching on a number of issues at once. Danton seems to be more focused on learning processes throughout the 10-week period, while Anka is involved in both.

Table 5. NLC 1 Case summaries of learning and tutoring processes for each of the phases. *T stands for teacher.

NLC 1	Brian*	Ryan	Mary	Danton	Anka	Aimi	Neem	Mort	Total
Beginning (57 messages)									
Learning	9	3	12	10	12	3	3	0	52
Tutoring	27	19	25	6	35	21	4	0	137
Middle (91 messages)									
Learning	0	35	35	13	26	19	26	8	162
Tutoring	18	26	25	6	16	16	27	8	142
End (87 messages)									
Learning	3	4	9	1	11	11	0	4	44
Tutoring	11	9	9	3	22	27	5	5	91

Based on this information we held a CER interview with the teacher to reflect on his tutoring style:

"My teaching style is to let the group be emergent in their learning and let them seek their own rhythms and ways of working and learning together. But at the same time being present in the workshop by giving subtle advice or hints in a certain direction or just keeping a close watch over the group's movements without interfering but being ready to do so whenever I felt necessary."

"I put in an advanced organiser in the spirit of Ausubel by giving them two headings. One is to organise the process and one is to identify a project. However, the group did not really bother with the process at this stage, they were only interested in the content. But I was trying to pre-organise it a bit. I might have been too early basically. But my concern was to flag up these two issues or concerns I had."

"They had lots of good and interesting ideas. But I was aware of the increasing complexity of their project. And I wanted to sound a note of caution by saying, keep it do-able. But in a gentle way, that's also why I added those smiles in my message."

"I was trying to manage the situation. Especially because I knew that later on in their group work they were going to face this issue in the process."

He saw himself as modest moderator within this group:

"I felt very comfortable throughout this workshop because of my experience. I knew the kind of mental framework that I was going to go through, I knew the kind of pitfalls they might go down and I knew the rabbit holes that might appear as well."

"I was making this sort of architectural framework through my messages, that was either going to be directive or taken up, or points that I can point back to and say, 'now I have made this framework and over there you see that door, or window, or arch or whatever', that can be supportive once they realize these points themselves."

He felt, because of previous experiences, that he has a deep knowledge of the dynamics around this workshop and that he kind of knows what the groups will go through and what to expect as a result of that:

"Obviously no group is the same and there are differences and problems but to have a general understanding and a mental framework helps me to create some scaffolding, and knowing how they operate in and around that helps me to pull them back if necessary. Sometimes they don't need it and they are fine on their own."

"I feel I have an internal architecture for this workshop and it does not always have to be or become an external one, but I feel comfortable with it."

This CER interview illustrates how the teacher felt during this workshop and explains his intention to act moderately (avoiding a central position) and let the learning emerge by supporting the group but also by acting as a learner and not being too directive in his tutoring style.

In NLC2 (with the starting teacher), we see some similarities in the teacher appearance in the socio-graphs (Figures 5-7). This teacher also remains peripherally active, however at the end, there is no involvement any more. In the beginning period the teacher is most active and reduces her involvement thereafter. This NLC, overall, seems in the beginning to be directed by three central participants and as a whole is not operating as one group. This is indicated by the star shape (see Figure 5). This shape changes later on where the shape becomes more like a circle suggesting a more equal participation of all the members.

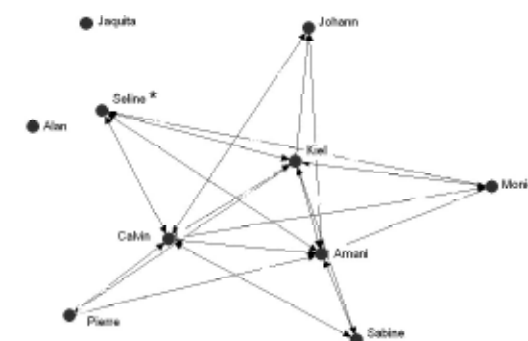


Figure 5. NLC 2, interaction patterns of beginning phase.

Also, in the middle phase the teacher still seems to be on the sideline of the overall interaction. This is indicated by the limited connections with the participants in this NLC. Most of the group activity is on the right side of this figure and 'disconnected' from the teacher's direct engagement. Amani and Kiel are still the central participants, Calvin has moved more towards the side.

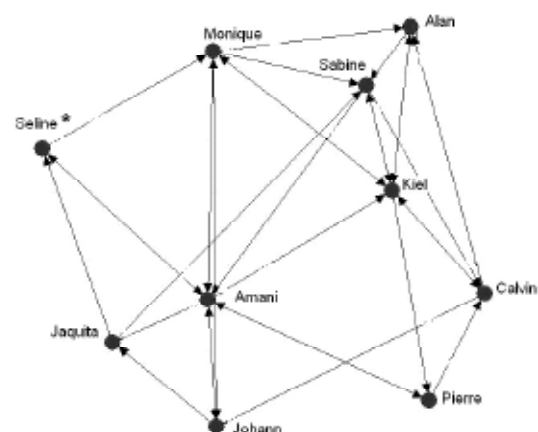


Figure 6. NLC 2, interaction patterns of middle phase.

At the end phase the teacher has made no active contribution to the NLC. Amani and Calvin together with Alan are the most active members, and Kiel made a marginal contribution in this stage.

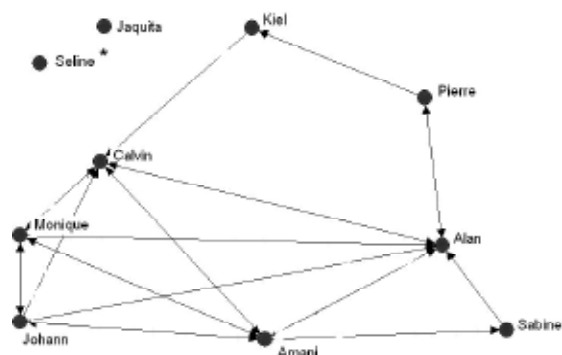


Figure 7. NLC 2, interaction patterns of end phase.

The coding summaries for NLC2 (Table 6) suggest a mixed (learning and tutoring) involvement from the teacher, and it seems that both Amani (tutoring=33) and Calvin (tutoring=25) are regulating and coordinating most of the discussion. During the middle phase the teacher involvement has reduced and became more focused on tutoring. In this phase, Monique started to contribute quite extensively, as well as Amani, but Sabine appeared less central in the SNA pattern when compared to Amani (see Figure 6). Kiel, interestingly, shows almost the opposite tendency, making relatively small learning and tutoring contributions, but still taking a central position in the SNA pattern (see Figure 6). In the end phase the teacher made no active contribution to the NLC discussion.

Table 6. NLC 2 Case summaries of learning and tutoring processes for each of the phases. *T stands for teacher.

NLC 2	Seline*	Sabine	Calvin	Monique	Pierre	Amani	Johan	Kiel	Jaquita	Alan	Total
Beginning (59 messages)											
Learning	2	19	17	13	8	14	0	3	0	0	76
Tutoring	16	12	25	14	4	33	5	9	0	0	118
Middle (94 messages)											
Learning	0	6	1	32	0	73	6	12	9	1	140
Tutoring	4	12	5	48	5	100	6	14	12	4	210
End (62 messages)											
Learning	0	0	11	12	0	21	4	0	0	5	53
Tutoring	0	6	16	17	4	19	14	4	0	10	90

During the CER we asked the teacher about the tutoring style and engagement in this NLC. She started by saying that once she reflected on the messages and when she went through them again, she realised she had more impact on the group than she initially thought:

“My feeling of the students of this workshop has stemmed from the fact that this is my first time as a tutor, and even though I know a lot about e-learning I found it a challenging experience and unnerving at many times. And I am now [during the 3rd workshop] getting near the stage of feeling comfortable about it, because now I am beginning to get the evidence and the feedback that some of the contributions that I have made have been worthwhile and I am seeing some student achievement there, despite my occasional shortcomings or my perceived shortcomings.”

“One of the students was very dominant and had a very strong online presence, and had a very combating and critical tone in his messages towards me and gave me, at one stage, a major crisis. This made me realise that I had to be there at a certain stage but I wasn’t, and I over-reacted to that especially when I realised that it wasn’t such an issue for the other students. It was just coming from him.”

The teacher reflects on the lessons learned from this experience:

“I allowed him to dominate me as the tutor, although the tutor and the students are on an equal basis. There is a point where the tutor has to assert certain things and I see now that I did not clarify the expectation they should have of me early on. But I will certainly do that the next time.”

“I felt overwhelmed by the complexity of the postings, raising so many issues that, well if I have to reply to all of that, it is going to take me so many hours and I don’t have the time. I am afraid that my strategy was that I did not respond because I felt I didn’t know what to do. I was wondering about my role, when it is learned, led and emergent learning, well how does the tutor facilitate that and move it on, because there are too many issues there to address all of them. So at times, I did not respond because I felt I did not have the skills and the know how to do that.”

She realises now that...:

“It is partly self-belief and partly the identity of how I communicate. The path I found was to comment in a gentle and constructive way and to touch on some issues rather than all of them and make a summarising remark to the other issues. It feels like a kind of balancing act.”

General Discussion and Conclusions

One of the main findings of this study is the picture it paints of online teaching as a rich and delicate undertaking, where the teacher is balancing between creating a climate of openness and using pedagogical experience to create supportive structures for learning, supporting the teaching styles mentioned during the introduction. It requires a lot of trust and sensitivity, on the part of the teacher, not to interfere with the activities of the learner immediately; it seems to help to build in (throughout the work) a kind of subtle support framework for the group. Learners can use this to work more independently as they progress.

It is clear from our findings that the experienced tutor:

- Lets the group be emergent in their learning
- Lets participants seek their own rhythms and ways of working together
- Keeps a close watch on the group without interfering, but being ready to assist
- Puts in advanced organisers to build a pedagogical framework for participants to use when they are ready
- Has a general understanding and a pedagogical framework that can be used to create specific scaffolding in particular contexts

From our analysis of the beginner tutor's experiences it is clear that:

- She was challenged and unnerved by the complexity of the task at times
- She was unsure how to deal with some common specific problems such as one of the students being very dominant and critical of her tutoring
- She did not anticipate the need to clarify the expectation that students should have of her at an early stage
- She felt overwhelmed by the complexity of the postings, raising so many issues
- She was unclear about her role, and how to facilitate and move the group on (at times she did not respond because she felt she did not have the skills and the know-how to do that)

The issue of the beginner teacher is also referred to by Goodyear (2001). One of the suggestions he makes to help novice online teachers deal with these potential complexities is to offer a larger framework within which the making of individual design decisions, or other pedagogical commitments, can be understood and located (a process of which the experienced teacher, Brian was clearly aware). The novice teacher needs to be supported and introduced in the larger pedagogical scheme of things. Part of the expertise of an effective online teacher is the ability to draw on a repertoire of such tactics, with the flexibility required to implement a variety of strategies. But an equally important part of this expertise is to be able to think longitudinally through the levels of the kind of pedagogical framework (Table 1) and the group dynamics portrayed in Figures 2-4. This allows teachers to participate in a joined-up process of educational design and see the connections between the highest level values and beliefs and the minutiae of moment-by-moment online teaching. Bonk, Kirkley, Hara, and Dennen (2001) have concluded that in complex learning environments the teacher is vital to any success and certainly cannot hide. Successful online tutors provide frequent feedback on student work, ongoing discussions, reflections and case scenarios. Among the social activities the teacher must be flexible in pressing situations and give some choice regarding assignments. With respect to the managerial role, it is important to provide the students with ways to find out the assignment structure and associated due dates, and to spell out the requirements and expectations. In this particular study we have seen differences in teachers' presence throughout the course and their reasons for it. The experienced teacher had a presence throughout and was following the groups activity very closely, building in supportive

scaffolds at various points. We also saw that this group had a higher and more equally spread participation rate as well as more stable connections between all its participants. These are two interesting emerging findings and further research is needed to study this potential relationship.

Despite the varied pedagogical approaches used in NL one of the main outcomes of the studies we discussed, and the research presented here, is that there are tensions between the roles of tutors and the roles and responsibilities of students. A key challenge arising from this is how can tutors escape from their traditional roles and give room for new learning? How can tutors gradually scaffold their leadership in a process-oriented approach? How should their role be constructed in the various stages of development of an NL community? The answers to these questions will require further carefully constructed multi-method research that focuses on the complexities of online learning and tutoring processes. A framework for a pedagogy for online teaching might also include support for dialogue and group regulation skills of the learners in NLCs, both to provide feedback on task performance, and to help to develop personal identity in a community of learners. One approach is to make learner experiences explicit not just at the end of the course but at various stages throughout it. This has less to do with conceptual learning and more to do with modelling the role, the language of the learner (Mayes, 2001) and gradually handing over teaching responsibilities to the learners. The presented data of this study clearly shows that both the teacher and students are engaging with tutoring responsibilities. Students are not only regulating their own learning but are also concerned with the group regulation of NL. We feel these findings indicate the importance of applying a multi-method approach to contextualise and relate these findings as a way to develop a context of understanding the complexity of NL. A context that should not only be available to researchers, NLCs should be provided (and create this themselves) with feedback on SNA, CA and CxA repeatedly during their activity as a way to reflect more strategically on their performance and make decisions on how to move forward. Early research in NL was focused mostly on the overall processes or outcomes of participant or teacher behaviour, using coding schemes (Gunawardena, Lowe & Anderson, 1997; Henri, 1992), questionnaires or student feedback (McAteer, Tolmie, Duffy & Corbett, 1997). More recently there has been articulated a need for a mixed-method approach – sometimes with a preference for a combination of quantitative and qualitative approaches (Hakkinen, Jarvela & Makitalo, 2003; Hammond & Wiriapinit, 2004; Stribos, 2004). However one aspect that has been largely ignored in NL research is the dimension of time. By focusing on the overall experience or processes of learning and teaching we are in danger of losing the development of this NL experience or how these learning and teaching processes evolve over time, out of sight. Conducting timeline analysis, in this case by describing the beginning, middle and ending phase of NL activities is a way to address this. This research shows that 1) when describing processes it is important to take into account that these processes are not static throughout time but have different dynamics at various stages of the collaborative work. More detailed knowledge of this process helps researchers and teachers (or moderators) develop more refined models for support of NL, and 2) a multi-method approach is not only a way of taking multiple perspectives but also a way of contextualising and building up an understanding of the activities that participants are engaged in, by using the outcomes of one method to further understand the results of next method. This way a more complete understanding of the NL activities can be developed.

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Chapter 7

Analysing Student Engagement with Learning and Tutoring Activities in Networked Learning Communities:

A Multi-method Approach

Abstract

The aim of this paper is to study the nature of teaching and learning processes in two networked learning communities. The study is undertaking empirical work using a multi-method approach in order to triangulate and contextualise our findings and enrich our understanding of the student participation in these NLCs. We apply social network analysis (SNA) to visualise the social structure of the NLC, content analysis (CA) to identify learning and teaching processes, context analysis (CxA) to study students' personal experiences and intentions. The paper reports some of the current findings of this work and discusses future prospects. This paper is part of a continuing international study that is investigating networked collaborative learning among a community of learners engaged in a Master's program in e-learning.

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Introduction

The aim of this paper is to study the nature of online learning within two networked learning communities (NLCs). By NL we mean the use of internet-based information and communication technologies to promote collaborative and co-operative connections: between one learner and other learners; between learners and tutors; between a learning community and its learning resources, so that participants can extend and develop their understanding and capabilities in ways that are important to them, and over which they have significant control (Banks, Goodyear, Hodgson & McConnell, 2003, p1). The notion of learning in communities (Wenger, 1998) has changed the way we experience teaching and learning in NL. It is no longer seen as desirable for the teacher to have full control; learners are encouraged to take active responsibility and start to coordinate and regulate their own (collaborative) learning (Anderson, Rourke, Garrison & Archer, 2001; Jones, Asensio & Goodyear, 2000). Researchers in NL are pointing to a changing teacher-student relationship (McConnell, 1999; Rimmershaw, 1999; Vonderwell, 2003). The teacher is becoming a 'guide on the side', implying that students are being stimulated to take active control over their own and collaborative learning processes. This requires students to explicitly schedule their activities and assign roles within the group, instead of just focusing on course content (Strijbos, Martens, Jochems & Broers, 2004) and there is a growing evidence for students participating in collaborative and community-based learning activities to learn and help each other with their project (Light, Nesbitt, Light & Burns, 2000; McAlpine, Koppi, McLean & Pearson, 2004; Schellens & Valcke, 2002; Veldhuis-Diermanse, 2002; Vonderwell, 2003). As such, members of an NLC may be seen as both learner and tutor (De Laat & Lally, 2003).

This article is part of a continuing study in NL where the focus is on developing an evidence-base for learning and teaching processes in NLC as a way of informing both theory and praxis. This will enable us to increase our understanding of what is actually happening when participants are engaged in networked teaching and learning activities. In this article we present students' involvement with NL. Our previous paper (De Laat, Lally, Lipponen & Simons, 2005) is concerned with the teachers' experiences working with the same NLCs and presented some findings with respect to two different teaching styles employed by the teachers (Brian, an experienced teacher builds on previous experiences and knowledge of what can be expected, whereas Seline, who is a beginner teacher on the course struggles in the absence of such understandings). Teaching online requires different, and often new, skills for the teacher, as well as a different attitude towards teaching or being a teacher. This is partly due to the open learning environment and the use of constructivist and community-based learning principles in the design of many NL courses. This changes the role of students from passive to active learners. In order to provide a more holistic and complementary analysis of these two NLCs, the main focus of this article is on the students' behaviour. In particular, we are interested in understanding the teaching and learning activities employed by the participants in these NLCs, to understand the way roles, tasks, and strategies emerge as the NL collaborators shape their collective endeavour through an online discussion.

Our research in NL is based on the idea that community-based learning principles provide an open learning environment where students can construct knowledge together. When learning collaboratively students create the opportunity to share and discuss their experiences and knowledge in a way that may benefit both the individual as well as the community. Learning in communities is a process where both individual and collective learning goals and agendas are carefully and constantly being negotiated, around a topic or domain that is of interest to each participant. In this way NLCs enable the learners to develop a space for a shared activity in which their learning is situated. Here they connect ideas, share problems and insights in a constructive way, and connect with concepts with which they are already familiar, using new knowledge that is collaboratively constructed through their dialogues and social interactions online. This view of socio-culturally mediated, situated and constructive community-

based learning is the main theoretical perspective that drives the design of the Masters in Networked Learning course at Sheffield University, offered since 1996. The theoretical underpinnings and their relationship to learning and teaching design are summarised as follows (EQUEL Position Paper, 2004):

- The problems and issues researched by the groups are defined by the groups themselves through processes of negotiation
- The problems and issues have a personal and professional focus: they are important to the members of the group, arising from concerns and interests they may have about their professional practice
- Problems require negotiation and communication to understand them: because the issues researched are complex and ill-defined, the members of each group have to engage in considerable communication in order to understand them and in order to negotiate changes in their perception of the 'problem' and its resolution as their work progresses
- Communication is both task oriented and socially centred. The group's function as learning communities which have an interest in sharing, supporting and learning collaboratively in a social context, and which are constructing understandings of what it means to learn together in a networked environment
- The groups are encouraged to view their research and learning as "action research", and they are introduced to the concept of action research in an earlier e-seminar. This provides them with a model of how to work together, which helps guide them in their collaborations
- They require a journey of learning: There are no specific pre-defined learning outcomes. Each group embarks on a learning journey which requires collaboration but which does not define in exact detail how they should work together or what the outcomes of their learning should be
- They involve a high degree of reflexivity: learning in these groups is highly experiential, and the groups are therefore encouraged to be reflective and to use this as a source of learning

A means for achieving this is exposure to other participants' development within the learning community. Members participate in developing the learning community perspective, which is based on participants and teachers taking collective responsibility for the (re)design and evaluation of the programme (EQUEL Position Paper, 2004).

Methods

Sample

The Master's Programme in E-Learning is based upon the establishment of a 'research learning community' among the participants and the university teacher. Activities are undertaken around five 'workshops' over a two-year period. The programme is entirely online and hosted in the virtual learning environment WebCT. The students are mainly mid-career professionals, many of whom have post-graduate experience of higher education, are engaged with teaching responsibilities, and often charged with developing e-learning within their own organisation. The analysis is based upon collaborative project work conducted by two NLCs. NLC1 consists of seven students and one teacher. NLC2 consists of nine students plus one teacher. We divided the 10-week period into three sections: beginning, middle and end. This allowed us to take a timeline analysis approach. From each period we took a 10-day sample to form our data set. This resulted in a selection of 235 messages in NLC1 and 215 messages in NLC2.

A Multi-Method Approach

In order to provide a more holistic and complimentary description of their participation in the NLCs, we developed a multi-method research approach. In research terms, much is still unclear about the

effective forms of networked learning (NL). There is also a need for more empirical descriptive research to provide an evidence base for the pedagogical processes both teachers and students are engaged in. Hakkinen et al. (2003) suggested a multi-method approach that is process-oriented and takes into account different contextual aspects of NL. They argue that research is needed that captures the process and organisation of collaborative interaction and its contribution to learning:

'Methods should be developed not only for capturing processes and outcomes of learning, but also experienced effects and individual interpretations of participation in CSCL settings.' (Hakkinen et al., 2003, p.402).

The aim of this kind of research is to provide a more complete picture of NL processes. We think it is important that this research is focused on the central processes of NL, that is: learning and teaching. We believe that these understandings will contribute to the development of better pedagogical frameworks and software that more effectively support learning and tutoring through pedagogical design. We have developed a multi-method research framework to study NL processes by making use of social network analysis (SNA) to find out 'who is talking to whom', content analysis (CA) through coding teaching and learning activities to find out 'what they are talking about', and context analysis (CxA) focusing on the experiences of the participants to find out 'why they are talking as they do'.

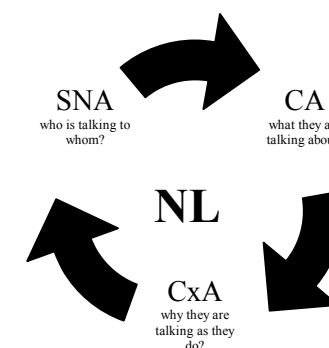


Figure 1. Multi-method research framework for studying networked learning.

These three methods are used to triangulate and contextualise our findings and to stay close or connected to the first-hand experiences of the participants themselves (De Laat et al., 2005).

To find out *who is talking to whom* we used SNA to study the way people participated and interacted with each other. Logged information from WebCT can be stored away in a case-by-case matrix (based on writing and responding activities) to analyse interaction patterns. We used UCINET (a SNA package) to make the visualisations of the relationships within the network. For this study we chose a sociogram representing the connections between the participants and its direction of ingoing and outgoing messages (Wasserman & Faust, 1997).

The following step of our analysis was concerned with finding out *what they are talking about*. The central purpose of content analysis (CA) is to generalise and abstract the complexity of the original messages in order to look for evidence of learning and tutoring activities. In order to probe collaborative NL (learning and tutoring) we 'coded' the contributions using two coding schemas (De Laat & Lally, 2003).

The first coding schema, developed by Veldhuis-Diermanse (2002), was used to code units of meaning that were regarded as 'on the task', focusing on the learning processes used to carry out the task. This schema includes four main categories: cognitive activities used to process the learning content and to attain learning goals; metacognitive knowledge and metacognitive skills used to regulate the cognitive activities; affective activities, used to cope with feelings occurring during learning, and miscellaneous activities. We decided to exclude miscellaneous category in our analysis since we are interested in the evidence of learning activities. The second schema is used to code units of meaning that are 'around the task' where the focus is on tutoring (Anderson, Rourke, Garrison & Archer, 2000). This schema includes three main sub-categories: design and organisation, facilitation of discourse and direct instruction. Our intention here was to attempt to reveal the ways in which the participants were facilitating and regulating each other's learning, while undertaking the workshop project task. Codes were assigned to parts of messages based on semantic features such as ideas, argument chains, and topics of discussion (Chi, 1997). Capturing these activities using strict syntactic rules was not possible because of the elaborate nature of a discussion. We chose to use NVivo software to help us partially automate this process: to highlight segments of the text with coding that we claim represents a particular learning or tutoring activity. In effect, these coded segments were our units of meaning. NVivo was also used to conduct searches of the coded data, in order to produce summary tables (see Tables, below). To determine our inter-coder reliability we firstly, for each coded message, checked to see if the codes assigned by the two coders referred to the same parts of the message (i.e. the same units of meaning). Secondly, we checked to see if the two coders had assigned the same codes to each unit. Based on a 10% sample of all the messages coded by the two researchers, a Cohen's Kappa of 0,86 was established.

The final step of this study aimed to highlight students' experiences as a way to find out *why they are talking as they do*. CxA can be done using several techniques, like interviews, critical event recall (CER), thinking out loud (TOL), course evaluation forms, student diaries, etc. Student self-assessment reports were used in this paper to collect information about the student experiences. These reports were organised around the following topics; product achievement, communication skill, social relationships and reflective skills. The students were instructed to reflect on their NLC experiences and to read through the messages to recall the entire event. They were also to make references in their self-review to particular messages to substantiate the issues addressed in their reports.

Results

Starting with SNA analysis (see Figures 2 and 3), it is clear that participation over time is dynamically changing, and within both groups the participants are more interconnected in the middle phase than in the other two phases. In group one the overall tendency is to act as a group; there are central and peripheral participants, but the interaction patterns are not centralised (a star shape) around a few 'dominant' participants. Brian, for instance, moves to the side after the beginning phase. Danton stays relatively central but moves to the side in the ending phase, whereas Anka (for instance) takes a central position. Mort, after being silent in the beginning, starts making modest connections with the group. Ryan, though rather active throughout, makes a strong appearance in the middle phase alongside Mary.

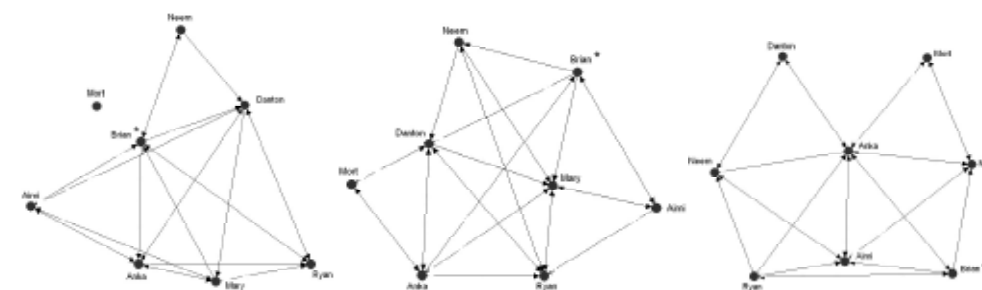


Figure 2. Interaction patterns of Beginning, Middle and End phase of Group 1 (Note: pseudonyms are used here and in the rest of this paper. An * symbol denotes the university-designated tutor in all figures and tables).

Group 2 shows a different dynamic. The interaction seems to change more drastically throughout the phases. In the beginning the interaction is rather centralised around three participants (Kiel, Calvin and Amani), where the middle phase is characterised by a more overall group structure. The ending phase seems to be organised around a few participants who are 'still' actively involved, and some participants (including the teacher, Seline) have not made contributions at all (note that this data is only a sample of 10 days in each phase). Amani keeps a central presence over the entire period, and so does Monique. Alan gets more involved as the project moves on, where Kiel steps relatively aside in the ending phase.

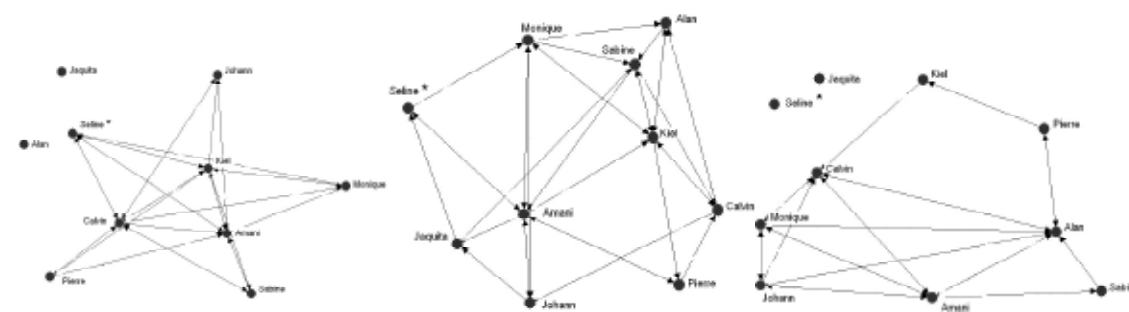


Figure 3. Interaction Patterns of Beginning, Middle and End Phase of Group 2.

In Tables 1- 6 we present summary tables of the CA to identify learning and tutoring processes in Brian's group. One of the general outcomes of Group 1 is the strong increase of learning activities in the middle phase (while the tutoring activities stay relative stable), only to decrease in the ending phase. There is a strong increase of both cognitive and metacognitive units coded in the middle phase. Affective learning activities remain relatively stable throughout, indicating a continuing expression of group feelings about their learning processes. Among the tutoring activity, there is a strong tendency for group members to facilitate each other, as well as to engage with the instructional design (though this decreases towards the end). Anka and Aimi contribute extensively for both learning and tutoring. Mary behaves similarly, but her engagement drops in the ending phase. Danton is more active as a learner (beginning and middle); Ryan and Mary develop a strong interest for the learning task in the middle, and Neem starts to get heavily engaged for both learning and teaching.

Table 1. Units of Meaning Coded for Learning Processes During the Beginning Phase of Group 1.

Beginning Phase									
Type of Learning Process	Learning Processes of Individual Community Members								Total
	Brian*	Ryan	Mary	Danton	Anka	Aimi	Neem	Mort	
Cognitive	5	2	4	4	6	1	2	0	24
Affective	3	1	4	4	3	0	0	0	15
Metacognitive	1	0	4	2	3	2	1	0	13
Total	9	3	12	10	12	3	3	0	52

In the beginning phase it is evident that, except for Mort, all the participants are in some way engaging with learning activities and conceptualising the task ahead. Danton, Mary and Anka are the strongest contributors. One can say that all activities are equally spread over the participants. Among the members there is a strong emphasis on making cognitive (46%) statements to each other (debating ideas, using and linking new information). 29% of the coded units are affective, i.e. emotional responses to options of other students' task content, and 25% of the codes refer to metacognitive units. It is interesting to see that Brian, the teacher, is present with respect to the learning processes.

Table 2. Units of Meaning Coded for Learning Processes During the Middle Phase of Group 1.

Middle Phase									
Type of Learning Process	Learning Processes of Individual Community Members								Total
	Brian*	Ryan	Mary	Danton	Anka	Aimi	Neem	Mort	
Cognitive	0	11	21	8	19	7	5	4	75
Affective	0	8	4	4	3	7	6	3	35
Metacognitive	0	16	10	1	4	5	15	1	52
Total	0	35	35	13	26	19	26	8	162

In this phase all the learning activities have increased for all the students of this group, though compared to the previous phase the cognitive and metacognitive units have made a strong increase. At this point the participants are discussing and reflecting on their task. Mort has started to get involved while Brian stopped making contributions to the learning task of this group. With respect to cognitive contributions, both Mary and Anka increased, as well as Ryan to some extent. Affective units increased as well and were coded across the group. Ryan, Mary and Neem started to make metacognitive statements, reflecting on the content and keeping clarity in the discussion.

Table 3. Units of Meaning Coded for Learning Processes During the Ending Phase of Group 1.

Ending Phase									
Type of Learning Process	Learning Processes of Individual Community Members								Total
	Brian*	Ryan	Mary	Danton	Anka	Aimi	Neem	Mort	
Cognitive	0	2	2	0	4	8	0	1	17
Affective	3	2	5	1	4	1	0	4	20
Metacognitive	0	0	2	0	3	2	0	0	7
Total	3	4	9	1	11	11	0	5	44

In this phase both the cognitive (39%) and metacognitive (16%) coded units have dropped considerably, while the affective learning processes increased (45%), indicating that the learning task is coming to an end and the group is mainly commenting on the work they have done. It seems that during this phase, it is mostly Anka, Aimi and Mary who are engaged in learning activities, and also Brian has started to get involved again, making affective statements about the learning of the group.

Table 4. Units of Meaning Coded for Tutoring Processes in the Beginning Phase of Group 1.

Beginning Phase									
Type of Tutoring Process	Tutoring Processes of Individual Community Members								Total
	Brian*	Ryan	Mary	Danton	Anka	Aimi	Neem	Mort	
Direct Instruction	7	0	2	0	5	5	0	0	19
Facilitation	11	11	11	5	15	8	3	0	64
Instructional Design	9	8	12	1	15	8	1	0	54
Total	27	19	25	6	35	21	4	0	137

With respect to tutoring activities in the beginning phase, Brian, Mary and Anka are, again, the strongest contributors. Direct instruction (14%) is taken up mostly by the teacher, though two students (Anka and Aimi) were involved in this as well. Also a few of the participants, again, Anka and Mary, were more involved with the instructional design (39%) of the collaborative project. This might suggest that within the group Anka and Mary were concerned mostly with organising the group's activity, while almost all the participants were engaged in facilitative activities (47%) towards each other.

Table 5. Units of Meaning Coded for Tutoring Processes in the Middle Phase of Group 1.

Middle Phase									
Type of Tutoring Process	Tutoring Processes of Individual Community Members								Total
	Brian*	Ryan	Mary	Danton	Anka	Aimi	Neem	Mort	
Direct Instruction	6	0	1	0	1	0	2	0	10
Facilitation	9	15	16	4	11	5	12	4	76
Instructional Design	3	11	8	2	4	11	13	4	56
Total	18	26	25	6	16	16	27	8	142

Tutoring in this phase stays relatively unchanged (Direct instruction (7%), Facilitation (53%) and Instructional design (40%) activities). Neem has started to take a strong tutoring interest (from 4 to 27) as well as Mort to some extent, while Anka was more focused on learning activities during this phase, similarly with Danton and Aimi.

Table 6. Units of Meaning Coded for Tutoring Processes in the Ending Phase of Group 1.

Ending Phase										
Type of Tutoring Process	Tutoring Processes of Individual Community Members									Total
	Brian*	Ryan	Mary	Danton	Anka	Aimi	Neem	Mort		
Direct Instruction	1	0	0	0	1	1	2	0		5
Facilitation	8	7	5	3	17	21	2	5		68
Instructional Design	2	2	4	0	4	5	1	0		18
Total	11	9	9	3	22	27	5	5		91

During the last phase tutoring activities went down in general, but also the contributions made within the group were less equally spread. Only Anka and Aimi are making a strong tutoring input, especially with respect to facilitation. Their engagement on both learning and tutoring is also supported by the SNA patterns in this phase, where they appear as central participants.

Tables 7-12 show the results of CA for learning and tutoring processes in Seline's group. In general, we can see a similar pattern in this group, as both learning and tutoring contributions increase in the middle phase. There is a strong increase of both cognitive and metacognitive units coded in the middle phase. Affective learning activities remain relatively stable throughout. Among the tutoring activity, there is also a strong tendency to facilitate each other (with a high peak in the middle), as well as to engage with the instructional design, again with a peak in the middle phase. In contrast to the other group, the contributions made here seem less equally spread over the participants, and participation changes considerably between the phases; the tables clearly show a low (or no) contribution to the learning of the group by most of the participants (again at different stages) and a stronger involvement with tutoring in general. Overall, both Amani and Monique are strong contributors, on learning and tutoring activities. Learning contributions in this group mainly seemed to be coming from Sabine, Calvin, Monique and Amani in the beginning; from Monique, Amani and Kiel in the middle, and from Calvin, Monique and Amani in the ending phase. With respect to tutoring it seems that Sabine, Calvin, Monique and Amani take the lead in the beginning, especially Amani and Monique who take this forward in the middle, together with Sabine, Kiel and Jaquita. In the ending phase most of the tutoring is undertaken by Amani, Monique, Calvin and Alan.

In Table 7 we can see that 23 (30%) units were coded for cognitive statements, and Sabine and Monique are mostly involved with this activity. Metacognitive processes are the largest category (31), representing 41% of all coded units. At this stage of the activity the group is still in the process of establishing relationships as a working group, and trying to understand and conceptualise the collaborative task it is about to undertake. Although SNA revealed that in this phase a few participants are central and there is not much communication between the participants as a whole.

Table 7. Units of Meaning Coded for Learning Processes During the Beginning Phase of Group 2.

Beginning Phase											
Type of Learning Process	Learning Processes of Individual Community Members										Total
	Seline*	Sabine	Calvin	Monique	Pierre	Amani	Johann	Kiel	Jaquita	Alan	
Cognitive	0	7	2	7	3	3	0	1	0	0	23
Affective	2	6	5	5	2	2	0	0	0	0	22
Metacognitive	0	6	10	1	3	9	0	2	0	0	31
Total	2	19	17	13	8	14	0	3	0	0	76

Table 8. Units of Meaning Coded for Learning Processes During the Middle Phase of Group 2.

Middle Phase											
Type of Learning Process	Learning Processes of Individual Community Members										Total
	Seline*	Sabine	Calvin	Monique	Pierre	Amani	Johann	Kiel	Jaquita	Alan	
Cognitive	0	6	0	11	0	34	4	7	4	1	67
Affective	0	0	1	2	0	12	2	0	4	0	21
Metacognitive	0	0	0	19	0	27	0	5	1	0	52
Total	0	6	1	32	0	73	6	12	9	1	140

In the middle phase Amani makes a very strong contribution to the learning of the group, which makes her stay at the centre of this group's interaction. Overall the units coded during this phase were contributed mainly by Amani and Monique, suggesting they were more or less working together during this phase. Contributions of Calvin and Sabine decreased while Jaquita started to join in (9 units were coded).

Table 9. Units of Meaning Coded for Learning Processes During the Ending Phase of Group 2.

Ending Phase											
Type of Learning Process	Learning Processes of Individual Community Members										Total
	Seline*	Sabine	Calvin	Monique	Pierre	Amani	Johann	Kiel	Jaquita	Alan	
Cognitive	0	0	6	2	0	12	3	0	0	2	25
Affective	0	0	4	8	0	2	0	0	0	3	17
Metacognitive	0	0	1	2	0	7	1	0	0	0	11
Total	0	0	11	12	0	21	4	0	0	5	53

Whereas in the other group we saw Brain reappearing in the discussion, no learning and tutoring units were coded for Seline. The group structure has changed again compared to the beginning and middle phase (see also Figure 3). For Sabine and Kiel (who were making learning contributions in the previous phase) no units were coded, while the opposite behaviour can be seen for Calvin who reappeared (both cognitively and affectively), as well as Alan who started to make a strong appearance in this phase. Whereas Jaquita seemed to have disengaged with the learning discourse again.

Table 10. Units of Meaning Coded for Tutoring Processes in the Beginning Phase of Group 2.

Beginning Phase											
Type of Tutoring Process	Tutoring Processes of Individual Community Members										Total
	Seline*	Sabine	Calvin	Monique	Pierre	Amani	Johann	Kiel	Jaquita	Alan	
Direct Instruction	7	0	1	0	0	3	0	0	0	0	11
Facilitation	6	7	14	10	3	13	5	5	0	0	63
Instructional Design	3	5	10	4	1	17	0	4	0	0	44
Total	16	12	25	14	4	33	5	9	0	0	118

Tutoring processes, as indicated by coded units of meaning, are dominated by facilitation at this stage of the activity (see Table 2: 63 units [53% of total]). Considerable group processing is also devoted to instructional design (44 units, 37% of total) as members of the group help each other to be organised for the task ahead.

Table 11. Units of Meaning Coded for Tutoring Processes in the Middle Phase of Group 2.

Middle Phase											
Type of Tutoring Process	Tutoring Processes of Individual Community Members										Total
	Seline*	Sabine	Calvin	Monique	Pierre	Amani	Johann	Kiel	Jaquita	Alan	
Direct Instruction	3	0	1	0	0	5	0	1	0	0	10
Facilitation	1	8	2	33	4	60	5	11	6	1	131
Instructional Design	0	4	2	15	1	35	1	2	6	3	69
Total	4	12	5	48	5	100	6	14	12	4	210

The students for whom learning activities were coded (Sabine, Monique, Amani, Kiel and Jaquita), also contributed as tutors during this phase. Facilitation (62%) processes are dominating (again Amani makes a very strong contribution here) but there is also some activity on instructional design (33%).

Table 12. Units of Meaning Coded for Tutoring Processes in the Ending Phase of Group 2.

Ending Phase											
Type of Tutoring Process	Tutoring Processes of Individual Community Members										Total
	Seline*	Sabine	Calvin	Monique	Pierre	Amani	Johann	Kiel	Jaquita	Alan	
Direct Instruction	0	0	0	0	0	1	1	1	0	0	3
Facilitation	0	3	7	13	3	12	8	2	0	8	56
Instructional Design	0	3	9	4	1	6	5	1	0	2	31
Total	0	6	16	17	4	19	14	4	0	10	90

Here, again, we see a similar shift in contributions, as described in the previous phase and the learning activities of this phase. Some active participants of the previous phase (Seline, Kiel and Jaquita) made way for others (Calvin and Alan). The main focus of the tutoring discourse was on facilitation (62%) and instructional design (34%).

The overall patterns emerging from these summary tables indicate that Group 1 shows a relatively stable and continuous contribution pattern by their participants, whereas in Group 2 each phase seems to have different participants, either moving away or back to the centre of the learning and tutoring discourse. The teacher in this group has been gradually fading out of the discourse. Two participants stayed central throughout the entire period (Monique and Amani) which might suggest that they were collaborating on the project together quite closely throughout.

Turning now to the analysis of self-assessment reports, the following section represents statements from the students about their experiences.

In Group 1 Brian (a more experienced teacher on this M. Ed.) applied a 'proven to be successful' framework to teach this course, building in advanced organisers to support emergent community learning or to act as scaffolding, available for the students when needed (De Laat et al., 2005). The tutor in this group had more experience of NL, knowing when to intervene, and when to let the group support itself as it progressed with its task.

Aimi, who made considerable and consistent learning and tutoring contributions throughout, commented that when working on the product:

"Initially I found it difficult to find material but found websites posted up by Ryan and Mary helpful.

"Brian's comments were helpful and were important in helping me achieve my goals and allowed us to expand the project area."

Anka had a similar contributing style and reported that:

"My participation during the project was persistent, corresponding to problems that could arise, constantly providing ideas and research results."

"I participated in the exchange of information and asked for consensus from my partners, before making any conclusions, appreciating that the opinions and ideas of other persons, could have a valuable and positive influence on my thoughts."

Danton, who seemed to be more engaged with the learning rather than tutoring, commented:

"I think that I was a bit reactive rather than proactive in deciding what we were going to do. I didn't offer my own ideas for a project title or area within which we should work, but rather saw what others had suggested and voted for which one I thought would be most interesting to me."

"I don't believe that I acted as a real team member. I did meet deadlines, but I feel that I would have been more able to build on comments and ideas from others had I been present more often during a crucial part of the project."

Ryan, who was mostly active in the middle phase, indicated that:

"I started a discussion thread with some ideas but realised that Neem had developed some ideas already and in more detail. We conversed regularly and commented on each other's initial work to help shape our contribution."

On the aspect of group communication and social relationships, Aimi reflected she tried to be supportive to the group:

"In order to ensure that everyone understood what we were doing, I tended to try and summarise where we were and who was doing what."

"At first, in discussions about the product I made suggestions, but found that when there were no answers to my postings (even disagreements would have been nice), I became frustrated and tended to take more of a back seat in making major decisions. In retrospect, perhaps I should

have communicated these feelings to the group.”

Anka commented upon the:

“...friendly and collaborative atmosphere created by all the members. I felt responsible for the progress and the wealth of the whole group. This kept me highly motivated.”

At the same time she found it more difficult to maintain relationships:

“This is an area that I consider myself to be weaker, as well as the area of being reflective. During the project I focused more on the aspects that had to do with the process of our work (like organisational issues, exchange of ideas, development of proposals).”

Danton, who is used to working alone, commented:

“I was never at any point overtly encouraging, avoiding being extremely patronising, aside from comments like ‘I think that is a good idea’, I praised no one.”

“I feel that I work better alone and that this has been made evident to the others.”

Ryan stated:

“At times I was getting lost with conversations and whilst I think the learning set has developed social relationships over the last few months, it still seems to be on a ‘work’ level rather than on a ‘social’ level.”

Reflecting on the overall experience, Aimi commented:

“I feel I have learned more about how I cope in situations where I feel I do not know people. For example instead of making a comment about how I felt I became quiet. This I found looking through a lot of the postings, was a common coping mechanism of mine – I tended to rant and rave offline (as it were). I have found this interesting, as normally I make my feelings known and always put my point of view across.”

According to Anka:

“More effort on summarizing attitudes and behaviours, analysis of the group’s behaviour and expression of this analysis, could have made the whole collaborative procedure more qualitative and group’s cooperation more effective.”

“At the same time, I observed my reactions and I found out that sometimes I acted with stress and panic, while some other times, I focused too much in the process and tended to neglect the feelings and the problems of my partners. Somehow, looking at the list of my messages, I found out that I hesitated very much to express such reflective thoughts in the discussion threads.”

Danton, reflected:

“Feelings of guilt for not being around throughout the project could be alleviated by better time management. I have learned that it is extremely important to stay in touch with others to fully

benefit from (and, obviously, contribute to) the learning process.”

In the second group, the beginner teacher (Seline) felt overwhelmed by the experience and wondered about her role, and whether she had the skills to teach online. Amani, who was a strong contributor (learning and tutoring) throughout commented that:

“At the start, Seline gave reassurance of her confidence in our ability, and offered direction. The group worked extremely effectively at the start, skills were coming to the fore, and my enthusiasm and a degree of awesome fear got me moving.”

Monique, was concerned that finding a way to collaborate was a real objective of participation:

“I created a schematic of roles/tasks/due dates to activate the members to volunteer and dialogue. With everyone’s efforts, most especially the clarifications provided by Calvin, Amani and Kiel in the area of setting up the organisation of our work, we refined this to firm-up an excellent framework

Alan, who contribution intensified as the project developed, reflected that his:

“...achievement was the design and build of the website. It was the area I was most comfortable in tackling and felt that I could build the trust lost by doing a good job.”

Sabine, who became less engaged during the course mentioned:

“I participated in the group discussion and I co-wrote the staff-role section of the assignment after reading the suggestions put forward by both Pierre and Seline.”

“I did regret that I suggested a website because I learnt how hard it is to design a site and failed to anticipate a limited contribution due to a change in home circumstances”

Amani commented on communication and social relationships. She saw herself as a group supporter (which is supported by the relatively high tutoring codes):

“One difficulty related in understanding Jaquita’s initial approach to analysing task design. This was the nearest we came to a misunderstanding, and sorting this out required a mediator, a role which I seem to have assumed”

Monique’s communication style was positive:

“Helping them [the group] cope with their own tensions, Alan was responsive in saying I helped brighten his day in one thread. I even composed a song for our set to help diffuse what I thought were tensions among the members!”

Alan commented that:

This project, more than the previous meet-and-greet activities, made us work together and develop our online personalities. Throughout the project I felt responsible to the group and wanted to make that effort. I felt that good relationships were made with several group members and a ‘bonding’ process started to develop. One can sense the real desire to do the best for each other.”

According to Sabine:

“It hasn’t been difficult to cultivate a friendly atmosphere in this group and this has been a very encouraging factor in my study. Though I often found the group’s collective indecision and eagerness to discuss minutiae in order to defer a decision very frustrating (similar to Alan). This led to a longing to have some action and an irritation with the progress the group was making. I have had to be much more tolerant than I would normally be and have tried to inject some humour into postings which were written when feeling irritated to take the edge off how I was feeling.”

When asked to reflect on the overall experience Amani commented:

“Roles chosen [by participants] reflected skills possessed. Kiel, Sabine provided web frameworks which enabled identity of content with format. Calvin, Monique and myself, each and variously, offered up systems for planning and organisation. Sabine, Jaquita and Monique’s incisive thinking, Alan’s web skills. Johann helped pull it all together along with Calvin and myself.”

Though she also found that she would:

“...need to stand back more and allow the process of group-thinking to take its course. I wonder what happens if people do not involve themselves and where the project goes, but maybe I need to learn more trust in others.”

Monique reflects:

“[I] observe others’ actions as well as my own, especially in the socio-emotional arena. “It is after going through the project I realised how deliberate one must be in forming a learning community in the VLE. However, it becomes fulfilling when you see others trying to make the relationship work in spite of technological challenges.”

Alan found:

The ending phase immensely rewarding. I feel it was the first real exercise that made me want to engage with the degree and the learning set as a whole [see Tables 9 and 12]. I am starting to feel more positive towards the whole thing, after wondering initially whether it was really what I wanted.”

Sabine often felt the following:

“I have been standing still, only to discover a few days later that I have indeed ‘learnt’ something, but that learning has not been immediately apparent.”

Conclusions and Implications for NLC

In this article we have presented and analysed the learning and tutoring experiences of students from two NLCs working on the same course and the same workshop. Despite there being a great difference in the way the teachers were participating in the two groups, there are no major differences found in the overall learning dynamics of the students within the groups. Both groups follow a similar pattern, where most of the activity (both learning and tutoring contributions) is found in the middle phase of the project. In both groups there are many cognitive, metacognitive and facilitative contributions emphasising the social nature of the learning – providing further evidence that participants are trying to be responsive and supportive to each other as a continual process of learning and group regulation (Light et al., 2000; McAlpine et al., 2004; Vonderwell, 2003). It seems that these activities are frequently occurring throughout the entire project, yet at different phases we see varying engagement. Groups tend to develop their own way of working together and create a rhythm that suits their circumstances (Wenger, McDermott & Snyder, 2002). Knowledge of participants’ activities as well as their engagement, in combination with their needs and desires, will help teachers (or moderators of web-based communities) to develop models and design for NL that provide the right kind of support when needed, adapted to the particular phase they are in. This way NL environments enables the learners to develop an open learning space for shared activity in which their learning is situated, where they connect ideas, share problems and insights in a constructive way with concepts they are already familiar with. As well as with new knowledge that is collaboratively constructed through their dialogues and social interactions online.

The course we have studied is designed to hand over many responsibilities to the community (EQUEL Position Paper, 2004), both in relation to the learning tasks, as well as coordinating and regulating tasks. The relative absence of the beginner teacher, and her insecurity, did not emerge in the students’ experiences as a central constraint upon their work. At the same time, and this emphasises the importance of a multi-method approach, participation patterns (based on SNA) between the two groups seemed rather different, Group 1 acted more as a stable group throughout, whereas in Group 2, participation differed from phase to phase and the involvement with especially the learning task was not equally spread amongst the participants. The second group (based on CxA) worked out an explicit framework of roles and responsibilities to support their way of working together. This suggests that this group was dealing with a lot of procedural issues while learning as a group. These findings imply that when developing models to support teaching and learning in NLCs, these dynamics should be taken into consideration. These are interesting emerging findings and further research is needed to study this potential relationship between teaching styles and group regulation by the students.

The self-assessment reports in combination with the other data inform us that NLCs are aware of creating this open learning space together and that it works because of a having shared activity that is clearly being negotiated. Students are self regulative and aware of taking on roles and discussing them amongst the group to make their collaborative learning successful. Teachers do need to provide support, process and content, but they can also hand over more trust to the groups instead of ‘worrying’ if things are okay. Staying tuned in and connected to the group’s process and work seems an important factor. It is important for both teachers and learners to develop insight about their learning and tutoring processes, as well as their experiences. It’s not just enough to know what they are talking about. We feel these findings indicate the need to apply a multi-method approach to contextualise and relate the findings as a way of developing a context to understand the complexity of NL. A context that should not only be available to researchers, NLCs should be provided (and create this themselves) with feedback on SNA, CA and CxA repeatedly during their activity as a way to reflect more strategically on their performance and make decisions on how to move forward.

Early research in NL was focused mostly on the overall processes or outcomes of participant or teacher behaviour, using coding schemes (Gunawardena, Lowe & Anderson, 1997; Henri, 1992), questionnaires or student feedback (McAteer, Tolmie, Duffy & Corbett, 1997). More recently there has been articulated a need for a mixed-method approach – sometimes with a preference for a combination of quantitative and qualitative approaches (Hakkinen, Jarvela & Makitalo, 2003; Hammond & Wiriapinit, 2004; Strijbos, 2004). However one aspect that has been largely ignored in NL research is the dimension of time. By focusing on the overall experience or processes of learning and teaching we are in danger of losing the development of this NL experience or how these learning and teaching processes evolve out of sight, over time. Conducting timeline analysis, in this case study by describing the beginning, middle and ending phase of NL activities is a way to address this. This research shows that: 1) when describing processes it is important to take into account that they are not static throughout time, but have different dynamics at various stages of the collaborative work. More detailed knowledge of this process helps researchers and teachers (or moderators) develop more refined models for support of NL. 2) a multi-method approach is not only a way of taking multiple perspectives but also a way of contextualising and building up an understanding of the activities that participants are engaged in, by using the outcomes of one method to further understand the results of next method. This way, a more complete understanding of the NL activities can be developed.

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Introduction

During the previous section we presented several studies in networked learning (see table 1 for an overview). It was our aim to address some of the complexities of researching networked learning theoretically, methodologically and empirically. The networked learning environment in the case of our study was designed, following the principles of community-based learning, so that participants are expected to participate in negotiating their activities, construction of knowledge, and building or cultivating their community. We presented findings of two case-studies on researching learning and tutoring processes in a networked learning community, partly as a way to develop a multi-method analysis to study the complexity of this networked learning environment. In this section, we would like to discuss how these two cases relate, as a way to identify differences and similarities between them and generate emerging themes.

Table 1. Overview of case-studies included in this thesis.

		Instruments			Focus of the study	Chapter
		SNA	CA	CxA		
Case study 1	NLC 1 (n=8)		√	√	Teacher	3
			√	√	Students	4
		√	√	√	Interaction patterns	5
Case study 2	NLC 1 (n=8)				Teacher, students,	
		√	√	√	interaction patterns	6
					Teacher, students,	
	NLC 2 (n=10)	√	√	√	interaction patterns	7

In order to undertake this exercise we will first present a short description of the outcomes of our first case study to provide a context against which the findings of the second case study can be contrasted.

In the first case study we saw, with respect to the content analysis, that the beginning phase was characterised by much cognitive activity (including the teacher).Two participants, in particular, actively contributed new information and debated some of the ideas suggested by the group members, but most of the other members were engaged in learning activities as well, trying to conceptualise their learning task. During this phase the teacher made most of the tutoring contributions, but he did not stand out, as all the other members were participating in this activity as well. The community was thinking about how to get organised as a group and discussed how to work together.

In the middle phase a different pattern was discerned. The cognitive learning activities increased even more and clearly became the dominant category of the learning processes. At this point in the workshop, participants are often thinking, and discussing the concepts of the task itself. During this period the teacher moved away from the centre, handing over the responsibility to the group. One person in particular started to compensate for this and made a significant contribution of facilitation, trying to regulate the group processes. During this phase we saw that instructional design decreased and that facilitation went up, suggesting that during this phase there is little need to further discuss their roadmap, and the attention is drawn towards encouraging and supporting each other to work on their project.

In the ending phase there is a drop in cognitive learning activities and in relative terms there is a rise of metacognitive activities. The group task is coming to an end and the participants are moving away from thinking ‘on the task’ and starting to discuss other matters not directly related to their task. Also during this phase the teacher started to make contributions to the group again, though most of them are related to regulating the group processes, trying to coordinate the round-up of the collaborative project of this community. In this phase the teacher is responsible for most of the tutoring activities.

Overall we have seen that the teacher acts asboth a learner and teacher, although his input into the group is mainly in the beginning and ending period of the project. All the students, though with varying intensity, are engaged in the project work. However, some individual profiles are discernible in these coding values. Some students appear to be task focused while others are deeply engaged with regulating the overall group processes. Social network analysis identified some central-acting participants, but also showed that these are not necessarily the same members for each period. Group cohesion proved to be stable over the entire collaborative project, the members were well-connected to each other, indicating that this community was working closely during the entire project. This finding was supported by the sociograms. The interaction patterns between the participants for each period were visualised, and thus revealed the dynamics of the group. Movements of individual members towards the centre or periphery of community activity were identified and can be used to seek further explanation for this behaviour or to contextualise previous findings about networked learning activities. A synthesis of these findings with the outcomes of the content analysis shows that although some central participants remained their position in the network, the nature of their contributions has changed, assuming a different role on the community or developing different interests during their collaborative work. It also indicated that increase or decrease of learning or tutoring activities are related to moving from or towards the centre of the group. These findings helped us select and direct the focus of the critical event recall interviews.

Critical event recall interviews with the teacher and the students, based on their participation in this community and the outcomes of the content analysis, helped us understand the emergent group structures and roles developed spontaneously through their engagement with this project. Through critical event recall we could probe into the thinking ‘behind the text’ and find some explanations for the complexity of the relationships the participants are engaged in. The teacher revealed his pedagogic thinking about his role as a tutor in this community. His strategy was to be active in the beginning and ending period and give the space to the group during the middle phase. Though keeping closely connected to wherever the discussion was going, ready to facilitate whenever necessary. He was concerned to maintain balance and integration within the group, assist socially oriented processes of learning and tutoring, and foster collaboration among group members. The teacher explained for example some of his behaviours as trying to ‘balance out’ the group activities, driven by his concern that one of the group members was acting very strongly in the beginning, trying to direct the group towards his preferred direction, without leaving space for the other participants to have a voice. Amongst the students, the critical event recall interviews were aimed at exploring some of the complexities of emergent role developments, behavioural strategies and group awareness. One of the participants was slow to become involved in the group but he watched group processes carefully. He was initially concerned with his own need to complete the task, but developed an increasing awareness that this could be enhanced by a more careful management of group processes. This was a skill he observed others using in the community. Another participant watched the group very carefully

from the beginning, aimed at understanding the needs and behaviours of the other group members, and used this to facilitate her own learning goals as well as the goals of the group. A third student was mostly driven by his own professional (work) agenda, which led him to bring in ideas and tried to focus the community (especially in the beginning) on this particular work-related problem. When this failed, his role in trying to regulate group processes decreased during the middle phase and focused on the learning task of the project until he partially withdrew in the ending phase, only making a small contribution. All three students expressed feelings of some uncertainty about themselves and their role in the group collaboration. One of the reasons for this might be that these roles or individual participation profiles were never explicitly discussed amongst the group, but were implicitly assumed, based on their individual styles and strategies of acting in this community.

Group learning is dependent on the contributions of its members. This case study showed that these members have different interests, agendas, and abilities in regulating the individual as well as the group learning processes. It also shows that collaborative learning is not a static activity throughout the entire project. Different stages have their own focus and dynamics; in the beginning, the groups try to design a way of working together, as well as starting to get a grip on the nature of their task. During the middle, the activity is highest of all phases, focused on doing the project work and keeping each other motivated. In the end, the group develops a more reflective working attitude with the aim to wrap up their project. All these factors contribute towards a unique blend of collaborative learning in a networked learning community.

The second case study, in which we included two NLCs, shows some overlap with the general patterns we found during our first study, most of the differences are concerned with teacher involvement and the intensity and the ability of the group to learn collaboratively and regulate their group processes. The research setting remained fairly constant, although the studies included different students and teachers, the networked learning pedagogies for design and structure of the environment and general principles used to support teaching and learning remained the same. Also the groups worked on a similar collaborative learning task for a similar length of time. Group size was roughly the same (case study 1: $n=8$ and case study 2: $n=8$ & $n=10$), but we found no indicators in our data that this might have had an impact on group performance.

We will start off with describing some of the similarities between these different communities. Across the studies we found that the summary tables showed a similar pattern. Overall the groups start off with a high number of learning activities, with a strong 'favour' for cognitive contributions. This high number of learning activities is consolidated in the middle period, with a (relatively) further rise in cognitive activity amongst the members of the community. Affective statements about their learning are present throughout but never dominated the discussion. Similar patterns were found for the tutoring processes in the communities. Facilitation is the most frequently coded activity, with a rise in the middle. In two groups (Case study 1 and Group 2 of Case study 2) we saw that during this phase, one person took the lead in facilitating group processes. Instructional design is the second most frequent activity, with the exception that in Case study 2 the emphasis on instructional design is more in the middle phase, whereas in Case 1, the community was more involved with instructional design processes in the beginning phase.

In all the groups, the teachers' involvement was focused more on tutoring activities than learning activities; though the teachers were engaged in both these activities.

In all the groups we found that the middle phase is the phase where the participants are most active and the ending phase is the period with the least activity. From the studies on group cohesion and connectivity, we also found some similar patterns across the networked learning communities. In the be-

ginning and middle phase the density of the group remains roughly the same with a drop towards the end (with the exception of Group 1 in Case study 2, that keeps the group density stable throughout the entire project). The groups also showed changing interaction patterns over time, evolving around core members who take active charge during particular stages of their collaboration for either tutoring and/or learning processes within the community. In none of the cases was there someone dominating the discussion or the formation of subgroups working in isolation.

Contextual analysis (critical event recall and students' assessment reports) showed that participation in networked learning communities is a delicate process where participants are trying to be responsive and supportive to each other as a continual process of learning and group regulation. These activities are frequently occurring throughout the entire project, yet at different stages we see varying engagement by community members. They tend to develop their own way of working together and create a rhythm that suits their own circumstances. The communities seem very engaged in tutoring processes and are able to actively take ownership of their own learning tasks and agendas without drawing heavily on the teacher as a general source of inspiration and guidance. Even in the second group of Case study 2, where the teacher felt overwhelmed and unclear about her role, the students made no statements about missing teacher guidance or support.

At the same time we want to point out that these social structures tend to remain implicit and are spontaneously managed by the members that embody certain roles or are attributed to them, based on the profile they have developed in the group. The use of contextual analysis, like critical event recall, seems crucial to understand the observed processes emerging through the other methods. This way participant intentions and experiences can be explored. Contextual analysis across the groups also revealed that although the participants were working on group tasks, most of them were concerned with their individual learning goals and outcomes, using fellow group members to exchange ideas reflecting on their tasks, as well the group processes. The studies clearly showed that in a networked learning environment both the teacher and the students are engaged in learning and tutoring activities. During these workshops we saw that various roles to coordinate and structure their learning and tutoring activities emerged spontaneously within the groups.

Some of the differences we would like to report are found in the way the teachers were moderating their communities. Between Case study 1 and 2 there are some subtle changes in the way the experienced teacher thought about his own behaviour. In the first study he indicated to be concerned with group facilitation and making sure the group was going in the right direction, keeping a close watch, ready to 'intervene'. During the second study he speaks more of subtlety building in a framework through his messages, ready for the group to pick up when necessary. His style advanced from trying to correct group behaviour through facilitation, to providing scaffolds, for the group to be emergent in their learning. This teaching style was rather different from the beginner teacher who clearly had not yet developed such a finely tuned model and understanding of this course. She was struggling to develop a method to provide structure and guidance for the community, and her participation was gradually fading. Whether or not this has directly influenced the way this community was able to carry out their collaborative project is unclear, but the findings indicate that collaboration and connectivity in this group was less structured. The contributions made seem to be less equally spread over the participants, and the participation changed considerably between the phases. The summary tables of this group clearly show a low contribution towards the learning of the group of most of the members (again at different stages), and a stronger involvement with tutoring the group, while the other two groups have shown a more stable and continuous contribution pattern by their participants. The second group in contrast to the other two groups, worked out an explicit framework of roles and responsibilities to support their way of working together. This suggests that this group was dealing a lot with procedural issues while learning as a group.

To summarise our findings it seems appropriate to cluster them around several key outcomes that concern both case studies:

- Through content analysis and social network analysis we have seen that the students are actively engaged in collaborative learning activities. Through online conversation they are debating ideas and problems amongst each other, contributing new information referring or extending their discussion, making summaries, reflecting on content, as well as sharing 'social' experiences with their fellow group members that are or are not directly related to the task.
- Part of these collaborative activities is engagement with tutoring processes. Group regulation is something all the participants are concerned with. They motivate each other, develop an open learning climate, encourage each other to contribute, think and co-design course activities, develop tasks and plan and discuss group activities together.
- At the same time these collaborative learning activities tend to be driven by personal interest and learning agendas or goals individual students have. They try to put forward their own interests (or stimulate ideas of others who happen to advocate their interests) when the learning task is being conceptualised, and during the project the motivation to regulate and coordinate group processes is often motivated with their personal desire to get the task finished. Comments from fellow students were valued as a way to achieve one's personal goals.
- Engagement with tutoring and learning activities changes over time, but in all cases the activity is highest during the middle phase, where the focus is also drawn towards working on the task and facilitation of group processes. In the beginning they show elements of working on the task and setting up a group structure to support this (facilitated by the teacher). During the ending phase there is a relative increase of reflection on the task and a focus on facilitation and instructional design to coordinate the final phase of their collaboration. The teacher is mostly engaged in this as well.
- The teachers in this course act both as learners and tutors, though their main concern is to guide and facilitate the group's learning. The role of the teacher continues to have a status apart, being responsible for the overall coordination of the workshop and its educational goals.
- Yet in this open learning space we see that the (traditional) relationship between the students and their teachers is changing. The students don't just rely on guidance from the teacher, but value and provide support and guidance towards each other. The teachers, during the courses, try to set the stage in the beginning, provide guidance and reassurance to the group to support the group in developing their collaborative project. But at the same time their position is levelled with that of the students in order to create an open learning environment where everybody can participate in the development and design of their collaborative project.
- We found that students are developing roles and strategies to structure their collaborative learning. In two communities these roles remain somewhat implicit, but the second community of Case study 2, explicitly developed certain roles, tasks, and deadlines to coordinate their project.
- Over time we have seen that these roles are not necessarily inhabited by the same people. Each phase has its own configuration of people coming in and out of the centre. Though active participants mostly stay connected to or continue to be part of the centre of the activity, but might change their learning or tutoring style.
- This study has pointed out that students, who are undertaking a course designed around community-based learning principles, show elements of developing a learning agenda together, taking active charge and control over their learning activities and engaging in processes of helping out, supporting and facilitating each other. They develop social relationships in order to sustain their work on the learning task.
- Through participation they learn from each others learning strategies and styles. They develop awareness that their learning and task completion can be enhanced through managing the process-

es in the community. Through observation they develop an understanding of needs and behaviours of their community and use this to facilitate their own learning goals as well as the goals of the group.

The aim of this thesis was to describe how participants of networked learning communities learn collaboratively. Through our case-studies we have developed some empirical understanding of the learning and tutoring activities participants are undertaking at various stages of their collaborative project. Outcomes of this explorative research suggest that the groups in this particular course were able to develop some form of self-organisation that enabled them to learn together and work on their collaborative project. We think that when offering support or developing new designs for network learning it is important to let these roles and tasks emerge from the group's thinking about how they want to collaborate themselves. Therefore, in the beginning phase of the project, emphasis should be put on explicitly contextualising the project and its aims, as well as the learning goals and intentions of the students involved. Through this process they can build up a collective understanding of each others desires, commitment and work (or learning) preferences. In an open conversation where people express their interests, desired ways of working and sharing ideas around some kind of schedule, the group can develop a structure that is true to their own situation and deeply connected with the content of their task. Through this process of personalising the group structure we think ownership of the task by the group will be stimulated and it might also be easier to reflect on their learning and tutoring strategies throughout the entire project. This way the expressed feelings of uncertainty about themselves and their role can hopefully be addressed. The teachers can support this process by levelling their status and becoming one with the group, setting the stage in the beginning by opening up these conversations about self-organisation of the group and defining the focus of their tasks. Teachers can use their pedagogical framework and previous experiences to induce the students in this process and discuss openly with the students about how to work together and what to expect during the course. During this process the teacher can facilitate group processes and content, and assist the group to develop (and articulate) their own rhythm.

To assist the groups to reflect on their learning and group regulation, it will be helpful to provide them with frequent feedback on their performance. Information on participation and interaction patterns might help them to reflect on their commitment and connection with the group and seek explanations for peripheral or central participation. Information about the nature and quality of the content might stimulate the group to reflect on their learning agenda and seek collective understanding and consensus about their collaborative work done so far. This information might elevate the awareness in the group on how things are going and stimulate them to reflect and act on the way they have organised themselves. Emergent role behaviour and participation patterns can be used as a source of inspiration to further refine the social structure and integration of the group and try to balance out or equalise the contributions made to the collaborative project. Instead of enforcing some kind of ready-made structure and roles on the groups we think it is better to seek connection with the group's (natural) structure that emerges from this process and, when necessary, start making suggestions for improvement from there. Predefined roles might not always suit the group's needs and ability to learn. They can also be misunderstood or cause frustration and hinder the group process instead of facilitating it. Teachers can help each other by sharing their experiences of working on the course and how they deal with the complexities they encounter. They can share their mental models of the course to build a larger pedagogical framework within which the making of individual decisions for support, guidance, design, etc can be understood.

In our next section we will further explore the results of our case-studies through a process of synthesising findings of studies in networked learning research similar to our own research-settings and interests. This way we aim to connect our own findings with a larger body of research in this area.

Chapter 8

Questing for Coherence:

A Synthesis of Empirical Findings in Networked Learning Research in Higher Education

Abstract

In this paper a review of empirical educational research in networked learning is presented. The studies included in this review contain research in higher education with a particular focus on teaching and learning processes in asynchronous networked learning communities. The findings are synthesised around key themes; collaborative learning, the role of the teacher, teacher-student relationship, group regulation and pedagogical orientation, and participating in networked learning communities. The aim of this synthesis is to relate results in the field of networked learning, as a way to generate a larger body of work and to find new directions or developments in the field of networked learning research.

Keywords

Networked learning, higher education, asynchronous learning, collaborative learning, research review.

Introduction

In this paper we present a critical synthesis of findings in Networked Learning (NL) research. NL² is a relatively new academic 'inter-discipline' (see below for further explanation of this term). By NL we mean the use of internet-based information and communication technologies to promote collaborative and co-operative connections: between one learner and other learners; between learners and tutors; between a learning community and its learning resources, so that participants can extend and develop their understanding and capabilities in ways that are important to them, and over which they have significant control (Banks, Goodyear, Hodgson & McConnell, 2003, p.1). This paper has a specific focus on NL research that features pedagogies for asynchronous learning and working in Higher Education (HE) because asynchronicity is currently the principle mode of working (Hara, Bonk & Angeli, 2000), and Higher Education is a principle domain of NL activity. Our aim is to examine findings from studies on teaching and learning processes in NL communities, rather than those that focus on platform (VLE, Virtual Learning Environment) design or other technical issues. The reasons for this synthesis are threefold. First, to contextualise findings from our own extensive case-studies of teaching and learning processes in a particular NL Community (NLC). Our research is based on one or two NLCs in a particular online HE course and it is important to relate findings from this research with other findings of similar research projects studying similar circumstances. Secondly, the field of NL in itself is rather fragmented and shows characteristics of a field in its early stage of investigation based on empirical and conceptual work (Plass & Whelan, 2005); research in NL is often based on small-scale studies and is, as a consequence, in need of a synthesis or meta-analysis/review exercises. Research in NL will benefit from a synthesis of findings drawn from a wider range of studies, as a way to relate results and generate a larger body of work and to find new directions or developments, as well as gaps in the current research agenda. Also when this more generalised picture of research on teaching and learning processes in NL is painted, it will be easier to use this to reflect on how these findings relate to the theoretical and design principles currently being used in NL. However at the moment, for this third reason, it is too early to conduct this theory-praxis conversation; this will be a next step. First we need to build this synthesis, which is the aim of this paper. In this paper, we gather findings from 32 empirical studies in an attempt to provide a synthesis, engage in critical analysis, and construct an overview of recent findings in the NL pedagogy research literature.

Reviews of NL Research

NL is a relatively new field of research endeavour (Goodyear, Banks, Hodgson & McConnell, 2004) in which there is a relatively small body of empirical research. Much of this work is based upon theoretical perspectives such as social constructivism and social learning theory (learning communities) that have been employed in HE course design (Kirschner, Martens & Strijbos, 2004; Paavola, Lipponen & Hakkarainen, 2002; Simons, Van der Linden & Duffy, 2000). Recent reviews in the field have focused on the technology platforms available for NL (Eseryel, Ganesan & Edmonds, 2002; Jermann, Soller & Muehlenbrock, 2001), or on specific disciplines (for example, Management Learning: Kimber, 1996). Other significant reviews have had a very broad focus, covering learning outcomes, platforms and theoretical underpinnings in general (Lehtinen, Hakkarainen, Lipponen, Rahikainen & Muukkonen, 1999) and the use of the internet to deliver web-based learning (Plass & Whelan, 2005). However, none of these reviews has attempted to focus on particular elements of NL, here teaching and learning processes in asynchronous networked learning communities to cluster research findings.

De Laat, M.F., Lally, V., Simons, P.R.J., & Wenger, E. (2005). *Questing for coherence: A synthesis of empirical findings in networked learning research in higher education*. Manuscript submitted for publication

² Networked Learning (NL), a term more prevalent in the UK than the U.S.A. and continental Europe, has been defined as learning in which information and communication technologies are deliberately used to promote connections between learners in a community, their tutors and learning resources (Steeple & Jones, 2002) in order to enhance the efficacy of intended learning among members.

We hope that by providing an analysis of the emerging themes in the field, and commencing the task of developing some theoretical coherence, this review will assist in the advancement of NL research.

Method and criteria

Over the last five years, we have undertaken an extensive case study in NL. Our focus was on developing an empirical overview of teaching and learning activities conducted by participants (including the teacher) while engaged in asynchronous collaborative learning during a Masters course in education. The design of this course was based mainly on the idea that community-based learning principles provide an open learning environment where students can construct knowledge together (see De Laat, Lally, Lipponen & Simons, 2005, for a description of the design principles of this course). The aim was to create an open learning environment where the students have shared responsibilities, can take active control and lead their own collaborative learning agenda. They are encouraged to share knowledge, resources, experience and responsibility. The entire course is online and hosted in WebCT³. We were particularly interested in eliciting these learning and teaching processes from different angles (focusing on the discourse, participants' experiences and relationships) and how these processes evolve over time. As such we developed a multi-method approach, using social network analysis, content analysis, and contextual analysis, such as critical event recall interviews and self-assessment reports, to try to provide a more holistic account of this particular NL practice. The main findings were clustered around the role of the teacher and the students and their changing relationship (with respect to learning and teaching activities), emergent role development among the students, group collaboration, regulation and social and emotional support. Putting these findings in a timeline perspective (beginning, middle and end), we saw that each phase had its own characteristics. Participants' behaviour changes as their collaborative project progressed. The NLCs use the different qualities that participants' bring to their collaborative project as a way to get things done collectively. It is a continuously evolving community activity that requires constant negotiation by all its members and careful monitoring by the teacher.

Since most of our work was focused on our own case study, we thought it was time to relate our findings to a wider body of research, and hence try to develop a stronger and more mature empirical evidence base of NL. We wanted to describe the current understanding of the processes in which students and teachers engage while working in groups on collaborative tasks. In order to undertake this synthesis we employed a set of 'ground rules' to guide our search for relevant studies in NL. We deliberately focused on networked learning environments (using asynchronous conversation) where threaded discussion forums (like those commonly used in WebCT, Blackboard⁴, etc) are the main means by which the participants exchange messages over a pre-defined period of time. We focused on reports of research on courses that are part of an institutional HE programme resulting in a recognised qualification, where there is evidence of significant supervision or tutoring by a teacher, and where the principal focus of the studies is on exploring the teaching and learning processes or activities occurring in these courses. We excluded studies evaluating the development/design of courses or platforms, studies comparing online with face-to-face learning (including blended learning), and studies that focus principally on learning outcomes rather than learning processes.

³ www.webct.com
⁴ www.blackboard.com

One of our aims for this synthesis, as articulated above, was to contextualise our research findings. The ground rules employed here remain close to our own research setting and focus: describing asynchronous networked learning and teaching processes in HE practice. Our aim is to analyse current research findings; therefore we included not only peer-reviewed articles, but also conference papers, both kinds of writings published over the last 7 years. We used Endnote to carry out our search for articles, using the ERIC, Psychlit, and NCC online databases. The selection of conference papers was based on leading conferences on research in NL that uses a full paper submission policy with a peer-reviewed selection procedure. The reason to include conference papers was to include more recent findings in this synthesis (this explains why conference papers cover most of papers found in 2004). Based on the keywords 'higher education', 'asynchronous', 'networked learning' (or, 'online learning', 'collaborative learning', 'computer-mediated communication' or 'discussion forum') a first selection of papers was gathered. First, we filtered out articles that did not appear to be relevant to our study. Secondly, we reviewed the abstracts or conducted a more general examination of the paper to see if the ground rules apply, in order to decide whether or not to include the paper. As a result of this process a total of 32 papers were included in this synthesis (see Appendix 1).

A Synthesis of Key Themes in NL Research

In this section we will present a synthesis of the findings on research into learning and teaching processes in NL. The findings will be clustered around five main themes. In the first theme findings on collaborative learning will be presented. Most of the included papers argue that there is empirical evidence for collaborative learning and present detailed description of the student activities. Another theme addressed in many studies was the role and involvement of the teacher in asynchronous learning environments. Some studies have argued that NL learning changed the position of the teacher and the teacher-student relationship, which is discussed in the following section. The fourth theme concerns findings on the need for group structure and pedagogical guidance for NL. Most of the research in this theme covers descriptions on how students organise and coordinate their collaborative learning and how this is supported through familiarisation with the pedagogical orientation of the course. The final theme addresses participation in NL communities. Most of the included studies used learning in communities as the main design principle for their courses and some of the studies reflected on development of a community feeling during the collaborative learning task.

1. Collaborative Learning

In the literature there is disagreement over the meaning of the term 'collaborative learning'. This term seems to range from applying a division of labour in groups that learn together, to joint problem-solving and knowledge-construction with equal contribution from all participants (Dillenbourg, 1999). However, in the studies included in this synthesis, collaborative learning was used predominantly to describe a setting in which students are working in groups on a shared task or problem, in which they are expected to have equal contributions and participation. As such, the participants who are more or less at the same level within their university education, are assumed to have similar skills and competencies, so they have clear shared goals and are instructed to work together on their task using their asynchronous discussion forum.

Ten of the studies presented made explicit references to the term 'collaborative learning'. Three of these studies investigated the fundamental question: is collaborative learning taking place? Two studies focused on the motivational benefits for students participating in collaborative learning events; six studies presented findings on the detailed processes of student collaboration and the learning strategies they employed. Below we present the key findings on these aspects of this theme. In the field of NL there is growing evidence of the implementation of collaborative learning using asynchronous discussion forums. The studies indicate that participants in NL environments are learning

and constructing knowledge together. McConnell (1999) described networked 'collaborative' learning as an activity in which learners are brought together using the internet, with a focus on them working as a learning community, sharing resources, knowledge, experience and responsibility. In his case study on a university course, where small groups of students (up to eight) and a tutor work together to study the use of the internet and electronic communications in learning, McConnell reported that through analysis of transcripts it is possible to see participants' ideas and knowledge developing, to see them picking up other participants' and tutor's points and using them" (p.235). This evidence is supported by Vonderwell (2003) in her case study on exploring student learning experiences and the implications of asynchronous communication in an online discourse. She reported that asynchronous environments appear to help students to construct and express their ideas and that collaborative work helps them to reflect on the issues being discussed. It is also a way for students to learn from each other. Hammond and Wiriyaipinit (2004) reported that the groups in their study were active, the participants communicated with each other and commented on each other's work, but they also mention that the participants were reluctant to express disagreements.

Kear (2004) and McAlpine, Koppi, McLean and Pearson (2004) investigated students' motivation for collaboration, participation, collaborative learning, and tutor intervention. Kear concluded that a key reason for students to participate in collaborative work is to obtain help, information and guidance from others, in order to support their own learning. Students who use the conferencing system report that input from other students is more important to them than input from staff; that most of the help and guidance is provided by fellow students; and that both giving and receiving peer feedback was useful for their learning. McAlpine et al. (2004) contrasted research literature with user experiences in their study on NL as a way to understand and improve online courses. Based on reflective diaries, surveys and a focus group of students, they concluded that students are motivated to collaborate when they find it rewarding, when it leads to a process of sharing ideas among the group, and when it is possible to reach a deeper understanding of the topic together.

Most of the studies were concerned with describing collaborative learning processes and activities to build up an account of what students were actually doing, and what is successful. One study, for instance, suggested that collaborative learning works better when students focus on solving practical problems rather than having a theoretical debate (Ronteltrap & Eurelings, 2002). The last mentioned authors described collaborative learning as a way of creating a situation in which productive interactions between learners can be generated. In their study they explored the relationship between the learning environment (e.g., goals of collaboration, tasks), and learning behaviour (interactions), and reported that practical learning tasks result in deeper processing of information than theoretical learning tasks because they encourage more interactions between the participants. They argued that if cognitive activity and interaction are goals for a learning environment or an online course, it is advisable to design relevant tasks in the context of professional activities (Ronteltrap & Eurelings, 2002).

Hammond and Wiriyaipinit (2004) found that although the students were actively communicating, the most common learning activities (mentioned by the students) were associated with representing personal positions such as introducing, stating, reporting, analysing, clarifying, and agreeing; there was a marked lack of open interactive discussion. In their study on the use of learning strategies in discussion groups, Stefanou and Salisbury-Glennon (2002), indicated that students showed an increase in the use of rehearsal strategies, organisation strategies, critical thinking, time management, and use of peer learning and help-seeking behaviours in collaborative tasks. This is supported by Light et al. (2000), who found that collaborative communication was task-focused and geared towards the production of final reports. The communication was structured around interpreting an activity, planning, drafting and collating a group response. Schellens and Valcke (2002) also found that discussion groups in

collaborative activities were task-focused (on- and off task ratio was 80:20). Based on their study on collaborative learning processes and the influence of these on cognitive processing of information, they found that group interaction increases over time as do the interventions of each student; the group discussion leads to higher levels of knowledge construction. The nature of the communication also changed, as the learning task evolved; they reported that exchange of information decreases in favour of reflective communication. But they also point out that this might be due to the structure of the task, which was based on evaluating e-learning tools and courses. As a consequence, they argued, the task structure seems to be an important factor in determining the nature of the communication. Hara, Bonk and Angeli (2000) presented a study on how online discussion encourages cognitive and metacognitive processing as well as student participation and interaction. Like the study above, they also implemented some structure by assigning two student roles to the groups. One was a starter role where a student had to summarise course material and present key questions or issues at the beginning of the online discussion. The other role was a wrapper, who had to contribute at the end to summarise the week's discussion and highlight overlapping, problematic issues and present future directions. They found that students were explicitly referencing each other and sharing knowledge. Content analysis indicated that students were processing course information at a fairly high level. Both cognitive and metacognitive processing varied from week-to-week, with cognitive activity being highest in the middle and metacognitive activity was found to be most frequent in the beginning.

Overall, these studies focused, to some extent, on gathering evidence for collaborative learning processes. Most of the results are interpreted in terms of the individual benefits of collaborative learning and not so much on a group level. In other words students seem to ask 'what's in it for me?' The studies indicated that student motivation for collaborative NL seems to be driven by the possibility to receive peer feedback and help from others as a way to support one's own learning. The learning activities investigated are mainly task-focused, mostly discussion-based, and aimed at sharing knowledge, some critical thinking and reaching agreement, in order to solve the problem and produce a report. However, some studies suggest that working in groups on cases, or more practically oriented learning tasks, seems to enhance learning processes and outcomes.

2. The Role of the Teacher

If design for NL has not only changed the environment in which students learn, it has also generated implications for the ways in which courses are being taught; with respect to, for example, the role, attitudes and responsibilities of the teacher. In general, the teacher's role, in the studies we looked at, was to design the course, set the task goals and to be responsible for the overall quality of the course and its coordination. The teachers' presence during the interaction in the discussion forum varied from being an active moderator throughout (Salmon, 2000) to just providing some instructions in advance on how to work in asynchronous discussion forums. Many of the studies we investigated covered this theme of the role of the teacher. Most of them were concerned with the general behaviour and the role of the teacher (in asynchronous learning environments). In some cases teacher behaviour was analysed on a timeline perspective to give a more detailed account for different phases in an overall discussion. Some studies were interested in the differences between teacher presence and absence. But, in general, one can say that these studies are concerned with trying to describe teaching styles and needs in NL.

Six studies offered some general insights on teachers' involvement in online collaborative discussions. In the study by Vonderwell (2003), it was found that students perceived the communication with the teacher as constructive and encouraging, and they wanted the teacher to be involved throughout the course, not just at the beginning. Rimmershaw (1999) concluded that the teacher's active participation might have been critical in setting the right tone for the more successful courses. Veldhuis-Dier-

manse (2001), in a study on the role of teachers in a CSCL environments, studied the effects of social moderation (stimulating social aspects of the group) and content moderation (to help students focus on the task) compared with a self-regulated group of student. Social moderation seemed to have no distinctive effect on the group interaction, but the group that received content moderation seemed to debate more, included more external information in their discussion and made more references to ideas and remarks presented by fellow students in the group compared to the students of the self-regulated group. According to Kear's study (2004), moderator inputs are needed when the discussions become confused or misleading, or when students ask for an 'official' response. Rovai (2001) stressed that it is the teacher's challenge to create appropriate conditions that support a positive learning experience, and according to him developing a sense of community in the group is one of these challenges. Browne (2003) emphasised the importance of the availability of a personal tutor, and the need for a clear role definition in relation to tasks in the learning and teaching environment. Teacher interventions are generally needed, although postings from teachers, their frequency and their nature, can affect students' reliance on peers for knowledge-building (Clouder & Deepwell, 2004).

Several of the studies looked at teachers' behaviour in asynchronous learning networks at various stages of the discussion. Lim and Cheah (2003) conducted a study on the role of the teacher in asynchronous discussion boards, as perceived and experienced by the students. As an overall conclusion they found a discrepancy between the role teachers play and the expectation of their role among the students. For instance, the students seemed to put more weight on the roles of the teacher (administrative, facilitation, and pedagogical roles) than they actually experienced during the online learning event. Based on a study of the literature, Lim and Cheah (2003) made a distinction between three stages of online discussion and corresponding teaching roles. In the pre-discussion stage, setting a meaningful task (a pedagogical role) was perceived to be the most important role, by the participants, but this role was the least observed in their study. This was also expressed with respect to setting clear goals. The students reported a need for basic guidelines and an indication of the expectations prior to the online discussion (administrative role). Responding to queries, during the discussion, was found to be the most important teacher role (facilitation). This was also the most frequently observed teacher role. Summarising, which is another facilitating role, was not observed frequently, but rated as almost equally valuable to students as responding. The students thought that this would assist them to stay focused on the topic, and help to 'clean up' the discussion. In this stage the gap between observed and perceived roles was most noticeable. Teacher roles were seldom observed during the post-discussion stage. Except for the facilitative role of drawing appropriate conclusions, they were not found to be so important. According to Lim and Cheah (2003) there are a number of roles that teachers should play during asynchronous learning; these are: setting meaningful tasks, providing technical guidance, participating actively, keeping the discussion focused, drawing conclusions, providing content expertise, and recommending resources for extension of learning. At the same time, they argued that teachers need more specific guidelines on how to execute their roles in asynchronous discussion boards. Levy (2003; 2004) reported similar findings in her study on experiences of students engaged in an NL community. There was a need for more intensive and direct personal contact between tutors and participants, especially at the early stages of the course. In particular, this was needed to monitor and support individual participants' awareness of specific features of the learning design and more general understanding of learning issues.

In another study, conducted by Ferry et al. (2000), the aim was to explore the role of the teacher when mediating an online discussion of an NL community. Based on interviews and content analysis, they concluded that it is the task of the moderator to set the scene at the beginning of the course, and to keep the conference constructive throughout. This needs skilful crafting of messages, and thoughtful judgements on when and how to intervene. They argued that teachers constantly need to monitor

the discussion and provide input at appropriate moments. On the other hand however, Mazzolini and Maddison (2003), pointed out that frequent posting by teachers to discussion forums did not lead to more student postings, on average. And the more the instructors posted, the shorter were the discussion threads (on average). Yet, in their study on teacher intervention in NL, they concluded that the number of postings is not a simple indicator of the quality of discussion forums – more subtle methods are necessary.

Five studies described the effects of teacher presence or absence in online discussions. Light et al. (2000) conducted a study to explore the effects of the absence of a tutor on students' learning experiences. Their case was based on a university course in which the teacher set up the group-based discussion but did not participate during the student-led discussion. Their aim was to explore the student perceptions and perspectives of online learning. They reported, based on interviews and content analysis, that students started to develop leadership roles within their group. These roles emerged from the strong feeling that a leader was needed to actively monitor and direct activities from time to time, as well as to keep the discussion focused. However, the students indicated they also welcomed greater tutor engagement (Light et al., 2000).

Martinez et al. (2003) constructed two social network graphs based on reading and writing behaviour of students in two groups in the asynchronous environment BSCW⁵. One group included the teacher and the other excluded her, allowing exploration of the teacher's overall influence on the use of BSCW. Both networks show that the density of the interactions decreases with time, but increased again in the last phase of the collaborative project, when the students had to produce a joint report. The network with the teacher showed a slightly higher density of interactions, with the teacher being the most central actor (contributions by the teacher were read more than any of the others), but some other students occupied central positions as well. The influence of the teacher's presence is also reported by McAlpine et al. (2004). Their work suggested that students look for the teacher to provide a positive input or attitude, and that having a teacher's active presence in the online discussions seems to be a critical issue. McAlpine et al., suggested a range of pro-active teacher activities, including posting instructions and expectations, and using dialogue as a process of inquiry, as well as providing feedback. However, most importantly, the teacher needs to 'tune-in' during the collaboration process to find out what kind of moderation behaviour a specific group may need. To assist teachers in developing these competencies, Kennedy and Duffy (2004), when reflecting on the role of collaboration in distance education, pointed out that creating teacher-teacher collaborations seems beneficial for sharing good practice derived from experience, and gives support to teachers as they develop their practice.

"The social and pedagogical presence of the instructor is essential for improved communication and learning. Yet, online instructors need to be careful in structuring a feedback mechanism to encourage students' inquiry and collaboration rather than quick immediate answers to a question that can, itself, be a barrier for effective student learning." (Vonderwell, 2003.)

In general, research in this theme suggests that teacher involvement and active participation is appreciated by students. The research presented reports that students find communication with the teacher constructive and encouraging, especially where teachers support the students to set the right tone for the discussion.

⁵ <http://bscw.fit.fraunhofer.de>

With respect to the roles that teachers should play, the studies suggest that students seem to need or appreciate active pedagogical guidance from the teacher in the beginning; this can gradually transform into a more facilitative role in the middle and end stages of the discussion. However, a constant monitoring (even if only at a distance) by the teacher throughout is required to enable her to tune in when needed. There is some evidence for students picking up some roles or leadership tasks to compensate for the lack or absence of teachers' input.

3. Teacher-Student Relationships

In the previous section we have seen that it is not only the teacher who has full control over the learning agenda any more. In networked learning environments where everybody's contribution is 'out in the open' and can be challenged by every participant in the group, one can expect that the traditional more vertically oriented teacher-student relationship is changing. The teacher is no longer in full control; learners are actively taking responsibility and start to coordinate and regulate their own (collaborative) learning by performing a substantial part of the teaching presence role (Anderson, Rourke, Garrison & Archer, 2001; Jones, Ansensio & Goodyear, 2000). This change is picked up by some of the studies included in this synthesis.

Eight of the studies asserted that in NL environments the status, roles and expectations of the 'traditional' teacher-student relationship is changing, or at least being renegotiated. However, this is not unequivocal. For example, McAteer, Tolmie, Duffy and Corbett (1997) suggested that the social context changes when teachers get involved. Yet they may find it difficult to avoid taking a directive role. Principally, this is because they are used to this form of communication and this is also what the students expect. McConnell (1999) pointed out that designing learning based on a community framework will, as a consequence, have an impact on how all the participants, including the teacher, relate to one another. Due to the high degree of openness that may be a feature of such communities, all the participants have equal access to the discussion including the comments made by the teacher, and therefore have the potential to respond and manage the learning process themselves. In this way the teacher may be challenged on certain issues by other participants. However, McConnell observed no sign of the teacher resorting to a differential power relationship in order to retain her status. According to McConnell, participants were all engaged in a 'learning relationship'. Though people participated in different ways, and to varying degrees, the sharing of power did become something that was real to them all. Something similar was found by Rimmershaw (1999), who concluded that the teacher may become one of the 'participants' in a broader sense. According to her findings, the students responded better when the teacher actively participated in the discussion and valued the contributed ideas and experiences seriously. Vonderwell (2003) also reported that the teacher may sometimes contribute to the group discussions. However she concluded that the teacher should be consistent with the amount of time they spend in the discussion forum because inconsistency can cause frustration and decreased motivation.

However, more recent studies, pointed out that this different relationship has to be carefully planned because it has implications for the expectations and behaviour of the participants in an NL environment. Kennedy and Duffy (2004) spoke of NL encouraging a shift in the balance of power, or a levelling relationship between teachers and students – a shift towards facilitating students' critical questioning of authoritative sources. "Teachers who are choosing to be a guide on the side are empowering students by establishing an educational climate that contributes to a feeling of student empowerment" (Nulden, 2001, p.369). A study carried out by Cook and Jacobs (2004) indicated that mutual expectations should not only be clear but also appropriate for the planned learning activities. In a case study they used content analysis to identify approaches to teaching and learning in an online discussion board. Their particular focus was on how rules and roles were defined within the interac-

tions that took place. They concluded that, where teachers and learners participate together in NL activities, discussion is not always appropriate to the task. They concluded that when discussion is used it should be clear and explicit how it will support that task, and what teacher expectations are in place. Hara, Bonk and Angeli (2000) purposefully designed an NL environment where the students were in charge of their own learning and assigned roles (starter and wrapper) to help the groups to foster student responsibility. They found that the students with roles dominated the discussion and that the design provides opportunities to develop common ground or intersubjectivity with their peers and teachers.

The studies presented reveal a tension between the traditional role of the teacher and the new social settings in NL contexts. For example, the teacher's input to the online discussion can be challenged and openly discussed by students. Both the teacher's style and the content of her contributions to the learning of the community may be scrutinised. The traditional boundaries between the teacher and the learner appear to be diminishing; a shift in the balance of power is apparent as teachers and students actively engage in a learning relationship. However, clarity about the rules of engagement is needed to inform the pedagogical design of these relationships.

4. Group Regulation and Pedagogical Orientation

To some extent, group work in education is often a challenge because of the tension between individual grading and the assessment of group activity. Yet at the same time it is widely accepted that group learning and teamwork skills are among the competencies that students have to learn. Participating in online discussion forums is a new skill that has become a part of this. The courses included in the paper are set up in such a way that students are expected to learn constructively through dialogue with each other. And, as we have seen, to some extent, not only be made responsible to take charge, or active control, of their learning but are also manage the group's activity.

In this section we present research that has investigated how online learners organise and regulate their own activities, and studied learners' orientations (or attitudes) towards the pedagogical context of which they are part of. Nineteen of the studies included presented findings related to this theme. Collaborative learning as a pedagogical process is often designed so that the participants need to discuss and agree upon the learning goals and plan their actions accordingly. Some studies have explored the extent to which students bring an understanding of this to the activities. Other studies have investigated how participants regulate their learning collaboratively during these activities.

Nulden (2001) investigated how participants are engaged and empowered in NL environments. He found that if students are given the responsibility for deciding what they learn, they will actively prioritise among the learning tasks. They will also think about how to approach and discuss these issues. Gustafson, Hodgson, Mann and Olsen (2004) focused their attention on the complex nature of the collaborative peer learning process, its norms and requirements. Their study focused on power relations and how a sense of control is revealed in an NL discourse. They found evidence for continuous negotiation of power amongst the members of the group. It seems that individual participants tried to find the space within the group to pursue their own learning agenda and learning style. This was done by 'trying' to dominate the entire group space, or by simply creating sub-spaces, to get on with the work they wanted to undertake. There seemed to be a constant 'tension' between the needs and desires of the individual participants and the direction of the entire group.

Hara, Bonk and Angeli (2000) described student participation and interaction patterns. They also found that several distinct characteristics of students in the conference emerged, such as who was a

social person, as well as who displayed extensive metacognitive skills or who showed clear insight in the discussion that has taken place.

Learner regulation and coordination of the learning activity within an NL setting was studied by other researchers. McAteer (1997) referred to 'rules of engagement' and reported that participants engaging in NL seem to actively take control of the learning task and start to create ownership of this task, as well as trying to regulate the group processes involved. These rules can be very explicit, like instructions, but more commonly they will be signalled implicitly through asking questions (for example), and are based on participants' knowledge of how other individuals are involved in this activity. Members of an NL community develop unwritten rules or implicit shared expectations on how to behave; they negotiate rules about interaction and participation that shape and are shaped by group dynamics (Clouder & Deepwell, 2004).

McConnell (1999) observed that learners in NL communities begin to take control over their learning, and begin to develop stronger positive views of themselves and their ability to learn. However, in his study, this control and regulation is not limited to the individual participants themselves. As they operate in an open social structure they have to be aware of and deal with fellow students, and develop an understanding of each other, a way to communicate and add some clarity about each other's expectations. In her study, Vonderwell (2003) found that NL participants actively coordinated their learning by agreeing on rules, deadlines and responsibilities. Hammond and Wiriyapinit (2004) reported that the participants were actively scheduling their activities, and assigning roles within the group as well as exploring the content and reflecting on the nature and purpose of group work. The development of roles to structure group learning is also found by Light et al. (2000). They indicated that within groups certain roles, (for example chairperson or supportive leader) emerge between participants and become publicly recognised by the group. Due to the absence of a facilitator, the students in this study tried to fulfil these roles and discuss how to structure and organise their discussion. Light et al. (2000) argued that it is important for an NL group to find a positive balance between outside regulation and self-regulation in order to manage and moderate the group's learning.

The nine aforementioned studies pointed out that participants in NL seek to develop ways in which they can coordinate and plan their learning. This form of group-regulated learning is, perhaps, a logical extension of the self-regulated learning behaviour, but it seems to require new skills and knowledge of metacognitive learning and group dynamics. Knowledge about one's own learning style alone is not enough in this context. Awareness of others' learning styles and strategies, combined with an extended form of 'inter-metacognitive' knowledge (knowledge of the cognitive processes and strategies of the group) have become important. Some researchers have noted that tension can arise between personal learning needs and the group learning agenda. Participants in NL try to address this by developing implicit or explicit shared understandings of how to behave, agreeing on rules, planning their actions, and assigning roles to structure group activities.

Nine studies mentioned the importance, for both students and teachers, of familiarising themselves with NL environments and how to use them successfully. Taking part in an online discussion requires time to develop attitudes and competencies. Students, according to Vonderwell (2003), needed to learn to adapt in order to gain learner autonomy as well as to learn strategies for effective collaboration. The conclusion is that awareness of group processes and facilitation of collaboration need to be learned by students during their education. Students, she argued, also need to learn to become active learners and seek active learning strategies in their online experiences (Vonderwell, 2003).

For most of the students and teachers NL requires a 'new' way of learning. It is based upon theories and assumptions that differ from those underpinning more traditional forms of learning (see, Simons et al., 2000, for an elaborate description on new ways of learning). Cramphorn (2004) argued that it is important that both students and teachers are explicitly informed of the social constructivist nature of NL, to reduce the shock of their own ideas and reflections appearing as transparent to all members

of the forums. Based on interviews, he argued that unfamiliarity with the constructivist approach to learning creates barriers. Students in his study were not used to posting their own thoughts in the early stages of a course and did not realise the fact that they could be seen and criticised by all the other members. The constructivist nature of NL, therefore, may initially be a de-motivating experience. Ronteltrap and Eurelings (2002), in a case of problem-based learning, also pointed out that students needed time to learn a new way of working.

The previous section pointed to the need for participants to become familiar with the pedagogies involved in NL. Other researchers also acknowledged that a start-up period is useful to support the focus on learning issues (Levy, 2004), and to provide an introduction to the mode of online teaching and learning (Kennedy & Duffy, 2004). Pedagogical strategies that assist in this familiarisation could be a valuable tool in the development of more successful courses (Rimmershaw, 1999). Kear (2004) reported that in some cases students were given special tasks to gain experience with conferencing and help develop the skills that they will need to move on to more in-depth conferencing work. According to Kennedy and Duffy (2004), course providers should pay more attention to preparing students to work collaboratively as their previous learning styles and habits may not be conducive to collaborative working practices. Kear (2004) concluded that students who are used to working independently, and to working at their own pace, may find it hard to adapt to group working and are likely to experience difficulties with the change over from knowledge acquisition within the university context to constructing knowledge within the practice setting (Clouder & Deepwell, 2004). They also mentioned that students need to develop confidence that they can construct knowledge that is valid and of value, and that their collective thinking offers benefits beyond those of individual cognition. Establishing a community forum is, by itself, not enough (Ferry et al., 2000).

To support students in the application of these new pedagogies to their learning task, De Wever, Valcke, Van Winkel and Kerkhof (2002) studied the impact of adding task structure in NL environments, on the level of cognitive processing. They found that adding structure to discussions, by instructing two procedural options for dealing with the problem, results in higher levels of knowledge construction, and stimulated negotiation of meaning among the participants. In general, there are at least two ways in which structure can be offered. Strijbos, Martens, Jochems & Broers (2004; in press) made a distinction between content-based roles, facilitating knowledge acquisition and construction, and process-based roles, facilitating participants' responsibilities with respect to managing group dynamics (coordinating and regulating group learning). In their research on the effect of roles they reported that groups using roles are more aware – and report a higher level – of perceived group efficiency, as well as making more coordinative statements during asynchronous communication, than groups without an explicit distribution of roles. Marttunen and Laurinen (2002) argued that offering a discussion structure or working method has a positive effect on group work. They found that introducing role-play to support critical reasoning and argumentation in discussion groups had a positive impact when compared to free debate. Ongoing support, in the form of informal opportunities and more structured tasks to encourage reflection and discussion, proved especially effective in support of learning orientation (Levy, 2004). Kennedy and Duffy (2004) also argued that collaboration is most likely to happen when specific participants are given the role of ensuring it.

The studies included in this section suggest that several aspects of pedagogy and design, related to power relations between learners, play important roles in NL. These include: negotiation of goals and plans, rules of engagement, deadlines, and responsibilities. Moreover, they suggest that students may need new kinds of 'inter-metacognitive' knowledge and skills to learn and function effectively as an NLC. Students need time and experience to familiarise themselves with new ways of learning taking place in NL. There can be tensions between individual and group goals, and between instruction and task structure.

5. Participating in NL communities

Most of the studies presented here designed their courses around notion of communities of practice. Learning in communities is characterised by members participating in a shared practice. Generally they are interested in discussing and sharing knowledge embedded in this practice, to learn from each other, to solve problems, to develop new skills and competencies, and potentially to advance the knowledge domain and the practice. Based on the included papers in this study, a general description of an NLC could be of a group of participants (including a teacher) that is potentially heavily connected and has clear boundaries with respect to who is a member and who is not. Membership is based on a shared interest for a specific subject or practice, but is fixed for an arranged period of time, mostly moderated by a teacher and aimed at participating in collaborative learning processes or problem-solving around themes that are essential for their practice or domain of knowledge. Active Participation itself is seen as a form of learning (Lave & Wenger, 1991) and has become the focus of several studies.

Nine studies included in this paper reported different modes and degrees of engagement or participation of students in NL activities. The identification of a sense of community among the participants should not automatically imply that all students are necessarily part of one large closely-knit group (Anderson, 2004). Some will take part because they gain information and help from others that supports their own learning (Kear, 2004). Zafeiriou, Nunes and Ford (2001) studied the perceptions of students on their participation in NL communities. They found that qualitative factors, such as content of contribution, provision of feedback, and relevance to the topic, were playing an important role in defining participation. Students preferred 'on target' and relevant messages above a large number of messages posted to the forum.

Rovai (2002) observed that communities contain at least two basic aspects: 'learning', which is related to the attainment of learning goals and expectations, and 'shared beliefs', concerning the feelings of cohesion, spirit, trust and interdependence. In his study, students appreciated the social and emotional support of being in a community instead of learning alone. Others (Clouder & Deepwell, 2004) suggested that students need to trust one another with their tentative ideas and such trust can only be developed through a sense of mutuality and responsiveness to others. However, the development of trust takes time and requires the capability among the participants to work as a group online. McAlpine et al. (2004) suggested that additional management processes are needed to kick-start the group processes, including introductory activities, or ice-breaking activities (Kear, 2004).

It would seem that being part of a community is appreciated by students as a way of being part of a group instead of being alone. The emphasis in the studies referred to above was largely on trust and emotional support, and the required time to develop this. Anderson (2004) similarly observed that engaging in an online community provides students with a social structure in which identities are formed, friendships are developed and peer-to-peer support systems established. Two kinds of support seem to appear most strongly in this study. On one side there was a strong affective element to this support, dealing with participant's well-being and group motivation. On the other side there is an emphasis on providing support for learning processes and helping each other out to improve learning outcomes. Kennedy and Duffy (2004) also reported that students in some cases volunteered as informal mentors to students who more recently entered the programme. This behaviour is sometimes referred to as the buddy-system. Creating a community of learners, then, can improve student motivation and help facilitate interpersonal/social interaction in an online classroom (Vonderwell, 2003). Stefanou and Salisbury-Glennon (2002) defined a learning community as a non-traditional, university-level learning context that emphasised (1) integrated courses, (2) active student learning, and (3) collaborative learning. In their study on the effects of participating in a learning community on students' motivation to learn, they found that students in communities had increased self-efficacy, intrinsic and

extrinsic motivation (for learning) and a decreased test anxiety. They concluded that students in these learning communities came to value the external judgements of their instructors and peers; one of the central tenets of this project was to create the sense of community in which all were stakeholders in both the pursuit and creation of knowledge (p.93).

In general, the studies in this section pointed to factors that contribute to, and can help create, a sense of community. For students, qualitative factors such as feedback and quality of contributions are more important than quantitative factors such as the number of contributions. Support is needed for both learning and group cohesiveness. Support factors studied include creating a climate of trust, promoting group wellbeing, kick-starting activities, buddy systems and specific learning-related support. The development of a sense of community may increase student motivation.

Conclusion and Discussion

Studies included in this synthesis were mostly inspired by constructivism and social learning principles of which the community perspective was commonly used (see Appendix 1). In this section we would firstly like to discuss the implications of the presented synthesis in the light of these theoretical perspectives to conclude with some directions for possible future research agendas for NL.

Kirschner, Martens and Strijbos (2004) have argued that constructivism is not only an approach or model for instructional design, but also a philosophy of learning based on the idea that knowledge is constructed by learners who are actively seeking for meaning. They suggest (see pp.6-9 for an overview) that in order to learn, learners need to be situated in real-life problem-solving contexts, where the environment is rich in information and where there are no right answers (embedded knowledge). Constructivist tasks, they argue, must be authentic, and are best learned in a 'rich' (i.e., complex) environment. Meaning is negotiated through interactions with others, and multiple perspectives exist. Reflexivity (looking at one's own cognition) is essential for this, and must be nurtured (by all participants). Finally, for them, this is best achieved when learning takes place in 'ill-structured' domains (p.7). The term constructivism, then, has come to serve as an umbrella term for a wide diversity of views about the context of learning. Many of the articles presented here (see Appendix 1) share an attitude towards active construction of knowledge through a process of dialogue with their fellow students.

Another closely related theoretical approach that was frequently drawn upon is the situated learning perspective and the notion of communities of practice. This departs from the idea that knowledge is rooted in actions. The process of meaning-making is embedded in the social context where concepts and skills are defined through their use. Lave and Wenger (1991) describe situated learning as a process of participating in the socio-cultural practices of communities. Adopting this approach, in education, means that students are required to participate in the socio-cultural practice of the subject or knowledge domain that they are studying. For this reason NL communities are offering a learning environment in which it is possible to inquire and explore the topics of the learning task in a social setting with the emphasis on participation in group activities. In this approach students are stimulated to develop rich discussions aimed at exchanging ideas and information, to reflect and elaborate in order to co-construct knowledge together, as we have seen in the collaborative learning theme. In this way they solve group tasks together, preferably in the context of a professional practice. At the same time, students are guided by task content, structure and goals that leads to an end product submitted for evaluation and assessment. Most of the time students are not actually connected to real-life contexts, nor are they assisted by outside experts. The teacher, therefore, is required to take on the role of a domain expert, coaching students (apprentices) into becoming active participants within the practice of their subject. This might explain why several studies conclude, in the theme on the role of the teacher, that teacher involvement and active participation is appreciated and often seen as

constructive. To a certain extent, however, one can argue that this 'situated' experience is limited. This situated experience may be too demanding to be realised in an educational context and needs to be 'down-sized' to operate within an actual educational context. This creates a tension around the role of the teacher, creating and limiting the learning context. More theory and design-driven research into the development of situated, open and authentic learning spaces, can be undertaken to challenge the traditional boundaries of the educational context. We need to rethink the roles and responsibilities of both the teacher and students in NL settings, as well as to think about how to invite other parties into the learning process. Which members and roles are needed and appropriated for engagement in learning activities? Who are responsible and when? Is it possible to open up this collaboration beyond the educational programs to connect to (or become) authentic learning communities or are communities of practice one of the major challenges to address this tension? (Sergiovanni, 1999).

Another tension relates to teacher's presence. Research presented here has, on the one hand, indicated that the teacher's presence is essential to improve learning and that students are in need of support for preparation and regulation (especially at the beginning). On the other hand, we see that students are capable of taking over some of the teacher roles, and starting to develop leadership roles themselves within the group (as a way to guide and support each other to participate in their activity). They are also acting as active learners, questioning and discussing the knowledge representing the knowledge domain they are studying. Therefore, when employing NL it seems important to carefully introduce students into taking over these responsibilities (Simons et al., 2000). In this process-oriented teaching there is a need to manage the interplay between self-regulation and external regulation (Vermunt & Verschaffel, 2000). This gradually changes the teacher-student relationship. However, this synthesis pointed out that when learning collaboratively it is not enough to become aware of your personal metacognitive knowledge, participants need to develop group-regulation skills to be successful as a community of learners. When students take over teaching roles and start to act as peer-tutors, they require an awareness of each others' learning styles and strategies, a process of developing 'inter-metacognitive' knowledge and skills in relation to the other members of the community. They need to relate this to the 'intra-metacognitive' knowledge they possess about their own personal learning behaviour to balance between their personal needs and desires, and the direction of the group. Developing inter-metacognitive knowledge and skills, we believe, needs more attention in NL. Some of the articles argued the need for participants to familiarise themselves with NL environments and to learn how to use them successfully. The fact that participants themselves develop strategies to structure and regulate group learning indicates that we need to study more carefully what inter-metacognitive knowledge and skills participants practice or desire. Also during which stage of the NL process, as well as how to embed support for this in the design of NL environments.

Some of the papers studied collaborative learning (explicit or implicit) as a way for students to participate in community-based activities. Participation is mostly described as a way for students to create and share knowledge together in order to solve pre-defined problems in an educational context, making use of the expertise, competence and tools available in existing cultural practices. This does not mean they don't create knowledge but that it remains within the sphere of individual/group knowledge structures.

If the aim is to have students learn through participation, then in most cases, as we have seen, the teacher will play the role of the full participant in her domain. The role of the teacher in this setting is one of a more competent participant who will act as a guide to model processes and skills; to model learning, thinking, and regulation of activities. The teacher will also provide metacognitive guidance and stimulate students to reflect on their own learning (Simons et al., 2000). If the aim is to create or build new knowledge through collaboration, however, we need to go beyond the participation metaphor (Sfard, 1998). Lipponen, Hakkarainen and Paavola (2004) argue that knowledge creation goes

further than participation because there is a distinction between knowledge used in productive work practices, and knowledge that is the object and product of the collaborative activity. This (latter) process requires participants who are well-connected to their practice and act as experts (at least to some extent) themselves. In this case more advanced learning can take place. The roles and expectations of all the members of an advanced NL community become aligned and deep learning relationships may form. Such a community may move beyond its current understandings of the domain and become creative, engaging in the re-negotiation of the knowledge in their domain (Wenger, 1998). These forms of community learning are reflection-based (Kirschner et al., 2004; Korthagen & Lagerwerf, 2001; Lipponen et al., 2004; Sergiovanni, 1999; Simons et al., 2000) and are more likely to be found in more advanced courses or within professional education, life-long learning and in workplaces where communities of practice are constantly renegotiating their meaning. However, this process of reflection, abstraction and conceptual thinking is a longer-term process. This may be the reason why the higher levels of knowledge construction are less frequently observed in most learning communities (De Laat, 2001; De Wever et al., 2002; Gunawardena et al., 1997; Veldhuis-Diermanse, 2002). Connecting subjects (knowledge domains) and practices over a longer period of time could be a way to transform communities of participation into creative communities or knowledge-building communities (Bereiter, 2002).

Concluding Comments and Directions for Future Research

In this final section, we propose some ideas for further research in relation to the themes of our synthesis.

Collaborative Learning

We saw that collaborative learning principles are strongly represented in NL design, but within the collaborative learning theme the most prominent conclusion is that the focus is predominantly on individuals using collective resources for their own purposes. Future research might focus on the possibilities for supporting a more genuinely collaborative focus in NL. This might, for instance, be through tasks or reward structures affording common interests. The presented research also suggests that some practically oriented learning tasks are more supportive of collaboration in NL than others. Future research should, in our view, study more systematically which task characteristics lead to more effective and collective collaboration. The general literature on collaborative learning may be of help in devising these research studies and guiding research on more pedagogy-driven design of NL tools to support collaborative learning processes in action.

Similarly most studies try to set up learning processes in a community framework that draw heavily on the social aspects of learning and social theories of learning (Wenger, 2004). One challenge is to take these theories actively into account when designing and researching HE courses. What does social learning mean, how is it organised and supported? What is the position of the individual in this context? How do we change as persons as a consequence of this? What is group learning and how do we study its processes and outcomes? What are the key social learning competencies and skills, and how do these change the teacher-student, student-student relationship and experience? Do we need teachers or the traditional educational boundaries at all? In our view, these questions need to be addressed in order to move the NL domain forward.

The Role of the Teacher

In view of the changing pedagogical approaches in NL (see Discussion) the main outcome of studies done so far appears to be that there are tensions between the roles of teachers in NL, and the leadership roles of students. How can teachers escape from their traditional roles and give room for new learning? How can teachers gradually withdraw their leadership and hand it over to students in process-oriented settings? How should the teacher's role develop in the various stages of development of an NL community? These are the central research questions to be addressed within this theme.

Teacher-Student Relationships

The main finding of this aspect of our synthesis is that teacher-student relationships may change during NL. More research is needed to understand this process. A further research question is: what is the most effective way to communicate the expectations of participants needed to understand their roles in NL?

Group Regulation and Pedagogical Orientation

Power relations between students are revealed as important, often hidden, characteristics of NL processes. More research is needed into understanding how power relations affect negotiation of goals, plans, deadlines, rules of conduct, responsibilities, and familiarisation. Another important area for future research relates to understanding the various kinds of implicit and explicit roles that develop among group members. Finally, more insight is needed into the 'inter-metacognitive' knowledge and skills that students need to function in NL and the ways these can be learnt.

Participating in Networked Learning Communities

The presented research suggests that a sense of community is important for participation in NL, and for student motivation in general. Although some factors that contribute towards this sense of community are clear from previous research. More research into these factors is needed: how can this climate of trust be reached? What makes groups feel like groups? What are important characteristics of this sense of community in the eyes of participants? How can this be supported? What hinders the development of community feelings? How are group identities developed? These are the central questions for a future research agenda.

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Appendix 1.

Author(s)	Type of publication	Research themes	Pedagogical orientation	Methods applied	Sample size
McAteer et al., 1997	Article	Group regulation and pedagogical orientation	Community learning	Case study based on student feedback	70 (2 groups)
McConnell, 1999	Article	Collaborative learning Role teacher Teacher-student relationship Group regulation and pedagogical orientation	Community learning	Case study based on content analysis	8 (1 group)
Rimmershaw, 1999	Article	Role teacher Teacher-student relationship Group regulation and pedagogical orientation	Community learning Social constructivist	Content analysis Observations Course evaluation forms Student interviews	38 (4 courses)
Light et al., 2000	Article	Role teacher Group regulation and pedagogical orientation	Social constructivist Collaboration	Interview Content analysis	29 (4 groups)
Ferry et al., 2000	Article	Role teacher Group regulation and pedagogical orientation	Community learning Problem-based learning	Interviews Content analysis	22
Hara, Bonk & Angeli, 2000	Article	Collaborative learning Teacher-student relationship Group regulation and pedagogical orientation	Community learning	Content analysis Interaction analysis	20 (1 group)
Nulden, 2001	Article	Group regulation and pedagogical orientation	Social Constructivist Problem-based	Student activity Questionnaire	210 (1 group)
Zafeiriou et al., 2001	Article	Participation in communities	Grounded theory	Interviews	50 (various courses)
De Wever et al., 2002	Article	Group regulation and pedagogical orientation	Social constructivist	Questionnaire Content analysis	12 (2 groups)
Marttunen & Laurinen, 2002	Article	Group regulation and pedagogical orientation	Socio-cognitive conflict argumentation method	Content analysis	11 (2 groups)
Ronteltrap & Eurelings, 2002	Article	Collaborative learning Group regulation and pedagogical orientation	Problem-based learning	Content analysis Interviews	16 (2 groups)
Rovai, 2002	Article	Role teacher Participation in communities	Community learning	Questionnaire	314 (27 courses)
Schellens & Valcke, 2002	Article	Collaborative learning	Social constructivist	Content analysis	300 (38 groups)

Author(s)	Type of publication	Research themes	Pedagogical orientation	Methods applied	Sample size
Stefanou & Salisbury-Glennon, 2002	Article	Collaborative learning Participation in communities	Community learning Project-based learning	Questionnaire	206 (6 groups)
Veldhuis-Diermanse, 2001	paper	Role teacher	Social-constructivist Knowledge building	Content analysis	28 (4 groups)
Browne, 2003	Article	Role teacher	Conversational learning	Interviews Content analysis	16 (1 course)
Lim & Cheah, 2003	Article	Role teacher	Shared knowledge construction Community learning	Questionnaire Content analysis Focus group interview	250
Martinez et al., 2003	Article	Collaborative learning	Situated learning	Questionnaire Focus group Interaction analysis	120 (4 groups)
Mazzolini & Maddison, 2003	Article	Role teacher	Constructivist principles	Questionnaire	515 (average 170 per year, 10 groups)
Vonderwell, 2003	Article	Collaborative learning Role teacher Teacher-student relationship Group regulation and pedagogical orientation	Knowledge building	Interviews Content analysis	22 (6 groups)
Anderson, 2004	Article	Participation in communities	Community learning Interview	Interviews	25 (5 groups)
Cook & Jacobs, 2004	Conference paper	Teacher-student relationship	Interview	Content analysis Interview	1 (teacher)
Cramphorn, 2004	Conference paper	Group regulation and pedagogical orientation Participation in communities	Social constructivism	Interviews	75 (3 courses)
Clouder & Deepwell, 2004	Conference paper	Role teacher Group regulation and pedagogical orientation Participation in communities	Social aspects of learning Social constructivism	Course evaluation forms Content analysis	127 (6 groups)
Gustafson et al., 2004	Conference paper	Group regulation and pedagogical orientation	Socio-cultural context	Content analysis	2 vignettes (1 course)
Hammond & Wiriapinit, 2004	Conference paper	Collaborative learning Group regulation and pedagogical orientation	Collaborative learning	Questionnaire Content analysis Interview	46 (1 course)

Author(s)	Type of publication	Research themes	Pedagogical orientation	Methods applied	Sample size
Kear, 2004	Article	Collaborative learning Role teacher Group regulation and pedagogical orientation Participation in communities	Knowledge building Collaborative learning	Questionnaire	183 (2 courses)
Kennedy & Duffy, 2004	Article	Role teacher Teacher-student relationship Group regulation and pedagogical orientation Participation in communities	Collaborative learning Community learning	Course evaluation reports	156 (1 course)
Levy, 2004	Conference paper	Role teacher Group regulation and pedagogical orientation	Constructivist and situated learning theories	Action research Questionnaire	1 (researcher)
McAlpine et al., 2004	Article	Collaborative learning Role teacher Participation in communities	Constructivist Community learning	Questionnaire Focus group	12 (1 group)
Strijbos et al., 2004	Article	Group regulation and pedagogical orientation	Collaborative learning Social constructivist	Questionnaire Content analysis	33/40 students (2 courses)
Strijbos et al., in press	Article	Group regulation and pedagogical orientation	Collaborative learning Social constructivist	Questionnaire Content analysis	41/51 students (2 courses)

Chapter 9

General Discussion

Many higher education institutes have adopted the use of networked learning in their educational practice. This ranges from offering email addresses, online student enrolment for courses and online monitoring of progress to the use of networked learning to support learning and teaching. The main aim of integrating computers in these institutes is to support and enhance the learning environment they offer their students (Ter Huurne, Bots & Terlouw, 2004). This is often done by using the computers to make the learning environment more learner-centred and stimulating students to actively learn together in groups (Simons & De Laat, 2005). Community-based learning principles are often adopted in networked learning design as a way to implement collaborative learning in their courses. In this thesis we were interested to empirically explore how participants of a networked learning community learn collaboratively. Networked learning is a relatively new research area and benefits, in our view, from rich descriptions of learning and tutoring processes during networked learning, to develop an understanding of what is happening and how this is experienced by both teachers and students. We believe that it is important to develop a general understanding of networked learning practice before making claims on how to change or improve it. In this thesis we focused on two case studies, trying to describe learning and tutoring processes in networked learning communities of one particular higher education course. This was followed by a synthesis of findings drawn from a larger body of networked learning research similar to our own research interest and setting. In this section we want to summarise and discuss the main findings.

On the whole we can conclude that the results of the studies included in this thesis (both case studies and synthesis) tend to point in the same direction. There are occasionally subtle differences but, in general, across the studies other researchers have presented similar findings to ours on the way teachers and students are engaged in networked learning. In the following section we will compare our conclusions with those of others (as summarised in Chapter 8) and formulate some suggestions for further research.

Collaborative Learning

There is considerable overlap between the findings of the collaboration theme (Chapter 8) and the findings of our own case studies (Part 2 of this thesis). On the whole, these studies present empirical data showing that participants are collaboratively sharing and constructing knowledge in their asynchronous discussion forums. However, engagement in collaborative learning processes does not automatically mean that the participants strive for collective learning *outcomes*. Both studies (synthesis and case studies) indicate that individual interests and learning goals are the main driving force and that peer feedback and help is appreciated to support one's own learning. It is most likely that in educational settings this personal approach to collaborative learning will be dominant. As long as people have to pay for their courses and join them for individual purposes, participants will try to get 'the most out of it'. Designing courses for collaborative learning is therefore not to be taken lightly. More importantly, not every learning task is suitable for collaborative learning. Ideally the task will have to be open ended (Carusi, 2003). This way all the participants can (try to) identify themselves with it, and it requires a group discussion on how to focus and plan their work. This way the group is stimulated to create ownership over their task right from the beginning. Personal interests and goals can be negotiated and married into a shared collaborative project.

The task should have a practical element to it, preferably relevant to the context of the professional background of the participants or subject of the course. A shared practice enables identification with the task and each other, which allow for sharing experiences. While working on cases or practical tasks

stimulates interaction amongst the participants.

The studies (both case studies and synthesis) indicated that students are mostly task-focused, but some studies (Chapter 8) reported that the discussions are mostly 'positive', supporting each other ideas instead of critically discussing them. Students might benefit from an induction period where they are introduced to the openness of asynchronous discussion environments, and develop a sense of social presence (see for example, Kreijns, Kirschner & Jochems, 2002) and group feeling, as well as experimenting with the social constructivist approach to learning.

Also we have seen that collaborative learning activities are dynamic, groups therefore might develop their own working rhythm. In the case studies, for example, we have seen that the majority of the cognitive activities were in the middle, the phase also with the highest activity. Each phase of the collaborative project has its own focus. More research to identify how groups develop their rhythm and working patterns throughout their collaborative project will enable us to further develop refined teaching and learning models to inform design and support for networked learning. Another research direction regarding networked learning processes is comparing successful groups with unsuccessful ones. Failure or breakdowns during collaborative learning will highlight features that might be overlooked when the focus is on studying success. McConnell (2005), for example, showed how strong personalities and failure to reply to requests and questions from other members can frustrate or hinder the collaborative learning experience and the production of a collective product in the end (Barron, 2003).

When reflecting on the collaborative learning experience it might be useful to distinguish individual behaviour from group behaviour. In particular with our case study we have seen that participants develop different collaboration styles throughout the collaborative project. Some are dedicated starters while others seem to grow during the process. Within the groups this was not picked up as a problem since the group as a whole was making progress. But we have to be careful when assessing individual's behaviour (both by the teacher and the students). Low levels of participation are often treated as problematic. People who make a small contribution to the group activities are in danger of being victimised within the group, even though they might be learning a lot, both about the subject and how to become an active participant in the group.

"Wenger's work allows us to see the importance of involvement [participation] per se; to worry less, in the first instance, about the terms of that involvement, and to understand that participation is the condition for transformation." (Cousin & Deepwell, 2005, p.61). The pressure might be too strong on the side of collaborative learning, leaving little room for personal growth. More research is needed to study the position of the individual within groups, to understand identity development and transformation (Wenger, 2004), construction of digital identities (Talamo & Ligorio, 2001) and the notion of multiple voices in a group (Akkerman, Admiraal, Simons & Niessen, in press). McDonald, Stuckey, Noakes, and Nyrop (2005) use social network analysis to study individual connectivity in groups. They found that participating in a variety of tasks, in different group compositions, makes the conversation more task-focused and stimulates participants to contribute. The central idea is that having different group compositions around particular topics breaks down dominating coalitions, hierarchical relationships, social exclusion and isolation in groups. Participation in multiple sub-communities provides the support needed to bring issues into a more public space where conflicts and disputes can be voiced (Hodgson & Reynolds, 2005). Some researchers are exploring the use of public and private spaces in networked learning environments (Brett & Freeman, 2005), to address social and individual needs and support the developing ability to find and articulate an independent and personal voice.

Role of the Teacher

Some of the studies (both case studies and synthesis) indicated that students are not only engaged in cognitive activities, but they also use metacognitive learning strategies, ranging from reflecting on the task to being concerned with the group's overall functioning. This supports the notion of students acting as learners and tutors in the group. There is a growing acknowledgement for peer tutoring in research on networked learning, but many studies (Chapter 8) are also concerned with the role of the teacher. In our case studies we have seen that the teacher acts as a learner and a teacher, but is mainly concerned with guiding and facilitating the group. Other studies have emphasised this stance as well. The case studies showed that some of the networked learning communities were very engaged in tutoring processes and were able to actively take ownership of their own learning tasks and agendas without drawing heavily on the teacher as a source of inspiration or guidance. In some other studies (Chapter 8) there was a greater need for teacher involvement and guidance. In the beginning phase, the students particularly welcome active pedagogical guidance, which can transform during the course into a more facilitative approach of the teacher. This does not mean that the teacher can 'relax and sit back'; instead constant monitoring of the group's activity is required. This way the teacher can provide support when needed. There is some uncertainty around the role of the teacher in networked learning environments. Lockhorst (2004) studied the role of the teacher in various groups and observed that groups with high teacher involvement showed a relatively high level of participation and interaction, but groups with a more peripheral-acting teacher, were also active. The students indicated that they appreciated an active teacher role, but that teachers with a minor role did not affect their collaborative process. Lockhorst observed that the teachers found it difficult to supervise, but noted that stimulating and critical remarks made by fellow students were more effective than those made by the teacher. She concludes that it may prove effective to invest in peer feedback mechanisms.

Certain teacher roles have been discussed in various studies (both case studies and synthesis) but there are no clear guidelines provided for teachers about what to do in particular circumstances. In general, we can conclude that teacher presence is preferred over teacher absence, but the teacher has to be careful not to dominate the discussion. The teacher should aim for a more peripheral presence and provide the structure and conditions for the group to be emergent in their learning. Bonk, Kirkley, Hara, and Dennen (2001) concluded that in complex learning environments the teacher is vital to any success and certainly cannot hide. Successful online tutors provide frequent feedback on student work, ongoing discussions, reflections and case scenarios. Among the social activities the teacher must be flexible in pressing situations and give some choice regarding assignments. With respect to the managerial role it is important to provide the students with ways to find out the assignment structure and associated due dates, and to spell out the requirements and expectations. In this particular study we have seen differences in teachers' presence throughout the course and their reasons for it. The experienced teacher had a presence throughout and was following the group's activity very closely, building in supportive scaffolds at various points. We also saw that this group had a higher and more equally spread participation rate as well as more stable connections between all its participants. In one of the studies in the synthesis paper (Chapter 8), the effects of teacher presence were reported as well. In this case the group with the highly involved teacher had a higher social network density. These are two interesting emerging findings and further research is needed to study this potential relationship between teacher presence and group social network density and participation.

Online teaching is a delicate process and requires not only subject matter expertise but a lot of human insight and good social skills. Some studies (Chapter 8) concluded that teachers would benefit from more specific guidelines on how to execute their roles in asynchronous discussion boards. More systematic research in the role and perceived role of the teacher in networked learning environments would be desirable. During our case studies (Part 2 of this thesis) we found that support offered by the teacher is not only situated but also deeply connected to the nature of the course. Teachers build pedagogical frameworks based on their previous experiences with the course, building up knowledge and

theories about the flow of the course and what kind of support the group will most likely need and at which point in their collaborative project. Sharing mental models and stimulating teacher-teacher collaborations seem beneficial for developing good practice (see for example, Lund, 2004). The issue of the beginner teacher is also referred to by Goodyear (2002). One of the suggestions he makes to help novice online teachers is to offer a larger framework within which the making of individual design decisions, or other pedagogical commitments, can be understood and located. The novice teacher needs to be supported and introduced in the larger pedagogical scheme of things. Part of the expertise of an effective online teacher is the ability to draw on a repertoire of such tactics, with the flexibility required to implement a variety of strategies. But an equally important part of this expertise is to use this framework to think beyond the day-to-day events and to put the networked learning events into a larger time frame. This allows teachers to participate in a collaborative process of educational design and see the connections between the highest level values and beliefs and the minutiae of moment-by-moment online teaching. Recently some work has developed around the notion of design patterns (Goodyear, 2005; Goodyear, De Laat & Lally, 2005). The patterns are descriptions about reoccurring problems in, in our case, the networked learning practice followed by a solution that can inspire teachers to experiment within their own teaching practice. The aim is that these patterns are a source for learning instead of checklists or predefined models that 'can' be applied blindly. These patterns can connect teachers to a wider body of work and thinking, instead of having to solve problems in isolation. Sharing and further development of patterns by teachers is an approach to improve networked learning design and a way to stimulate teachers to theorise their practice (Korthagen & Lagerwerf, 2001).

Teacher-student Relationships

It has been discussed in a few studies (Chapter 8), that asynchronous learning environments impact the relationships between the teacher and students. Due to the openness of the environment, students are able to critique, discuss and support comments made by the teacher and fellow students. This means, for example, that the expertise and teaching style of the teacher can easily be challenged during the online discussions. The high degree of openness allows all the participants to have equal access to the discussion and comments made by all the participants, and therefore everybody has the potential to respond and manage the learning process themselves. In our case studies we have presented how students take on tutoring responsibilities throughout the course. Some studies (Chapter 8) rightfully raise some concern around this issue. This levelling teacher-student relationship needs to be clarified during the course as a way to make positions clear. Also not everybody is used (or wants) to relate to teachers or fellow students in this way. Learning in communities is not a technique you apply to a course and people start learning and constructing knowledge together. Social learning raises cultural issues as well as identity questions about who we are and where we are going (Wenger, 2004). Instead of being a happy passive learner you are confronted with all sorts of social challenges on top of your learning activity, which have to be managed. Some studies (Chapter 8) rightly pointed out that mutual expectations should be made clear and rules of engagement should be negotiated within the group. Despite the varied pedagogical approaches used in networked learning, one of the main outcomes of the studies we synthesised and the case studies presented here, is that there are tensions between the roles of tutors and the roles and responsibilities of students. A key challenge arising from this is: how can tutors 'escape' from their traditional roles and give room for new learning? How can tutors gradually scaffold their leadership in a process-oriented approach? How should their role be constructed in the various stages of development of a networked learning community? The pedagogical framework for online teaching needs to include support for online discussion and group regulation skills of the learners in networked learning communities (especially in learner-centred environments). Support is needed to provide feedback on task and group performance, and to help to develop personal identities (including role-play) in a community of learners. One approach is to make learner experiences

explicit, not just at the end of the course, but at various stages throughout. This has less to do with conceptual learning but has more to do with modelling the role and language of the learner (Mayes, 2001) and gradually handing over teaching responsibilities over to the learners. The presented data of this study (see Chapter 3) clearly show that both the teacher and students are engaging in tutoring responsibilities. The students are not only regulating their own learning but are also concerned with the group regulation of networked learning. When employing networked learning it seems important to carefully introduce students into taking over these responsibilities (Simons, Van der Linden & Duffy, 2000). In this process-oriented teaching there is a need to manage the interplay between self-regulation and external regulation (Vermunt & Verschaffel, 2000). This gradually changes the teacher-student relationship. Cousin, and Deepwell (2005) argue that communities need the space and time to create ownership over their project.

Group Regulation and Pedagogical Orientation

A consequence of this changing relationship is that students are invited to take part in the design of their collaborative project. The studies included in the synthesis (Chapter 8) have presented some empirical evidence that students are actively taking control of their learning agenda. These studies indicate that students are thinking about how to approach their learning task. In some cases this can lead to constant negotiation of power amongst members of the group trying to pursue their own learning agenda and/or style. To some extent we have seen this in our case studies as well (see Part 2 of this thesis). These ongoing tensions need to be monitored carefully because they can be destructive and lead to different subgroups emerging or individuals ignoring, or being ignored by, the rest of the group. These tensions are common within group learning and when dealt with in the right way can have a very positive effect on how the group functions. Group regulation of learning is an activity that has been recognised in several studies. In our own case studies, and some others, we have seen that during group work certain roles emerge within the group to regulate the learning activities, to provide social support to facilitate group members, and to keep a positive group atmosphere. These roles to some extent remained implicit and developed spontaneously during the group activity. During one of the case studies the group decided to explicitly develop certain roles and tasks to organise their collaborative learning. This suggests that the group was dealing with a lot of procedural issues during their collaborative project. Other studies (Chapter 8) offered or divided particular roles up front as a way to offer structure or a working method to the group. They indicate that role-play supports collaborative learning, but these studies didn't indicate the extent to which these roles were executed over time. In our case studies we have seen that students switch roles during the collaborative project, based on changing interests and group dynamics. These findings imply that when developing models to support teaching and learning in networked learning communities, these dynamics should be taken into consideration. Students are then capable to reflect on their learning process and develop support structures based on that. We think it is important to make students active players in developing their own social structure to regulate and coordinate their learning. More research into the development of emerging group structures will be needed to study this relationship between teaching styles and group regulation by the students. Are there common roles that students develop or are they unique for each group and/or learning task? In our case studies we have seen some common factors within the roles, but further and more detailed analysis of the tutoring and learning codes might tell us more about the nature of these activities.

In general, we can conclude that there is evidence of students coordinating and planning their collaborative learning. Also having or developing a more explicit awareness of roles and tasks will benefit group regulation of learning. Offering roles or stimulating role awareness in the group increases the amount of coordination in the group (De Laat & Lally, 2005; Strijbos, 2004). In a study where functional roles were compared with spontaneous roles, it was found that the role groups (who received prescribed role-instruction) performed predominantly according to the functional roles (Strijbos, De

Laat, Martens & Jochems, 2005). In a follow up study trying to find out if role behaviour leads to better learning outcomes, Strijbos, Martens, and Jochems (2005) found that a higher degree of emergent functional role behaviour in (spontaneous) non-role groups is associated with a higher grade. In other words, the more functional the role behaviour the higher the grade. This raises some interesting questions about the ability (or willingness) amongst the participants to understand and play these roles. Should pre-defined roles be provided to the group or is it better to let roles emerge spontaneously within the group? Also should these roles be played by the participants who seem to excel in them or is role-play part of the learning process? The latter, as a consequence, might very well hinder or frustrate the collaborative learning process.

Some studies (Chapter 8) indicate that students need time to familiarise themselves with networked learning environments and develop competencies required to take part in asynchronous discussions. Students need to learn to adapt in order to gain learner autonomy, as well as to learn strategies for effective collaboration. In our case studies we found examples of participants developing these qualities over time and from each other. During the synthesis we also concluded that group regulation requires additional metacognitive knowledge and skills (see Chapter 8). In group learning with increased learner control, knowledge alone about one's own learning style is not enough. Awareness of other's learning styles and strategies, combined with an extended form of inter-metacognitive knowledge has become important. There is a need for all the participants to become familiar with the pedagogies involved in networked learning. The constructivist nature of networked learning embedded in a community-based approach to learning can create barriers for learning. For most teachers and students networked learning requires a 'new' way of learning and it is wrong to assume that all participants have experience with it (see also, Veldhuis-Diermanse, 2002). Researchers conclude that it is useful to schedule a start-up period where an introduction to the model of teaching and learning is offered, discussed and experienced. When providing pedagogical structure it is useful to make distinctions between content-based pedagogies facilitating knowledge acquisition and construction, and process-based pedagogies concerned with facilitation and group regulation of learning (Strijbos, 2004).

Participation in Communities

The studies presented in this thesis (both case studies and synthesis) clearly indicate that students showed different forms of participation in their communities. Also the way they participate in these communities is not fixed but varies over time. There are many factors that explain these varying forms of participation. Some participants would rather learn alone, some follow their own interest while others support participants who express a similar interest. Others are simply learning by observing how other members of the community are acting and become increasingly more active when they themselves feel competent to do so. Disappointment on the quality, direction or engagement of fellow students input and engagement may also lead to decreasing participation. Research indicates that group members develop social relationships to sustain their collaboration. Being part of a community in which there is a sense of trust, emotional support, interdependence and mutual engagement is appreciated by students and preferred above learning alone. However, this takes time to develop and some studies (Chapter 8) indicate that additional management processes and introductory activities are needed. Some studies, including our case studies, show how networked learning communities develop social structures through which students facilitate each other, providing effective support, dealing with participants' wellbeing and group motivation. At the same time there is an emphasis in these communities on providing support for learning processes and helping each other to improve learning outcomes. Knowledge of participants' activities, as well as their engagement, in combination with their needs and desires, will help teachers (or moderators of web-based communities) to develop models and design for networked learning that provide the right kind of support when needed, adapted to the particular phase they are in. This way, networked learning environments enable the learners to de-

velop an open learning space for shared activity in which their learning is situated, where they connect ideas, share problems and insights in a constructive way with concepts they are already familiar with, and with new knowledge that is collaboratively constructed through their dialogues and social interactions online. We have indicated that currently this situated learning experience is limited to what is available within and to the community. In the context of higher education, the students are often not directly connected to real-life contexts, nor are they assisted by outside experts. In these cases it is mostly the teacher who is required to take on the role of domain expert and to coach students into becoming active participants within their subject. If we want to develop how the community model is used in higher education we might want to rethink how educational institutes are currently organised to challenge the traditional boundaries of the educational context and to make rich connections with the world outside. They develop dual learning trajectories (like the police academy of the Netherlands), have real or online excursions, guest speakers, develop relationships with professional or societal communities and report back to your community.

Participation, by the studies included in the synthesis, is mostly described as a way for students to create and share knowledge together in order to solve predefined problems in an educational context, making use of the expertise, competence and tools available in existing cultural practices. This does not mean they do not create knowledge but this remains within the sphere of individual/group knowledge structures.

If the aim is to have students learn through participation, then in most cases, as we have seen, the teacher will play the role of the full participant in his or her domain. The role of the teacher in this setting is one of a more competent participant who will act as a guide to model processes and skills; to model learning, thinking and regulation of activities. The teacher will also provide metacognitive guidance and stimulate students to reflect on their own learning (Simons et al., 2000). However, if the aim is to create or build new knowledge through collaboration, we need to go beyond the participation metaphor (Sfard, 1998). Lipponen, Hakkarainen, and Paavola (2004) argue that knowledge creation goes further than participation because there is a distinction between knowledge used in productive work practices, and knowledge that is the object and product of the collaborative activity. This latter process requires participants who are well connected to their practice and, to some extent, act as experts themselves. In this case more advanced learning can take place. The roles and expectations of all the members of an advanced networked learning community become aligned and deep learning relationships may form. Such a community may move beyond its current understandings of the domain and become creative, engaging in the re-negotiation of the knowledge in their domain (Wenger, 1998). These forms of community learning are reflection-based (Kirschner, Martens & Strijbos, 2004; Korthagen & Lagerwerf, 2001; Lipponen et al., 2004; Sergiovanni, 1999; Simons et al., 2000) and are more likely to be found in more advanced courses or within professional education, life-long learning and in workplaces where communities of practice are constantly renegotiating their meaning. However, this process of reflection, abstraction and conceptual thinking is a longer-term process. This may be the reason why the higher levels of knowledge construction are less frequently observed in most learning communities (De Laat, 2001; De Wever, Schellens, Valcke, and Van Keer, in press; Gunawardena, Lowe & Anderson, 1997; Veldhuis-Diermanse, 2002). Connecting subjects (knowledge domains) and practices over a longer period of time could be a way to transform communities of participation into creative communities or knowledge building communities (Bereiter, 2002).

Methodological Considerations

In our thesis we conducted exploratory studies in networked learning with the aim to describe collaborative learning and tutoring processes in networked learning communities. Due to the qualitative nature of this work we studied several interconnected and related networked learning practices. This way we hoped to get a better understanding of the networked learning processes involved. We are aware that each study has its own unique set-up and therefore tells its own story, but by studying multiple

practices we tried to rise above individual practices in an attempt to synthesise and further generalise our findings through connecting with a larger body of networked learning research. Conducting case studies can be a useful approach in this context because the case itself facilitates our understanding of networked learning processes (Stake, 2003) and can be seen as an exploration towards generalisation in itself or can be used to inspire generalisation-producing studies. In this thesis we conducted two case studies to build up an understanding of learning and tutoring processes in a particular course. We then related these findings to a wider body of research studying similar networked learning practices.

During the first case study we developed a multi-method approach to study the networked learning processes we are interested in. We started by using content analysis (a popular approach at the time as discussed earlier, in the introduction of Part 2). Content analysis, using coding schemes, allows you to pattern and abstract rich qualitative data. But this approach also has its limitations, coding schemes are often developed in small studies and have as a consequence a narrow empirical base, they are rarely compared with each other (see, De Wever, Schellens, Valcke & Van Keer, in press, for an extensive review) and highlights only what can be 'seen' from the messages exchanged between the group. To overcome some of these limitations one can use existing coding schemes (or develop more generic ones) and conduct additional analysis, like interviews, to probe the thinking behind the (coded) text. As a result of the coding exercise, some additional questions around the notion of collaboration in networked learning communities arose. In our research we focused on two main questions, level of involvement of the participants and their experiences.

Coding showed us that not everybody was involved in the collaborative project in a similar way or in a similar intensity; it also showed that these factors were not stable throughout the duration of the project. We wanted to know more about what these coding results said about individual positions in the group and how these are related to the other members of the group (see for example, Lockhorst, 2004). Based on these questions we decided to use social network analysis as an additional lens to look at collaboration in this networked learning community.

Social network analysis was used to verify if the participants with relatively high or low coding results were also appearing central and peripheral in the group. Secondly it can provide some additional information on connectedness on a group level. We have seen that coding outcomes are somewhat related to their position in the group but we must be careful not to favour one method above the other, since they draw upon different sources of information. In our study we were not able to investigate the number of times certain messages were read and by whom. We focused on active participation, through making contributions to the group, but it will be interesting to find out more about 'passive' behaviour as well. This way we can find out to what extent peripheral members are engaged with the group. Also we could keep track of the messages participants read between their own contributions. This might highlight more on how their contributions build on or are inspired by the thinking of others in the group. A combination of personal networks and whole group networks might serve this purpose. More information about individual behaviour will also assist the selection of participants for follow-up research as well as helping to focus or sharpen critical event recall interviews. In our case studies (see Part 2 of this thesis) we used the content analysis and social network analysis outcomes to select participants for a follow-up interview (critical event recall) to 'confront' them with our findings and find out how they felt at the time. Critical event recall allows you to study a larger period of time where a particular event as a whole can be reflected upon. The limitations of these interviews are that they are post hoc. To know more about how they felt at the time, other methods such as thinking aloud or observations mixed with interviews immediately after could provide more details about individual experiences and learning strategies/styles.

Validity and Generalisability

In our research we are concerned with whether or not our interpretations and explanations fit with the practice we are studying, without claiming that there is only one way of interpreting an event (Denzin & Lincoln, 2000). There are, however, several ways to support the interpretation process and improve validity of the study. To improve external validity (or generalisation) of the findings, one can undertake multiple case studies to identify general patterns. In this context, Stake (2003) refers to naturalistic generalisation, where people look for patterns that explain their own experiences and the world around them. According to Stake (2003), one of the strategies to ensure internal validity is the use of triangulation throughout the research process, for example using multiple data sources and mixed-methods to confirm the findings (see Schrire, in press). Triangulation is also used to clarify meaning by identifying the different ways in which the phenomenon is being seen (Stake, 2003).

The triangulation in this thesis is done in several ways. Firstly, by integrating the outcomes of one (or more) method into the next method. In our study, for example, we used notions of student participation, and teaching and learning activities, to strategically select the participants for the critical event recall interviews. In this way we tried to cover some interesting emergent patterns, like dynamics of central- versus peripheral-acting participants, and participants who showed increasing versus decreasing activity over time. Secondly, we used the summary tables produced during the content analysis (for example) as a stimulus during the critical event recall interviews, and asked the participants to reflect on these patterns as a way to focus the interview. Thirdly, by using the outcomes of one method to interpret and contextualise the outcomes of another method, for example, by relating participants' position on the sociograms with the outcomes of the content analysis table. It's the expectation that central participants will also have engaged more frequently in learning and teaching activities. The forms of triangulation we are using are referred to as data (gathering data at different times) and methodological (using more than one method to gather data) triangulation – (Denzin & Lincoln, 2000). Another less-observed method to improve internal validity, is carrying out cross checks with the members involved in the study by allowing them to review the material (Janesick, 2003). Cross checks are often conducted in the case of interviews, where the researcher (by lack of full transcription) provides the interviewee with a summary to check if it captures the essence of the conversation that took place. A slightly different, but interesting, method, called 'audit procedure', is used by Akkerman, Admiraal, and Brekelmans (2005). The aim of conducting an audit is to check and assess the quality of the applied research methods and its outcomes by an external researcher, following prescribed guidelines. This way the interpretation and conclusions, derived from ethnographic data gathering and/or in-depth qualitative analysis, can be verified.

In our case studies (see Part 2 of this thesis) we carried out a member check during the critical event recall interviews. Before these interviews the participants received the summary tables of the coding materials and a full print-out of the messages that were included in our data set. During the interviews these were used to reflect on whether or not they could recognise themselves in the patterns that emerged.

The emerging reality of our own work in this area is that the nature of interactions among participants in online educational communities is sometimes very complex and multi-dimensional. It is not easy to research the processes of these interactions using any single method. This has stimulated us to explore a multi-method approach to understanding interactions among members of these communities. And in doing so, attempting to reveal and understand the richness of the processes beyond the capability of any one of the methods, when used by itself. Other researchers have recently started to call upon multi-dimensional methods of analysis to address the richness and complexity of networked learning environments (De Laat, Lally, Lipponen & Simons, in press; Hakkinen, Jarvela & Makitalo, 2003; Lockhorst, 2004; Ravenscroft, 2003; Strijbos & Stahl, 2005; Weinberger & Fischer, in press). Mixed-

method approaches increase the possibilities to verify our findings and our understanding of the phenomenon we are studying.

Timeline Analysis

Early research in networked learning was focused mainly on the overall processes or outcomes of participant or teacher behaviour, using coding schemes (Gunawardena et al., 1997; Henri, 1992), questionnaires or student feedback (McAteer, Tolmie, Duffy & Corbett, 1997). More recently there has been articulated a need for a mixed-method approach – sometimes with a preference for a combination of quantitative and qualitative approaches (Häkkinen, Järvelä & Mäkitalo, 2003; Hammond & Wiriyaniti, 2004; Strijbos, 2004). However, one aspect that has been largely ignored in networked learning research is the dimension of time. By focusing on the overall experience or processes of learning and teaching, we are in danger of losing the development of this networked learning experience or how these learning and teaching processes evolve over time out of sight. Conducting timeline analysis in this case study by describing the beginning, middle and ending phase of networked learning activities is a way to address this. This research shows two things: 1) When describing processes it is important to take into account that these processes are not static throughout time, but have different dynamics at various stages of the collaborative work. More detailed knowledge of this process helps researchers and teachers (or moderators) develop more refined models for support of networked learning. 2) A multi-method approach is not only a way of taking multiple perspectives, but also a way of contextualising and building up an understanding of the activities that participants are engaged in, by using the outcomes of one method to further understand the results of next. This way, a more complete understanding of the networked learning activities can be developed.

Theoretical and practical implications

In Chapter 3 we raised an argument about the need for a theory praxis conversation; one in which networked learning design and practice is informed by theory and where the practice is used to critically reflect on our networked learning experiences, theories, pedagogies, and design to enhance our praxis. This is an ongoing process on various levels of scaling. First of all, it is not expected that every study has to lead to theoretical advancement, but they can be a smaller part of a chain, where advancement is made over a larger period of time. Secondly, research can be aimed at reproducing certain findings to strengthen or weaken a particular theoretical framework. Thirdly, research can be directed towards theory-building, for example, through theorising practice or logical reasoning. The focus of this thesis was to firstly undertake exploratory research to describe how participants of networked learning communities learn collaboratively. We started with describing the theoretical perspectives that influenced the networked learning practice we were focused on. However, we soon realised that 'completing' a theory praxis conversation, through a process of synthesising findings, followed by a systematic analysis of how theories are used in networked learning research, proved to be beyond the scope of this thesis. However some issues for theoretical considerations have been put forward.

The studies have shown that during collaborative learning the role and position of the individual should not be overlooked. Theories on social construction of knowledge and community-learning might need to have more emphasis on the importance of the needs of the individual, instead of being so focused on collective outcomes. In this thesis we have seen that participants reward collaborative learning and engage in learning processes on a social level in the group where knowledge is shared, discussed and constructed, but their reasons for doing so are also connected with personal growth. On several occasions we have seen that students express a need for a teacher (or moderator) to provide reassurance that they are still on the right track, and prefer for their shared product to be 'verified' before being convinced of the quality of their own/collective product. It seems that they seek approval before accepting their learning outcomes. Some researchers argue that students need to learn to be-

come constructive collaborators, but one could also wonder whether this is a by-product of our need (or being used) to be rewarded. The role of reinforcement during (social) learning processes influences the way we operate (Ravenscroft, 2003) and might need to be taken into account when reflecting upon theories currently used to design networked learning. Do we need to build in reward-driven approaches to become successful collaborators or are they hurdles preventing us from experiencing a pure collaborative experience? In other words; “would collaboration occur if we [teachers/designers] did nothing?” (Downes, 2005).

We have discussed that collaborative learning, or learning communities, in higher education might be too much consensus-driven and inward focused. Learning is participating in situated activities, but also about crossing boundaries as a way to seek new practices to participate in; ones that inspire you to grow as a person. The balance between learning in social interactions and collective learning activities needs to be addressed further to build a theoretical framework to guide design for networked learning.

The emerging tension between teacher and student control and their changing relationship is an issue that needs further attention. At the moment the role of the teacher and its status is somewhat unclear. The question arises to what extent we need to re-conceptualise teaching in networked learning environments. How can teachers renegotiate their traditional roles and give room for new learning? How can teachers gradually withdraw from their responsibilities and hand over control to the students? Do teachers want to give up control, and if not, what makes them resistant? More research is needed to understand and deal with these tensions effectively.

Another point to put forward is the notion of inter-metacognitive knowledge. The capability to reflect on your personal learning strategies has been widely acknowledged; but the design of learner-centred learning environments, where students are stimulated to learn in groups, has extended this notion even further. It also requires students to have interpersonal metacognitive knowledge and skills, in order to take (shared) control and manage their learning together. Further investigation and connection with theories on metacognitive knowledge is needed to study how different these skills are from each other. In networked learning we have seen how course design models have developed from teacher-centred to learner-centred (Simons & De Laat, 2005). But the findings presented in this thesis point towards the need for a more community-centred model, where both individual as well as collective learning processes and outcomes are accounted for and negotiated by the community. We have seen that the participants themselves are actively involved in managing and regulating their learning. Many design principles or pedagogical models are strongly focused on the role of the teacher to (pre)design, facilitate, moderate and assess networked learning. We would like to shift this focus somewhat to include all the participants in the design process and develop a more community-centred approach to networked learning.

We will now try to translate the themes we have identified in this thesis, into guidelines for networked learning design. In doing so, we will take a process approach (including a start-up, beginning, middle and ending phase) with the aim to describe events that need to take place during a collaborative project. These actions are not prescriptive and there are sufficient design principles and studies available that provide more detailed information about what to do in these specific circumstances (Anderson, Rourke, Garrison & Archer, 2001; EQUOL Position Paper, 2004; Goodyear, 2002; Kirschner, Martens & Strijbos, 2003; Lockhorst, 2004; Mason, 2001; Salmon, 2000; Van Merriënboer & Kester, in press; Veldhuis-Diermanse, 2002; Verdonschot, 2003; Wenger, McDermott & Snyder, 2002). Using these principles in combination with the outcomes of this thesis we will attempt to outline design guidelines for a community-centred approach to networked learning. These guidelines will apply more specifical-

ly to learning activities in networked learning communities within higher education, but we think they can be a source of inspiration for networked learning in general, where people try to solve problems together in groups. A summary of this community-centred approach is presented in Table 1.

Start-up period

The aim of this period is to get familiar with the networked learning environment, be introduced to the pedagogical models, get to know each other and start building a sense of community.

Prior to the actual collaborative project, the group should organise a pre-meeting where they can share their experiences with networked learning. At this point they should also share their expectations and involvement with the coming collaborative project. Here they can negotiate some rules of engagement and what it means to them to participate in a collaborative project. During this period they can get to know each other and provide some background information about the work they do and/or why they signed up for the course.

This is the opportunity for the teacher to explain more about collaborative learning in groups and discuss what the role and position of the teacher is during this process. The main issues are to set the right tone for the discussion and contribute to the development of a sense of community. The teacher should raise the awareness that collaborative learning is not limited to a task focus but that group processes will have to be regulated as well. Within the group they can start reflecting on their personal learning preferences and capabilities to manage group processes and express their interests in doing so.

The previous phase provided some initial information about the collaborative project. In the beginning phase the group needs to start conceptualising their collaborative project together. The communication is not only task focused but also socially centred, aimed at building trust and promoting group wellbeing.

Based on the information about the task and what they know about their group, they can negotiate amongst themselves what their collaborative project could be about and which problems it will address. Here they will start thinking about individual and shared responsibilities, develop an action plan and set up several deadlines to be met throughout the project.

It is recommended that this project has a personal and professional focus. This way the members in the group can personalise their project and identify and recognise the issues that need to be addressed. Ownership of the collaborative project is created in this period through a process of negotiation within the group. During this phase the group could make explicit how their project meets both group and individual needs and how they can support and help each other realising these learning goals. This way any overlap or gaps between individual (both individual learning and learning in social interaction) and collective-learning processes and outcomes can be monitored by the group.

In the beginning period the students appreciate active guidance from the teacher. The teacher can play an active role during this phase by making sure that the collaborative project will not become too ambitious. The teacher can facilitate the group's processes to make sure everybody has a voice in establishing their project. We have seen that teacher involvement is mainly to make sure the group develops a healthy learning climate, develops a method to work together, and develops a learning agenda. Based on the conversations held during the starting-up phase the group can make some decisions about participant involvement and the preferred way of working. This can be used to build a more explicit learning culture in the group, based on roles and focuses that emerged from the interest and competencies available in the group.

Teacher participation should be exercised in a way where ‘control’ is gradually handed over to the group. That this would happen was already discussed during the start-up period and should have stimulated the group into thinking more actively and strategically about their group work. However, the effects brought on by a teacher who is gradually withdrawing start to surface in this period.

During the middle phase, where the group is mainly working on the task, they need to regularly reflect on their progress and processes, in order to monitor their learning agenda. We have seen that groups welcome teacher involvement, but also that they are more than capable of carrying out their task themselves. The initial group structure, developed during the beginning phase, will help them make necessary adjustments. This is based on the work that needs to be carried out during this phase, as well as the support needed and the participation in the project. The group moved on from thinking about how to carry out the task to actually working on the task. During this period the participants are discussing ideas, looking for additional information and building up an understanding of their project’s topic. This requires a journey in learning where they must deal with uncertainties regarding their direction. The group needs to build trust amongst themselves to believe in the quality of their work. The presence of a facilitator in the group that supports these processes is very important. The tutoring roles are concerned with connecting members of the group and drawing in participants to take part in the discussions, stimulate reflection on the content, and assess the efficacy of the process. It is important to maintain a learning climate within the group by making people feel confident enough to express their opinions. Through this process of managing the group’s functioning and emerging dynamics, the group will be able to adjust accordingly; changing the roles needed during this phase, dealing with personal growth of participants and changing interests, setting new deadlines, etc. The teacher’s role is to provide the group with feedback regarding their performance and to keep connected with the direction in which they are going, and being ready to facilitate when necessary. A constant monitoring of the group (both content and process) by the teacher is required to be able to tune in when needed.

In the ending period the group will gradually turn its focus from predominantly working on the project to reflecting on the work done. The group needs to work towards a conclusion and tie loose ends together. We have seen that learning activities tend to decrease and there is more reflection on the task. But the group still requires a high level of facilitation and design activities. The group needs to develop a working structure to find the best method of finalising their project. This phase is a difficult one to manage as some members might start to focus on other activities outside the group. We have seen that density drops and people start to disconnect from the group. This period benefits from a stronger teacher presence, providing guidelines on how to end the project and remind the group about the deadlines and procedures that need to be followed. However the teacher should be careful not to take over the control given to the group earlier on.

In the following table the community-centred approach to networked learning is summarised. This summary is based on findings of the case studies, outcomes of the synthesis paper and additional design studies previously mentioned.

Table 1. A community-centred approach to networked learning

Phase	Group activities	Teacher activities
Start-up phase		
Initial networked learning design		Use previous pedagogical framework and share with other teachers on this (or similar) course
Familiarisation with networked learning environment	Organise pre-meetings and share experiences Get to know each other Provide background information about the work they do, their interests and why they signed up for this project	Provide an introduction to the open-learning space Be an active participant and address changing relationship
Familiarisation with pedagogical models	Discuss what collaborative learning means within the group	Explain the approach to collaborative learning and attitudes towards knowledge construction Discuss what the role of the teacher is during this process Raise awareness of regulating both task and group processes
Community building	Negotiate individual learning preferences with learning goals and group capability to learn	
	Develop rules of engagement and etiquette	Participate in these conversations, set the right tone and contribute to the development of a sense of community
	Build trust and discuss how to provide support and guidance to each other Discuss intended level of participation and availability during the project Build up a collective understanding of each others desires, commitment and work (or learning) preferences	Set the stages in the beginning, provide guidance and reassurance to the group Teacher participates in this and discusses their presence and availability during the project
Beginning phase		
Conceptualise collaborative project	Negotiate what the project could be about and which problems it will address	Active teacher guidance and facilitating the group’s processes to make sure everybody has a voice in establishing their project
Task-focused communication	Create personal and professional focus to increase personalisation, identification and recognition of the issues that need to be addressed in the project	Participate in developing a working method and learning agenda
Socially centred communication	Identify and address overlap and gaps between individual and collective learning processes and outcomes Creating a healthy learning climate and think about their individual and shared responsibilities	
	Develop a learning agenda based on personalising the group structure and task ownership	Teachers can open up these conversations and use their pedagogical framework to induce students in this process

Phase	Group activities	Teacher activities
Beginning phase (continued)		
Develop a group rhythm	Develop an action plan and set up several deadlines and milestones to be met throughout the project Students develop roles and strategies to structure the collaborative learning	Stimulate the group to make roles and strategies explicit
	Based on previously discussed levels of participation and duration of the task	Discuss teacher presence
Inter-metacognitive knowledge and skill	Gradually develop inter-metacognitive skills	Gradually hand over control to the group and withdraw
Middle phase		Close monitoring (both content and process)
Strong focus on the content of the task and ongoing facilitation of group processes Ongoing reflection on group functioning and dynamics	Group is actively working on the task	
Community spirit and trust building	Group is in control of regulating and managing their project Make necessary adjustments based on emerging roles, levels of participation and work needed during this phase Monitor and adjust overlap and gaps between individual and collective learning processes and outcomes	Teacher has handed over control to the group Provide access to feedback material on how the group is working
	Facilitate each other and maintain a healthy learning climate in the group Believe in the quality of the work	Monitor and adjust overlap and gaps between individual and collective learning processes and outcomes
		Provide scaffolding or guidance when needed
Ending phase		
Gradual shift towards reflection on the work done	Wrapping up the project	Active teacher participation to provide guidelines and procedures
Reflect on the current group structure to facilitate and design	Revisit original structure to deal with emergent structures	Providing guidelines on to how to end the project, provide deadlines and procedures
Reflection on the project	Assess individual and collective learning outcomes, using self and peer assessment reports	
		Update pedagogical framework

Specific Implications for the Police Academy

The police academy is committed to implementing networked learning in their courses to provide rich connections between students, teacher and student, and student and police officers in the workplace. Since the introduction of their new educational system, their focus is on providing a learner-centred learning environment where students are active learners, collaborating with fellow students and police officers in the workplace on authentic learning tasks situated in the work practice. The police academy offers dual learning trajectories where periods of learning at school are alternated with periods of learning in the workplace. On the one hand, the e-campus serves as an open networked learning environment, accessible to all the members involved in the learning trajectories within the police organisation. This way, the students especially, are able to maintain contact with their fellow collaborators while they are working on their collaborative tasks from the workplace where they are situated. On

the other hand the e-campus will be used to make students familiar with networked learning and prepare them to become constructive social learners who are able to initiate or address learning challenges on their own when encountered during their work or elsewhere. Being able to learn with, and from, others, by actively participating in various activities that matter, is a form of informal learning that the police academy strives to improve amongst the police force. Work-related learning is therefore not limited to learning online (see Doornbos 2005, for an extensive study in work-related learning in the Dutch police force), but it is rapidly becoming part of everyday reality. The police knowledge network, a knowledge management institution, established several years ago has now fully merged with the police academy and strategically leads the police knowledge and expertise centre. One of the aims of the police knowledge network is to implement a nationwide knowledge network to improve dissemination and access to up-to-date police know-how and to stimulate communities to interact and discuss and solve work-related problems. The police academy seeks to streamline the processes through which workers keep themselves up to date and the need for the organisation to know what it knows. Combining these processes requires knowledge management on both organisational and individual levels and an information and communication technology infrastructure to support it (Broer, 2002). However, the implementation of such a structure alone is not enough. New competencies are required in order for this system to be used effectively (Ter Huurne et al., 2004). It is clear that this requires additional learning skills. In this thesis we have seen that networked learning is a process driven and designed by the learners. This does not mean they do not need support, but support should be directed towards increasing the degrees of freedom through which learners can sustain their learning independently.

Through the use of the e-campus the police academy prepares students to become self-directed active learners capable of using computer networks to retrieve information and interact and collaborate with peers to share and discuss experiences and work-related problems. Learning in networked learning communities, using the e-campus, is being introduced and we believe that the outcomes of our thesis provides some guidelines and insight into how networked learning processes can be organised, supported. It also identifies what the learning and tutoring activities are that people carry out during a collaborative project. Additionally, based on the outcomes, we think that the police organisation is in a strong position to design networked learning tasks because of the direct links with the police practice. The tasks students work on can be integrated (hence the dual learning trajectories) with ongoing work in the workplace. The tasks can have a strong professional focus and relevance, and stimulate students to share their work experience with fellow students and discuss emerging differences in how work is done, approached, etc. The tasks can be open ended and actively designed by the students based on their learning needs and upcoming events in the workplace. Also in these networked learning communities there is no need for the teacher to model the expert role; in fact the teacher is, or should be, one of the experts in the field, teaching from their experience; representing the best of what their community can offer. The teacher and students should be able to invite guest speakers from their workplace (or elsewhere) to participate in the group discussion to share or elaborate on stories being told, and provide an alternative perspective to widen the focus or provide a bigger picture. Connecting the students with experts and peers in the field is not a one-way process. The teacher can (or, at the very least, encourage to) take the students on (online) excursions exploring both national and international contexts, pointing out relevant sources of information, inviting them to the communities who are talking about the issues they are studying and letting them join and listen in. This way the teacher can act as the guide on the side, opening up the doors that are relevant to the topics the group is deciding upon to address as they continue to develop or maintain their learning agenda.

A study conducted by the police academy (Ter Huurne et al., 2004) indicated that recently the educational institutes within the police offers a large number of discussion forums within their e-campus environment, but most of these forums are not frequently used (contributions ranging from 0-5 mes-

sages). They concluded that the creation of discussion forums by the teacher does not automatically lead to active use by the students. This emphasised their expectation that use of discussion forums is reliant upon personal initiative and involvement of the teacher. Also it is not clear to what extent these discussion forums were integrated into the course design and whether the tasks (mostly initiated by an open question) were part of the overall course objectives or functioned as an add-on to what was done during the face-to-face contacts. In a follow-up study the teachers were explicitly trained to embed the discussion forum in a case-based course task and applied a content support model with an active role of the teacher. This study indicated that providing content structure leads to a higher grade on average but the difference between the groups was not statistically significant. The effect of an active versus a passive teacher leads to similar results. The provision of structure (content and process) has, to some extent, a positive influence on the learning outcomes of the students. The students indicated that the discussions showed that they shared different perspectives on the problem which led to the development of a richer understanding of the case they were studying. The teachers commented that this way of working increased their understanding of the lives and experiences of their students. Practical relevance of the discussions is one of the successful driving -factors of these forums. Students indicate that participating in discussions and sharing knowledge with fellow students is important for their own learning process. They appreciate the possibility of maintaining contact with the students and teachers during their time in the workplace, although they also indicate that they mostly prefer live discussion above asynchronous communication. The use of networked learning in courses at the police academy needs to be carefully blended with the ongoing face-to-face meetings and used in such a way that it has an added value to existing practices and that it is used in a meaningful way. Ter Huurne et al. (2004) conclude that using discussion forums benefits from concrete information for the teachers on how to use them, i.e how to guide and support the collaborative learning processes of the students, knowing when to intervene and making action plans and roles explicit. These promising findings indicate that the use of networked learning within the police academy has a future and are comparable to experiences with networked learning outside the police organisation. Combining these conclusions with the findings of this study, mainly to emphasise the active role of the students to regulate their group learning and teaching them how to do this, can be used to further develop the use of the e-campus. In their conclusion Ter Huurne et al. (2004) are relatively teacher-centred. We think that these conclusions should be used to increase student awareness on how to learn together on collaborative learning tasks.

As we have seen in the previous section both the teacher and students should be familiarised with networked learning processes and procedures. They should design and manage the collaborative task together, applying a community-centred approach. The teacher can use previous experiences (mental model) to raise awareness about the flow of the project work, highlight typical activities for each period and point out expected pitfalls. The group needs to learn how to learn together, manage individual and collective learning needs, desires and outcomes, align the learning strategies with emerged structures within the networked learning community, and reflect regularly on the way things are going and make optimal use of the capacity that's gathered together in the group.

Both the e-campus and the police knowledge network provide opportunities for people to initiate (meaningful) interactions with other members of the organisation. But there are still some boundaries between them. Further integration of the police knowledge network in the police organisation and education institutes provides the opportunity to connect students with professional communities and confer online about their practice.

The presented approach to networked learning in this thesis stems from community-based principles on learning, and provides structure for learning in networked learning communities in higher education as well as in organisations. Cultural and organisational differences are to be expected between

learning in educational institutions and in the workplace. For example, the reality of the situation and the responsibility or pressure to act in these situations are radically different, but when creating cross-overs between these two worlds, one might find that the way groups learn is not that different at all. In both situations there is the need to participate in ongoing discussions, discovering solutions for the problems at hand. During this process the groups will have to regulate their group processes, develop plans and working models. This thesis highlighted that participants are heavily engaged in these processes and that it will be positive to direct support for design around the needs and working methods developed by the group themselves. As such, support from a teacher (or moderator, in the case of the police knowledge network) should be focused on teaching the groups to actively learn together, in a way which is relatively self-directed, situated in their own activities and connected to their professional practice. Participation in networked learning communities is partly driven by the individual's need to learn and solve problems encountered during work. There is a recognised benefit from discussion groups using the police knowledge network; that is to have access to a community that understands your problem, potentially provide solutions based on previous experiences, or is interested in learning from each other's problems and develop the practice as a whole. Through this thesis we developed a detailed understanding of the networked learning processes and procedures, which can be used to address the needs of networked learning communities to provide better design and support.

Final Thoughts

In this thesis we have explored how participants are learning collaboratively in networked learning communities. In the beginning of this thesis we mentioned that it is important to undertake exploratory research to gain an understanding of the learning and tutoring processes that take place when people are learning together through computer networks. We found that networked learning provides people with the opportunity to gain more active control and take ownership over their learning agenda. As such, people are stimulated to reflect more and think strategically about what they want to learn, how they want to organise this and with whom they want to learn. Networked learning environments provide open learning spaces where people are able to develop meaningful interactions between each other. This is not limited to learning in educational institutes or organisations necessarily. There are plenty of examples of communities available on the internet, which indicate that networked learning has a global impact, connecting people wherever they are. Networked learning happens spontaneously between people who decide to share their interests. The extent to which this is learning in social interactions or collective learning will vary, based on the level of participation the learners choose to make. However, it is the communities that people build that open the doors for 'new' learners to enter their knowledge domain, take part in their conversations and learn about their practice. It is the community that keeps knowledge alive and accessible over a longer period of time, through fostering meaningful lasting relationships. Communities are social learning spaces and without them it would be silent in the world of networked learning. When thinking about networked learning we should think in terms of providing the right tools that stimulate people to develop meaningful connections and build community structures to support their learning.

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Background and Research Question

Over the years the demand for online communication has become so strong that educational institutes and organisations are now actively implementing network technology to facilitate communication and online learning. In this context we speak of networked learning. By networked learning we mean a context in which internet-based information and communication technologies are used to promote collaborative and co-operative connections: between one learner and other learners; between learners and tutors; between a learning community and its learning resources, so that participants can extend and develop their understanding and capabilities in ways that are important to them, and over which they have significant control (Banks, Goodyear, Hodgson & McConnell, 2003, p.1).

The police academy of the Netherlands is interested in this networked learning phenomenon. Since the 1990s the Dutch police have been rapidly building networks to support the exchange of information over a nationwide intranet, called the police knowledge network. The aim is twofold: 1) to make police knowledge and procedures available and 2) to engage police officers in processes of collaborative learning and knowledge-building together through social interaction. This network facilitates online communication, using email, chat and discussion forums. Using these tools the police academy plans to increase connectivity amongst police officers to stimulate them to share work experiences and discuss work-related problems, as a way to keep police knowledge and procedures alive and up to date. Similar developments were taking place in the police academy, aiming to offer online education and preparing them to become active networked learners to support lifelong learning in the workplace. One of the key ideas to support communication was to offer the possibility to build or join online communities on the police network, where workers can share and discuss their expertise or students can collaborate on course assignments. The focus on communities of practice (Wenger, 1998) seemed appropriate because this was an emerging concept and is still a central concept influencing research agendas in the areas of human resource development, knowledge management and networked learning. This concept of learning in communities captured the notion of negotiation of knowledge through participation in groups of people sharing a similar interest for a certain domain or practice, while building a sense of belonging and shared identity. Communities not only provide an open learning space where they develop their knowledge domain and practice, it is also a place where community knowledge is kept alive and learning is situated in the activities, context and culture of the community. Learning community knowledge and skills are processes of participating in community activities where knowledge is constructed through social interactions (Lave & Wenger, 1991). This process can largely be facilitated by the internet (or network technology), and the concept of communities provides an interesting perspective through which networked learning in the police organisation can be designed.

Networked learning was a relatively new concept and is still far from common practice within the police organisation. For this reason we decided to conduct exploratory research to describe how members of networked learning communities engage in collaborative learning activities. Our research question is:

How do participants of networked learning communities learn collaboratively?

In the first part of this dissertation we explore the concept of collective learning. In Chapter 1 we focus on social aspects of learning and we distinguish between learning in social interactions and collective

learning. During learning in social interactions people learn with and from each other, but the learning outcomes are mostly geared towards individual needs. When people explicitly aim for collective learning outcomes through a collaborative learning process we speak of collective learning. Frequently occurring forms of social learning in organisations are: learning through participation in networks, teams and communities. The conclusion of this chapter was that learning in communities is an interesting approach for organisations. Learning in communities is bottom-up, self-governed and based on the experiences and daily activities of the members of the community. Communities are nodes for the exchange and interpretation of knowledge; they retain knowledge in 'living' ways, steward competencies and provide homes for identities (Wenger, McDermott & Snyder, 2002).

Networked learning communities provide the police with an attractive solution for bringing expertise that is dispersed over the entire country, together. In Chapter 2 we discuss how the police academy implements knowledge management as a way to stimulate learning in the workplace and we conduct a tentative pilot-study to describe how communities of practice within the police organisation might use this network to facilitate their learning. During the pilot-study we tried to locate some early examples of networked learning in communities. We followed an inductive approach through a process of observation, interviews and content analysis to develop an understanding of the way these communities used information and communication technology to interact with each other. We concluded that this usage was at a very 'experimental' stage. The implementation of a police knowledge network in the workplace had only just started and most police officers had no clear conception of what this kind of technology had to offer or how it worked. The introduction of the police knowledge network (together with the reorganisation of the police academy) meant a cultural change, raising both scepticism and enthusiasm amongst police officers. Some were keen to use the police knowledge network as a way to develop or support communities. It also became clear that most of the community members were not yet connected to the network or found it hard to participate in online discussions. The online discussions we saw were often question-and-answer-based, and unstructured and dissolved into monologues or two-way conversations that fail to involve the whole group (Wertsch, 2002).

The police knowledge network still needed to do a lot of advertising, and the communities included in our pilot-study were affected by this. They were in very early stages of development, where community activity was overshadowed by a few core members trying to build up the community. For this reason, in the next part of the thesis, we decided to make a journey outside of the police context, so we aimed at studying networked learning communities in higher education.

In Part 2 of this thesis we study how participants of networked learning communities learn collaboratively while undertaking a Master's programme in E-Learning at the University of Sheffield. The design of the course follows community-based design principles for networked learning, aimed at providing an open learning environment where students can construct knowledge together (EQUEL Position Paper, 2004). This course is taught entirely online and the participants are expected to participate and organise community activities together. The research in this part of the thesis consists of two case studies. In the first case study we explore the learning and tutoring processes in a networked learning community and we develop a method for studying these processes (see Chapters 3, 4 & 5). This case study is followed by a second case study where we re-apply the developed method in two other networked learning communities who are undertaking the same course (see Chapters 6 & 7). This way we replicate our first study to check whether the research method can be used outside the context in which it was developed, and secondly to see if we find similar results. In both case studies, the communities worked on a similar task with the aim of developing a course design for online learning, making use of current learning theories and research findings.

Method and Findings

In this thesis we used a multi-method approach to study the complexity of learning and tutoring processes in networked learning communities. Through the use of mixed-methods and multiple data sources we can provide a more holistic description of networked learning and, in doing so, attempt to reveal and understand the richness of this process beyond the capability of one of the methods, when used by itself. This process is called triangulation. Triangulation is a process through which more than one approach is used in the investigation of a research question, in order to enhance confidence in the ensuing findings (Bryman, 2004). In our thesis we combined three methods. We used social network analysis to find out 'who is talking to whom', content analysis through coding tutoring (Anderson, Rourke, Garrison & Archer, 2001), learning activities (Veldhuis-Diermanse, 2002) as a way to find out 'what they are talking about', and context analysis (using critical event recall and self-assessment reports) focusing on the experiences of the participants to find out 'why they are talking as they do'. Triangulation in this research project is done in several ways. First by integrating the outcomes of one (or more) method into the next method. We used notions of student participation, and teaching and learning activities to strategically select the participants for the critical event recall interviews. In this way we tried to cover some interesting emergent patterns, like dynamics of central- versus peripheral-acting participants, and participants who showed increasing versus decreasing activity over time. Secondly, we used the summary tables produced during the content analysis (for example) as a stimulus during the critical event recall interviews, and asked the participants to reflect on these patterns as a way to focus the interview. Thirdly, by using the outcomes of one method to verify and contextualise the outcomes of another method. For example by relating participants' position on the sociograms with the outcomes of the content analysis table.

The collection of data was divided into three time periods: beginning, middle and end. This way we could study how the activities of the participants evolved over time. From each period (of a 10-week collaborative project) we took a 10-day sample to form our data set.

How do Participants of Networked Learning Communities Learn Collaboratively?

Based on the results we can see that the students are actively engaged in collaborative learning activities. Through online conversations they are debating ideas and problems amongst each other, contributing new information to their discussions, referring or extending their discussions, making summaries, reflecting on the content of their discussions, as well as sharing 'social' experiences with their group members who are not directly related to the task.

Part of these collaborative activities includes engagement with tutoring processes. Group regulation is something all the participants are concerned with. They motivate each other, develop an open learning climate, encourage each other to contribute, think and co-design course activities, develop tasks and plan and discuss group activities together.

At the same time these collaborative learning activities tend to be driven by personal interests and learning agendas, or individual students' goals. They try to put forward their own interests (or stimulate ideas of others who happen to advocate their interest) when the learning task is being conceptualised, and during the project the motivation to regulate and coordinate group processes is often animated by their personal desire to get the task finished. Comments from fellow students were valued as a way to achieve personal goals.

Engagement with tutoring and learning activities changes over time, but in all cases the activity is highest during the middle phase, where also the focus is drawn towards working on the task and facilitation of group processes. In the beginning they show elements of working on the task and setting up a group structure to support this (facilitated by the teacher). During the ending phase there is a relative increase of reflection on the task and a focus on facilitation and instructional design to coordi-

nate the final phase of their collaboration. The teacher is mostly engaged in this as well. The teachers in this course act both as learners and tutors, though their main concern is to guide and facilitate the group's learning. The role of the teacher continues to have a status apart, being responsible for the overall coordination of the workshop and its educational goals.

In this open learning space we see that the (traditional) relationships between the students and their teachers are changing. The students don't just rely on guidance from the teacher but value and provide support and guidance for each other. During this course the teachers try to set the stage in the beginning, provide guidance and reassurance to the group to support them in developing their collaborative project. But at the same time their position is levelled with that of the students in order to create an open learning environment where everybody can participate in the development and design of their collaborative project.

We found that students are developing roles and strategies to structure their collaborative learning. In two communities these roles remain somewhat implicit, but the second community of Case study 2, explicitly developed certain roles, tasks, and deadlines to coordinate their project.

Over time we have seen that these roles are not necessarily inhabited by the same people. Each phase has its own configuration of people coming in and out of the centre. Though active participants mostly stay connected to, or continue to be part of, the centre of the activity, but might change their learning or tutoring style.

This study has pointed out that students, who are undertaking a course designed around community-based learning principles, show elements of developing a learning agenda together, taking active charge and control over their learning activities and engaging in processes of helping out, supporting and facilitating each other. They develop social relationships in order to sustain their work on the learning task.

Through participation they learn from each other's learning strategies and styles. They develop an awareness that their learning and task completion can be enhanced through managing the processes in the community. Through observation they develop an understanding of needs and behaviours of their community and use this to facilitate their own learning goals as well as the goals of the group.

Through our case studies we have developed some empirical understanding of the learning and tutoring activities participants are undertaking at various stages of their collaborative project. In our next section we will further explore the results of our case studies through a process of synthesising findings of studies in networked learning research similar to our own research-settings and interests. This way we aim to connect our own findings with a larger body of research in this area and increase the external validity of the cases studies.

Synthesis and Discussion

In Chapter 8 we synthesise and discuss the results of 32 studies in networked learning, similar to our own research-interests and settings. On the whole we can conclude that the results of the studies included in this research project tend to point in the same direction. There are occasionally subtle differences, but in general across the studies, other researchers have presented similar findings on the way teachers and students are engaged in networked learning as we did. We will briefly summarise certain aspects of our findings and make suggestions for future research.

On the whole the synthesised studies present empirical data showing that participants are collaboratively sharing and constructing knowledge in their asynchronous discussion forums. However, engagement in collaborative learning processes does not automatically mean that the participants strive for collective learning outcomes. Both studies (synthesis and case studies) indicate that individual interests and learning goals are the main drivers and that peer feedback and help is appreciated to support one's own learning. It is most likely that in educational settings this personal approach to collaborative

learning will be dominant. As long as people have to pay for their courses and join them for individual purposes, participants will try to get the most out of it. Designing courses for collaborative learning is, therefore, not to be taken lightly and more importantly not every learning task is suitable for collaborative learning. Ideally the task will have to be open ended (Carusi, 2003). This way all the participants can (try) to identify themselves with it, and it requires a group discussion on how to focus and plan their work. This way the group is stimulated to create ownership over their task right from the beginning. Personal interests and goals can be negotiated and married into a shared collaborative project. Individual development and their position in the group (McDonald, Stuckey, Noakes & Nyrop, 2005) as well as identity development and transformation (Wenger, 2004) deserves more attention when designing for networked learning.

Also we have seen that collaborative learning activities are dynamic, groups therefore might develop their own working rhythm. For example, in the case studies we have seen that the majority of the cognitive activities were in the middle (the phase that also had the highest activity). Each phase of the collaborative project has its own focus. More research to identify how groups develop their rhythm and working patterns throughout their collaborative project will enable us to develop further refined teaching and learning models to inform design and support for networked learning. Studying failure or breakdowns during collaborative learning (McConnell, 2005) is an interesting exercise to highlight features that might be overlooked when the focus is on studying success.

There is some uncertainty around the role of the teacher in networked learning environments. It generally seems that there was a greater need for teacher involvement and guidance. Especially in the beginning phase, the students welcome active pedagogical guidance, which can transform during the course into a more facilitative approach of the teacher. Online teaching is a delicate process and requires not only subject matter expertise but also a lot of human insight and good social skills. Some studies (included in the synthesis) concluded that teachers would benefit from more specific guidelines on how to execute their roles in asynchronous discussion boards. During our case studies we found that support offered by the teacher is not only situated but also deeply connected to the nature of the course. Recently some work is developing around the notion of design patterns (Goodyear, 2005). Patterns are descriptions about reoccurring problems in the, in our case, networked learning practice followed by a solution that can inspire teachers to experiment with in their own teaching practice.

A few studies discussed that asynchronous learning environments impact the relationship between the teacher and students. Due to the openness of the environment, students are able to critique, discuss and support comments made by the teacher and fellow students. This means for example that the expertise and teaching style of the teacher can easily be challenged during the online discussions. The high degree of openness allows all the participants to have equal access to the discussion and comments made by all the participants and therefore everybody has the potential to respond and manage the learning process themselves. Some studies rightfully raise some concern around this issue. This levelling teacher-student relationship needs to be clarified during the course as a way to make positions clear. Also not everybody is used to, or wants to, relate to teachers or fellow students in this way. The synthesis pointed out that there can be tension between the roles of tutors and the roles and responsibilities of students. When employing networked learning it seems important to carefully introduce students into taking over these responsibilities (Simons, Van der Linden & Duffy, 2000). In this process-oriented teaching there is a need to manage the interplay between self-regulation and external regulation (Vermunt & Verschaffel, 2000). This gradually changes the teacher-student relationship. Cousin and Deepwell (2005) stress that communities need the space and time to create ownership over their project.

A consequence of this changing relationship is that students are invited to take part in the design of

their collaborative project. The studies included in the synthesis have presented some empirical evidence that students are actively taking control of their learning agenda. These studies indicated that students are thinking about how to approach their learning task. During the synthesis we also concluded that group regulation requires additional metacognitive knowledge and skills. In group learning with increased learner control, knowledge alone about one's own learning style is not enough. Awareness of other's learning styles and strategies, combined with an extended form of inter-metacognitive knowledge has become important. There is a need for all the participants to become familiar with the pedagogies involved in networked learning. The constructivist nature of networked learning embedded in a community-based approach to learning can create barriers for learning. For most teachers and students networked learning requires a 'new' way of learning and it is wrong to assume that all participants have experience with it (see also Veldhuis-Diermanse, 2002).

Some studies in the synthesis, as well our case studies, show that students are capable of reflecting on their learning process and developing support structures based on that. We think it is important to make students active players in developing their own social structure to regulate and coordinate their learning. More research on the development or emerging group structures will be needed to study this relationship between teaching styles and group regulation by the students. Are there common roles that students develop or are they unique for each group and/or learning task? Strijbos, Martens and Jochems (2005) found that a higher degree of emergent functional role behaviour in (spontaneous) non-role groups is associated with a higher grade. In other words, the more functional the role behaviour the higher the grade. This raises some interesting questions about the ability (or willingness) amongst the participants to understand and play these roles. Should pre-defined roles be provided to the group or is it better to let roles emerge spontaneously within the group?

The last aspect we would like to summarise is participation in communities. The case studies as well as some studies included in the synthesis indicate that students show different forms of participation in their communities. Also the way they participate in these communities is not fixed but varies over time. These studies indicate that group members develop social relationships to sustain their collaboration. Being part of a community in which there is a sense of trust, emotional support, interdependence and mutual engagement is appreciated by students and preferred above learning alone. However, disappointment on the quality, direction or engagement of fellow students' input and engagement may also lead to decreasing participation. Knowledge of participants' activities as well as their engagement, in combination with their needs and desires, will help teachers (or moderators of web-based communities) to develop models and designs for networked learning that provide the right kind of support when needed, and adapted to the particular phase they are in.

In the context of higher education the students are often not directly connected to real-life contexts, nor are they assisted by outside experts. In these cases it is mostly the teacher who is required to take on the role of domain expert and coaching students into becoming active participants within their subject. If we want to develop how the community model is used in higher education we might want to rethink how educational institutes are currently organised to challenge the traditional boundaries of the educational context and to make rich connections with the world outside: develop dual learning trajectories (like the police academy), have real or online excursions, guest speakers, develop relationships with professional or societal communities (Scardamalia & Bereiter, 1996) and report back to your community.

Implications

When thinking about further development and design of networked learning it is important to emphasise the social aspects of learning in communities. At the time when networked learning was implemented there was a strong focus on teacher-centred designs. However, the findings presented in this thesis point more towards the need for a community-centred model of networked learning, where

both individual, as well as collective learning processes and outcomes, are accounted for and negotiated by the community. Based on the findings of this thesis and inspired by several networked learning design studies we have provided several guidelines (see Chapter 9) to develop a more community-centred approach to networked learning. This model takes a process approach (including a start-up, beginning, middle and ending phase) with the aim of describing events that need to take place during a collaborative project. Before starting the collaborative project it is important that the participants are familiarised with the networked learning processes and procedures. During the start-up phase the role and responsibilities of both the teacher and the students need to be negotiated. At the beginning of the project the participants can share their individual and collective learning goals in order to develop a learning agenda. During the learning process the groups need to be supported by the teacher. In the beginning period, especially, there is a need for guidance and reassurance that the group is on the right track. The extent to which the group is capable of regulating their learning independently is an indicator for the level to which the teacher can hand over control to the group and gradually withdraw to the periphery of the community. In the middle phase the group needs to reflect regularly on their process and content to make the necessary adjustments based on levels of participation, emergent roles and group structures, as well as desired learning styles and strategies. In the ending phase the group will gradually turn its focus from predominantly working on the project to reflecting on the work done. The group needs to work towards a conclusion and tie loose ends together. It needs to develop a working structure to find out how best to finalise their project and this period benefits from a stronger teacher presence. The teacher should provide guidelines on how to end the project and remind the group about the deadlines and procedures that need to be followed for successful submission of their product.

Networked Learning at the Police

The police academy is committed to implementing networked learning in their courses to provide rich connections between students, teacher and student, and student and police officers in the workplace. Since the introduction of their new educational system, their focus is on providing a learner-centred learning environment where students are active learners, collaborating (with fellow students and police officers in the workplace) on authentic learning tasks situated in the work practice. The police academy offers dual learning trajectories where periods of learning at school are alternated with periods of learning in the workplace. The e-campus serves as an open networked learning environment, accessible to all the members involved in the learning trajectories within the police organisation. This way, the students especially, are able to maintain contact with their fellow collaborators while they are working on their collaborative tasks from the workplace in which they are situated. However, will the e-campus be used to make students familiar with networked learning and prepare them to become constructive social learners who are able to initiate or address learning challenges on their own when encountered during their work or elsewhere. Based on the findings presented in this thesis, we think that the police organisation is in a very strong position to design networked learning tasks because of the direct links with the police practice. The tasks students work on can be integrated (hence the dual learning trajectories) with ongoing work in the workplace. The tasks can have a strong professional focus and relevance, and stimulate students into sharing their work experience with fellow students and discussing emerging differences on how work is done, approached, etc. The tasks can be open ended and actively designed by the students based on their learning needs and upcoming events in the workplace. Also in these networked learning communities there is no need for the teacher to model the expert role; in fact the teacher is or should be one of the experts in the field, teaching from their experience; representing the best of what their community can offer. The teacher and students should be able to invite guest speakers from their workplace (or elsewhere) to participate in the group discussions to share or elaborate on stories being told, providing an alternative perspective, and widening the focus or providing the bigger picture.

Both the e-campus and the police knowledge network provide opportunities for people to initiate (meaningful) interactions with other members of the organisation. But there are still some boundaries between them. Further integration of the police knowledge network in the police organisation and educational institutes provides the opportunity to connect students with professional communities who confer online about their practice. Students and police officers can learn a lot from each other. Students for instance can confront police officers with new procedures and insights and ask 'surprising' questions, while police officers can invite students to be a part of the police reality and witness how they deal with the change and unexpected events. Being members of the same communities might also increase the continuity and liveliness of the current networked learning communities, also because support from within the organisation and the police academy can be combined and strategically placed.

In both situations (e-campus and police-knowledge net) the groups will have to learn to regulate their group processes, develop plans and working models. As such, support from the teacher or moderator should be focused on teaching the skills that allow them to actively learn together and relatively independently within their communities.

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Samenvatting

[Summary in Dutch]

Achtergrond en vraagstelling

De afgelopen jaren hebben organisaties en onderwijsinstellingen veel geïnvesteerd in het implementeren van computernetwerken ter ondersteuning van het leren en kennis management. Iedere werknemer of student beschikt onderhand over een email adres en heeft toegang tot het internet. Het internet wordt tegenwoordig alom gebruikt als communicatiemiddel en heeft mede daardoor veel potentie om gebruikt te worden in leersituaties. Mensen leren graag van en met elkaar; men vertelt elkaar bijvoorbeeld verhalen, vraagt om hulp, wisselt ervaringen uit en men bediscussieert problemen of actuele zaken om zo de wereld om hen heen beter te begrijpen. Wanneer we netwerktechnologie doelbewust gebruiken om leren te faciliteren, spreken we van leren in netwerken⁶. Met leren in netwerken bedoelen we het creëren van een omgeving waarin informatie- en communicatietechnologie wordt gebruikt om onderlinge relaties: tussen de lerende en medelerenden; tussen lerenden en tutoeren; tussen een community van lerenden en de (leer)middelen waar men toegang toe heeft, te bevorderen, zodat de deelnemers gezamenlijk hun begrip en mogelijkheden ontwikkelen, in de richting die voor hun van belang is en waarover ze een zekere mate van controle hebben (Banks, Goodyear, Hodgson & McConnell, 2003, p.1).

De mogelijkheden voor leren in netwerken interesseerde ook de Politieacademie. Sinds de jaren negentig is men volop bezig met het aanleggen van een landelijk dekkend intranet, waarop alle politie-bureaus en gerelateerde politie-instituten een aansluiting krijgen. Dit netwerk, ook wel politie kennis net genoemd, heeft in de hoofdzaak twee doelstellingen. In de eerste plaats wil men zo politiekennis en procedures toegankelijk maken voor politiemensen en in de tweede plaats wil men politiemensen de mogelijkheid bieden om dit netwerk te gebruiken met elkaar te leren en gezamenlijk nieuwe politiekennis en procedures te ontwikkelen. Het politie kennis net biedt hiertoe verschillende communicatie mogelijkheden zoals, email, chat en discussie forums. Met behulp van deze tools kunnen politiemensen uit het hele land met elkaar werkervaringen delen en bediscussiëren om zo de aanwezige politiekennis 'levend' te houden en aan kritische reflectie te onderwerpen. Tegelijkertijd werkte men binnen de Politieacademie ook aan een e-campus om de studenten vertrouwd te maken met het leren in netwerken en om het onderwijs gedeeltelijk online te kunnen aanbieden. De centrale gedachte achter het leren in netwerken werd voornamelijk gevoed door het concept 'community of practice' (Wenger, 1998). De Nederlandse politie wil het (informele) werkgerelateerde leren van en met elkaar stimuleren door mogelijkheden te bieden voor politiemensen om communities of practice op te richten, waarin men expertise en ervaringen kan delen. Het concept leren in communities of practice heeft de afgelopen jaren een hoge vlucht genomen in zowel organisaties als onderwijsinstellingen omdat het een aansprekende beschrijving geeft van hoe mensen leren in sociale interacties, waarbij het leren wordt gezien als het deelnemen aan de activiteiten die door de community worden georganiseerd (Lave & Wenger, 1991). Leren wordt gezien als een groeiprocés waarbij men geleidelijk aan kennis neemt van de cultuur en kennis die leeft in een bepaalde community, waarbij men zich ontwikkelt tot een volwaardig actief lid.

⁶ Leren in netwerken is een directe vertaling van de Engelse term networked learning. Een algemeen geaccepteerde vertaling van deze term is niet aanwezig, maar wij denken dat leren in netwerken nog het best de Engelse betekenis benaderd.

Deelname aan communities (en met name de kennisuitwisseling) kan voor een groot deel online plaatsvinden. Mede daardoor is de Politieacademie zeer geïnteresseerd in de wijze waarop communities leren in netwerken. Echter leren in netwerken is een relatief nieuw verschijnsel en binnen de politie organisatie was men tijdens het opstarten van dit onderzoek nog volop bezig met de oprichting van dit landelijk politie kennis net.

Om praktische redenen is daardoor besloten om een gedeelte van het hier beschreven onderzoek elders uit te voeren, om zo kennis te vergaren ter ondersteuning van het ontwikkelen van leren in netwerken bij de politie.

Zoals we reeds aangaven is het leren in netwerken een relatief nieuw verschijnsel en is er weinig bekend van de processen die plaatsvinden op het moment dat men gezamenlijk aan het leren is. Om die reden is ervoor gekozen om een verkennend onderzoek uit te voeren, om zo te beschrijven hoe community-deelnemers gezamenlijk leren in netwerken. De onderzoeksvraag is als volgt:

Hoe leren deelnemers van communities met elkaar in netwerken?

In het eerste deel van dit onderzoek hebben we ons in eerste instantie breder georiënteerd op de sociale aspecten van leren en hebben we diverse vormen van gezamenlijk leren in organisaties beschreven. Hierbij maakten we, waar het ging om gezamenlijk leren, een onderscheid tussen leren in sociale interacties en collectief leren. Bij leren in sociale interacties is het leerproces gezamenlijk, terwijl de uitkomsten voornamelijk ten goede komen van het individu. Bij deze vorm van leren is de groep niet bewust op zoek naar gedeelde leeruitkomsten. Dit is wel het geval bij collectief leren waar zowel het proces als het product het resultaat zijn van een gezamenlijk verlopen activiteit. Veel voorkomende vormen van gezamenlijk leren in organisaties zijn het leren in je persoonlijke netwerk, teamleren en leren in communities of practice. De conclusie van dit hoofdstuk was dat leren in communities, voor organisaties een interessant gegeven is, omdat communities spontaan ontstaan rond thema's of zaken die leven in een organisatie. Het leren is bottom-up georganiseerd, zelf-gestuurd en sluit nauw aan bij de ervaringen en activiteiten van de werknemers in de dagelijkse praktijk. Communities ontwikkelen kennis en vaardigheden, houden bestaande kennis levend in hun gesprekken en reflecteren kritisch door de know how van de community te spiegelen aan de veranderingen om hun heen. De meerwaarde van het leren in communities voor organisaties, naast de formele leermogelijkheden, komt met name tot uiting in het informele zelf-gestuurde leren van de deelnemers.

Voor de politie, waar expertise verspreid is over het gehele land, biedt het leren in netwerken voor communities een aantrekkelijke mogelijkheid om het informele leren op de werkplek te bevorderen. In hoofdstuk 2 hebben we aan de hand van pilotstudies een korte verkenning uitgevoerd naar de wijze waarop communities binnen de politie gebruik maken van de mogelijk om te leren in netwerken. Het bleek dat het gebruik van netwerken ter ondersteuning van het leren geen gemeengoed was binnen de politie. Dit was ten dele omdat niet iedereen over toegang beschikte tot het netwerk, maar ook omdat het samen leren in netwerken een nieuwe ontwikkeling is dat met gemengde gevoelens werd ontvangen. Niet iedereen is overtuigd van het nut, werkwijze en meerwaarde van deze technologie. Tegelijkertijd stonden de drie communities, die aan de pilotstudie deelnamen, niet per se afwijzend tegenover het gebruik van het politie kennis net, ter ondersteuning van het leren in hun community. In de eerste community gebruikte men het politie kennis net voornamelijk als communi-

catie middel om de agenda en uitkomsten van vorige bijeenkomsten te verspreiden onder de leden. Men kwam regelmatig bij elkaar zodat men niet zozeer de behoefte had om ook nog eens online met elkaar te overleggen. De tweede community kwam zelden bij elkaar en koos doelbewust voor het leren in netwerken om zo met elkaar ervaringen uit te wisselen en werkgerelateerde problemen op te lossen. Het interactiepatroon van deze community liet zien dat men als een hechte groep interacteerde, rondom enkele kernleden van de community. Het overgrote deel van de communicatie was gericht op het uitwisselen van informatie en in mindere mate leidde dit tot discussies waarin men trachtte om onderlinge tegenstellingen nader te onderzoeken. De communicatie had vooral het karakter van vraag en antwoord. In de derde groep kwam juist naar voren dat de groep behoefte had aan structuur tijdens het leren in netwerken. Het ging daarbij zowel om inhoudelijke structuur om zo de groep te ondersteunen bij het focussen van de discussie als om procesmatige structuur om de activiteiten en betrokkenheid van de deelnemers te coördineren.

Aan de hand van deze pilotstudies kregen we een eerste indruk van wijze waarop leren in netwerken wordt gebruikt door de deelnemers van communities in hun behoefte om gezamenlijk te leren. Echter moesten we ook concluderen dat het zich nog in een zeer experimentele fase bevindt. Het politie kennis net en de e-campus waren nog niet voldoende geïmplementeerd in de politieorganisatie en/of de communities waren zelf in een vroege fase van oprichting, waarbij de communicatie werd overschaduwd door één of twee kernleden. Dit was de reden om in het tweede deel van dit onderzoek een uitstapje te maken naar leren in netwerken in het hoger onderwijs.

In deel twee van deze dissertatie zoeken we aansluiting bij een universitaire studie in e-learning, welke werd gedoceerd aan de Universiteit van Sheffield. De cursussen zijn vormgegeven rond leerprincipes die gebaseerd zijn op het leren in communities, waarbij participatie aan gesitueerde leeractiviteiten in de community de basis vormen voor de constructie van kennis rondom het project waaraan men gezamenlijk werkt (EQUEL Position Paper, 2004). Deze cursus is volledig online en er wordt van de deelnemers verwacht dat men actief deelneemt en mede de community-activiteiten organiseert. Het onderzoek in dit deel van de dissertatie bestaat uit twee casestudies. Tijdens de eerste casestudie worden leer- en tutorprocessen beschreven en wordt er de basis gelegd voor een methode om deze processen te bestuderen (zie hoofdstukken 3, 4 en 5). Vervolgens wordt in een tweede casestudie dezelfde methode nogmaals toegepast in twee andere communities, die dezelfde cursus volgen (zie hoofdstukken 6 en 7). Op deze manier willen we de eerste studie herhalen om te zien of de ontwikkelde methode ook hier toegepast kan worden en tevens om te beoordelen of we in deze communities vergelijkbare resultaten vinden. In alle gevallen werkten de communities aan een gezamenlijke open leeropdracht waarbij men uitgaande van theorie en onderzoek op het gebied van e-learning, een ontwerp moesten maken voor een cursus die volledig online werd aangeboden.

Onderzoeksmethode en resultaten

Bij het beschrijven van het gezamenlijk leren in netwerken hebben we gebruik gemaakt van meerdere methoden om zo vanuit verscheidene databronnen de processen van de deelnemers te kunnen beschrijven. Door meerdere methoden en databronnen te gebruiken kunnen we een rijker empirisch beeld schetsen van de processen die zich afspelen en bevorderen we tevens de validatie van het onderzoek. Dit proces wordt ook wel triangulatie genoemd. In ons onderzoek hebben we drie methoden gecombineerd. Met behulp van twee codeerschema's (Anderson, Rourke, Garrison & Archer, 2001; Veldhuis-Diermanse, 2002) hebben we de inhoud van de geschreven berichten bestudeerd op het voorkomen van leer- en tutorprocessen in de community. Content analyse is een bruikbare techniek om rijke kwalitatieve data enigszins te abstraheren in bepaalde categorieën om zo eventuele patronen in de activiteiten van de deelnemers te kunnen herkennen. Hierdoor kregen we een beeld van de activiteiten die de deelnemers ondernamen. Op zichzelf is dit heel interessant maar het zegt nog

niet zoveel over de onderlinge betrokkenheid in de community en deelname aan bepaalde activiteiten in de groep. Om meer informatie hierover te krijgen hebben we de interactiepatronen van deze communities onderzocht met behulp van sociale netwerk analyse. Aanvullend en mede op basis van de voorgaande gegevens hebben we de werkwijzen van de deelnemers nader onderzocht. Dit werd gedaan aan de hand van contextuele analyses, door het uitvoeren van critical event recall interviews en het analyseren van self-assessment rapporten aan het eind van het samenwerkingsproject. Hierdoor kregen we meer zicht op de ervaringen en bedoelingen van de deelnemers over de wijze waarop ze participeerden in hun community. Door meerdere methoden te gebruiken waren we in staat om de uitkomsten van de ene methode te relateren aan de andere methoden en zo bepaalde ontstane patronen te verifiëren. Tevens werden de uitkomsten gebruikt om zo doelbewust deelnemers te selecteren voor de interviews om met de deelnemer de ontstane patronen nader te onderzoeken.

Het onderzoek hebben we opgedeeld in drie tijdsperioden om een duidelijker beeld te kunnen vormen van het verloop van de samenwerking over tijd. Data-analyses hebben betrekking op de begin-, midden- en eindperiode van de samenwerking in hun community. Iedere periode bestreek 10 dagen van een samenwerkingstraject dat in zijn geheel 10 weken bedroeg.

Hoe leren deelnemers van communities met elkaar in netwerken?

Aan de hand van de analyses hebben we gezien dat de deelnemers actief betrokken zijn bij de leeractiviteiten in de community. Tijdens het online overleg bediscussiëren ze met elkaar de ideeën en problemen die ze tegenkomen, gaat men op zoek naar aanvullende informatie om bepaalde ideeën te staven of juist onderuit te halen, en om nieuwe denkrichtingen in te slaan. Ook refereren ze naar elkaar en bouwt men voort op de resultaten van hun eigen overleg. Het overleg is vooral taakgericht maar er is ook ruimte voor het bespreken van sociale ervaringen en biedt men elkaar emotionele ondersteuning. Naast het gezamenlijk leren blijkt dat de deelnemers ook actief betrokken zijn bij het uitvoeren van tutoractiviteiten. De groepsleden zijn actief betrokken bij het nadenken over en het vormgeven van de leeractiviteiten en men ondersteunt elkaar tijdens het werken aan de opdracht. Men maakt actieplannen en bespreekt de groepactiviteiten met elkaar. Aan de andere kant hebben we ook gezien dat de gezamenlijke leeractiviteiten voor een deel voortkomen uit persoonlijke interesses en voorkeuren. Met name in het begin, als de groep bezig is met het ontwikkelen en het invullen van de groepstaak, proberen groepsleden hun eigen doelstellingen of leeragenda in de groep naar voren te schuiven. Tijdens de uitvoering van het project kwam naar voren dat sommige deelnemers gemotiveerd zijn om de groepsprocessen te reguleren, vanuit de persoonlijke wens het groepsproject goed af te ronden. Samenwerking met andere deelnemers werd gewaardeerd, maar werd ook opgevat als een goede manier om de eigen leerdoelen te bereiken.

De betrokkenheid van de deelnemers en hun deelname aan leer- en tutoractiviteiten varieert sterk per tijdsperiode, maar in alle gevallen was men in de middenfase het meest actief. Tijdens deze periode is men vooral gericht op het werken aan de taak en faciliteert men elkaar. Tijdens de beginperiode is de groep veelal gericht op het conceptualiseren van de taak, maar is men ook actief bezig met het ontwikkelen van een groepsstructuur ter ondersteuning van het samen leren. Hierbij werd de groep gedeeltelijk ondersteund door de docent. In de middenfase nam de (directe) docentbetrokkenheid af. De eindfase kenmerkte zich in zekere mate door reflectie op de taak, bleef er veel aandacht voor ondersteuning en dacht men na over de organisatie van deze laatste fase in het groepsproces. De docent is over het algemeen weer actief betrokken bij deze fase en helpt actief mee bij het ondersteunen van de samenwerking en geeft informatie over de afronding van de taak.

De resultaten laten zien dat de docenten, in deze cursus meedoen, aan leer- en tutoractiviteiten en zich gedragen als student en tutor. Ook blijkt dat de (traditionele) relatie tussen docent en student aan het veranderen is. Met name door de open transparante werkwijze tijdens het leren in netwerken, zien we dat studenten niet alleen afgaan op de mening van de docent, maar ook de ondersteuning

en mening van de overige deelnemers in de community waarderen. De docenten proberen met name in het begin de groep te begeleiden en gerust te stellen om zo de groep op het juiste spoor te zetten, maar daarin is hun positie op hetzelfde niveau als de overige deelnemers. De studenten kunnen de bijdragen van de docent openlijk bekritisieren en van alternatieven voorzien.

Uit het onderzoek kwam ook naar voren dat de groepen spontaan rollen aannemen en strategieën ontwikkelen om zo het gezamenlijke leren te reguleren. Bij twee communities bleven deze rollen enigszins impliciet, maar, zo bleek uit de interviews, had men wel een duidelijk beeld van elkaars werkwijze in de groep. Bij de andere community ontwikkelde men juist expliciet bepaalde rollen, kwam men tot een taakverdeling en stelde men deadlines op om zo hun project te kunnen coördineren. De uitvoering van dergelijke rollen bleek niet vast te staan. Tijdens iedere fase traden enige verschuivingen op in de intentie waarmee bepaalde deelnemers participeerden in de community. Ook bleek dat actieve deelnemers tijdens het samenwerkingsproces van stijl wisselden, bijvoorbeeld van een actieve bijdrage aan leeractiviteiten in het begin naar een sterk faciliterende rol in de middenfase. Door te participeren in communities leren de deelnemers van elkaars leersstrategieën en leerstijlen. Men ontwikkelt het inzicht dat hun persoonlijke leervoorkeuren en de mogelijkheid om de taak te volbrengen wordt versterkt door het managen van de activiteiten en welzijn van de community. Door deel te nemen aan de community leert men de behoeften en gedragingen van de groep te begrijpen en gebruikt men dit inzicht om zowel de persoonlijke als collectieve leerdoelen te realiseren. Men ontwikkelt als het ware metacognitieve kennis van zowel het eigen leerproces als van het leerproces van de andere deelnemers in de groep. Deze kennis gebruikt men vervolgens om het leren van de groep te reguleren.

De rol van de docent is met name gericht op het voorbereiden van de deelnemers op de betekenis van het leren in communities en het aangeven van de activiteiten men in de groep moet ondernemen om het gezamenlijke leren succesvol te laten zijn. Tijdens het geven van de cursus ontwikkelt de docent een pedagogisch model (of stelt dit bij) op basis waarvan de docent in het begin aanwijzingen kan geven op hetgeen de groep te wachten staat en tijdens het traject ondersteuning kan geven op het moment dat de groep daar behoefte aan heeft.

Aan de hand van de empirische casestudies hebben we een beeld gekregen hoe deelnemers van communities met elkaar leren in netwerken. Echter deze bevindingen blijven beperkt tot het gezamenlijk leren in deze cursus. In het volgende deel van deze dissertatie richten we ons op het maken van een synthese van onderzoeksbevindingen in vergelijkbare studies, waardoor we de resultaten van de casestudies kunnen vergelijken en contextualiseren in een bredere internationale onderzoekscontext. Op deze wijze verhogen we de externe validiteit van de case studies en generen we een breder empirisch beeld van de wijze waarop men gezamenlijk leert in netwerken.

Synthese en discussie

In hoofdstuk 8 bespreken we de resultaten van 32 studies, waarin de processen en procedures die een rol spelen bij het gezamenlijk leren in netwerken worden onderzocht. Over het algemeen kunnen we concluderen dat de bevindingen uit onze casestudies een sterke overlap vertonen met de besproken resultaten in de synthesestudie. We zullen hier kort enkele aspecten per thema bespreken en suggesties doen voor toekomstig onderzoek.

Over het algemeen laten de studies zien dat de deelnemers actief samen leren en vindt men aanwijzingen dat de betrokkenen gezamenlijk kennis construeren in asynchrone discussie forums. Dit betekent echter niet dat men ook altijd streeft naar gedeelde uitkomsten. Ook uit de synthese blijkt dat persoonlijke motieven een belangrijke rol spelen bij het deelnemen aan gezamenlijke leerprocessen. Het is ook niet onwaarschijnlijk dat zolang men in het onderwijs de nadruk legt op individuele leerresultaten, de persoonlijke (leer)voorkeur een belangrijke rol blijft spelen. Het is bovendien niet vanzelf-

sprekend dat iedere taak zich leent voor gezamenlijke leeractiviteiten. Samenwerkend leren verdient de voorkeur bij open leeropdrachten (Carusi, 2003) waar er voldoende ruimte is voor de groep om de taak eigen te maken en in te richten naar de wensen en werkwijzen van de deelnemers. Het verdient de voorkeur om hierbij uit te gaan van praktisch georiënteerde taken, gerelateerd aan de werkcontext van de deelnemers. Hierdoor kan men persoonlijke interesses en voorkeuren bespreken en nauw verbinden met de groepsactiviteiten. In sommige gevallen kan de druk om samen te moeten leren te hoog oplopen en wordt een lage bijdrage aan het groepsproces veelal geproblematiseerd. De ontwikkeling van het individu (McDonald, Stuckey, Noakes & Nyrop, 2005) en de positie van het individu in de groep en de identiteitsontwikkeling (Wenger, 2004) verdient meer aandacht bij het vormgeven van gezamenlijk leren in netwerken.

Van belang is tevens om het (gewenste) ritme van de groep aan de orde te stellen. Deelname aan groepsactiviteiten wisselt sterk en elke fase in het samenwerkingsproces kent zijn eigen accenten. Toekomstig onderzoek zou zich daarbij meer kunnen richten op het belichten van de negatieve aspecten van samenwerkend leren, waarbij falen of het uiteenvallen van de groep wordt bestudeerd (McConnell, 2005). Hieruit kunnen belangrijke lessen worden getrokken van het vormgeven van leren in netwerken, die anders onderbelicht blijven.

Over de rol van docent tijdens leren in netwerken bestaat onduidelijkheid. In het algemeen blijkt wel dat een sterke aanwezigheid (met name) in het begin van belang is, waarbij dit bij voorkeur in overleg met de groep naar verloop van tijd minder wordt. De docent geeft dan geleidelijk aan de controle en verantwoordelijkheid voor het leren over aan de groep. Online doceren is een delicate aangelegenheid waarbij men over veel menselijk inzicht moet beschikken. Sommige studies in de synthese geven aan dat er meer richtlijnen moeten komen voor docenten over hun rol en werkwijze in asynchrone discussie forums. Daarbij bleek uit de casestudies dat de expertise van de docent ook nauw verbonden is met kennis van het verloop van de cursus. Op basis van eerder opgedane ervaringen met de cursus ontwikkelt de docent een pedagogisch model dat de docent helpt in het bieden van de gewenste ondersteuning aan de groep. In dit verband doet Goodyear (2005) onderzoek naar de mogelijkheid tot het beschrijven en uitwisselen van design patronen, die docenten kunnen informeren bij het oplossen van terugkerende problemen.

In een aantal studies in de synthese wordt de veranderende relatie tussen de docent en de student genoemd. Als gevolg van de open leeromgeving, waarin iedereen ‘zichtbaar’ betrokken is bij het vormgeven en bediscussiëren van de taak, kan de opvatting van de docent openlijk worden bekritiseerd. Dit is inherent aan het leren in communities waar we bijvoorbeeld hebben gezien (zie hoofdstuk 1) dat communities zelfregulerend zijn. Op zich hoeft deze verandering in de onderlinge relaties geen problemen op te leveren, maar, zo geven sommige studies uit de synthese aan, het is wel van belang dat men dit met elkaar bespreekt. De verwachtingen en verantwoordelijkheden kunnen het beste in de groep worden besproken. De uitdaging hierbij is om spanningen tussen de rol van de docent en student op een positieve manier te bespreken. Tijdens leren in netwerken is het aan te raden om de deelnemers voorzichtig voor te bereiden op het (gedeeltelijk) overnemen van docentverantwoordelijkheden door de groep (Simons, Van der Linden, & Duffy, 2000). Via een process-georiënteerde doceerstijl kan de docent het extern reguleren van de groep geleidelijk overhevelen naar een vorm waarbij de groep zelfstandig de regulatie van het leren overneemt (Vermunt & Verschaffel, 2000). Cousin & Deepwell (2005) wijzen terecht op het feit dat communities wel de tijd moeten krijgen om een eigen stijl te ontwikkelen.

De meeste studies betrokken in de synthese leveren empirische aanwijzingen voor het feit dat studenten in groepen actief betrokken zijn bij het beheren en plannen van de leeragenda van de groep. Dit bevestigt de resultaten uit de casestudie waar we ook constateerden dat studenten reflecteren op

het groepsproces en nadenken over de juiste groepsstructuur ter bevordering van het gezamenlijk leren. Deze vorm van reflectie verbreedt de meer traditionele opvatting over metacognitieve kennis en vaardigheden. Over het algemeen wordt metacognitie gezien als kennis over je eigen leren, in een community-setting blijkt echter dat men ook in toenemende mate moet beschikken over een vorm van interpersoonlijke metacognitie om zo te kunnen reflecteren (en reageren) op de leerstijlen van de overige deelnemers in de groep.

Het is wenselijk om meer onderzoek uit te voeren naar de wijze waarop in groepen spontaan rollen ontstaan om het leren te coördineren en hoe het uitvoeren van deze rollen verandert tijdens het samenwerkingsproces. Een interessant dilemma is de vraag of rollen van te voren moeten worden aangeboden of dat de rollen juist moeten aansluiten bij de wijze waarop de groepen hun taak willen uitvoeren. Stijbos, Martens en Jochems (2005) vonden in hun studie dat een hoge mate van functionele rolgedragingen in spontane rolgroepen correleert met een hoog cijfer. Daarbij geven een aantal studies aan dat het bevorderlijk is om de studenten te introduceren in de pedagogische modellen die ten grondslag liggen aan het leren en construeren van kennis in asynchrone communities. Voor de meeste studenten is leren in netwerken een nieuwe vorm van leren en is een opstartperiode waarin men vertrouwd kan raken met deze werkwijze raadzaam. Het is verkeerd om aan te nemen dat men hier al voldoende ervaring mee heeft (Veldhuis-Diermanse, 2002).

Het laatste aspect gaat over participeren in communities. Uit zowel de synthese als de casestudies blijkt dat participatie varieert per groep. Daarbij wisselt ook de mate waarin wordt deelgenomen aan groepsactiviteiten van tijd tot tijd. Over het algemeen wijzen de studies uit dat groepsleden sociale relaties ontwikkelen tijdens het werken aan hun taak. Studenten geven aan dat ze deelname aan een community, waar een gevoel van onderling vertrouwen heerst, men elkaar emotioneel ondersteunt en waar een zekere mate van wederzijdse betrokkenheid is, prefereren boven individueel leren. Echter teleurstellingen in de wijze waarop men als groep leert, leiden tot een daling in participatie. Kennis van de activiteiten van de deelnemers alsmede hun betrokkenheid en wensen zal de docent helpen bij het vormgeven van de leeromgeving en het ontwikkelen van ondersteuning tijdens het leren op momenten dat het nodig is.

In vele gevallen is participatie in deze communities een vorm van deelname aan de activiteiten in de groep waarbij de docent als het ware de rol van de expert op zich moet nemen. Als we in het hoger onderwijs dit community-model meer willen gaan toepassen, zouden we ons kunnen afvragen of we niet meer en rijkere verbindingen kunnen maken met de wereld buiten de onderwijsinstellingen, zodat studenten kunnen meedraaien in de toekomstige werkomgeving en participeren in ‘echte’ communities waarin men de thematiek, die men tijdens de cursus leert, aan de orde kan stellen (Scardamalia & Bereiter, 1996). Het ontwikkelen van duale leertrajecten, zoals bij het politieonderwijs, is een mooi voorbeeld hiervan. Tevens zou men ook actiever de buitenwereld binnen de onderwijscontext kunnen halen door ‘virtuele’ excursies te maken en gastsprekers uit te nodigen.

Implicaties

Wanneer we het leren in netwerken verder willen ontwikkelen en inzetten moeten we meer aandacht schenken aan de sociale aspecten van het leren in communities. In het hoger onderwijs was het leren in netwerken tijdens de invoering voornamelijk docent-gestuurd. Echter de bevindingen van deze dissertatie wijzen meer in de richting van een community-gestuurde benadering van leren in netwerken, waarbij rekening wordt gehouden met zowel individuele als collectieve leerprocessen en uitkomsten. Aan de hand van de resultaten uit deze dissertatie in combinatie met enkele designstudies voor leren in netwerken (zie hoofdstuk 9) hebben we een aantal richtlijnen beschreven voor een meer community-gestuurde benadering voor leren in netwerken. In deze benadering wordt expliciet aandacht gegeven aan de tijdsperiodes die het gezamenlijke leren mede beïnvloeden. Tijdens leren in netwerken is het van belang dat de deelnemers vooraf worden geïntroduceerd in de werkwijze van leren in netwer-

ken. Daarbij moeten ook de rol, positie en verwachtingen van zowel de docent als student besproken worden. Aan het begin van het leerproces kunnen individuele en collectieve interesses en leerdoelen worden besproken, zodat men hierbij rekening kan houden tijdens het maken van een leeragenda. Tijdens het leren moeten de groepen in het begin worden ondersteund bij het vormgeven van de taak alsmede de groepsprocessen. De mate waarin de groep in staat is om het reguleren zelfstandig te regelen is mede bepalend voor de wijze waarop de docent zich geleidelijk aan kan terugtrekken in de middenfase. De groep moet regelmatig reflecteren op hun werkwijze om zo aanpassingen te kunnen maken gebaseerd op participatie en interactie, aard van de leeractiviteiten, (wenselijke) leerstrategieën van de deelnemers en de benodigde rollen om het gezamenlijke leren te faciliteren. Tijdens de laatste fase van het leerproces verschuift de aandacht van het werken aan de taak naar reflectie en afronding van de werkzaamheden. In deze fase is een actieve deelname van docent weer wenselijk om zo de groepen te begeleiden en te informeren over de wijze waarop de taak kan worden afgerond en opgeleverd.

Leren in netwerken bij de politie

Sinds de invoering van het nieuwe onderwijs bij de politie zijn ook de mogelijkheden tot het leren in netwerken toegenomen. De Politieacademie legt expliciet een koppeling met het informele leren op de werkplek, waarbij het samenwerkend leren en participatie in communities of practice wordt gestimuleerd. Het politieonderwijs is nu gebaseerd op duale leertrajecten waarbij periodes van opleiden worden afgewisseld met het opdoen van ervaring, al dan niet in combinatie met gerichte opdrachten, in de praktijksituatie. De rol van de e-campus wordt hierbij nadrukkelijk ingezet als een vorm om het samenwerkend leren te stimuleren om zo de student voor te bereiden op een actieve leerhouding op het politie kennis net en om het leren in netwerken tijdens de opleiding te continueren zodra de studenten werkzaam zijn in de praktijk. Via de e-campus kunnen de studenten blijven samenwerken, waarbij men de opgedane praktijkervaringen met elkaar kan bediscussiëren om zo de groepsopdrachten te voltooien. Vanwege de hoge praktijkrelevantie en nauwe contacten met de praktijksituatie kunnen de groepsopdrachten een sterke praktijkfocus hebben, waarbij de studenten de ruimte krijgen om de taak mede vorm te geven aan de hand van uit te voeren werkzaamheden op de werkplek. Tegelijkertijd, vanwege de directe lijnen tussen het onderwijs en de praktijk hoeft de docent niet het enige rolmodel te zijn tijdens het leren in de communities. Idealiter is de docent dé expert op het vakgebied, die de studenten het beste geeft van wat de community op dat moment heeft te bieden. Is dit niet het geval dan kan de docent (en ook de studenten) regelmatig gastsprekers uitnodigen om zo een verbinding te leggen tussen onderwijs en praktijk. Vanuit het onderwijs kunnen de studenten ook geleidelijk aan betrokken raken bij de lopende discussies op het politie kennis net en uitgroeien tot volwaardige deelnemers. Zowel de e-campus als het politie kennis net bieden veel mogelijkheden tot het initiëren van (betekenisvolle) interacties met andere politiemensen in de organisatie om zo gezamenlijk te leren van werkgerelateerde problemen. Het is wenselijk om beide netwerken nauw te laten samenwerken en eventuele barrières weg te nemen. Studenten en politiemensen kunnen veel van elkaar leren, doordat studenten bijvoorbeeld de politiemensen kunnen confronteren met nieuwe inzichten en ‘verassende’ vragen, terwijl de politiemensen de studenten deelgenoot maken van de actualiteit en veranderlijkheid van het vak. Ook kunnen zo aan de continuïteit en levendigheid van het overleg in de communities nieuwe impulsen worden gegeven doordat er zowel vanuit het onderwijs als de praktijk ondersteuning kan worden geboden. In beide gevallen (e-campus en politie kennis net) moeten de communities leren om dit leren in netwerken in grote mate zelfstandig te reguleren en te organiseren. Het is daarom van belang om de communities te ondersteunen in het ontwikkelen van een meer community-gecentreerde benadering bij het leren in netwerken. Ondersteuning van docenten en moderators zou hierop moeten zijn gericht, zodat zij de communities die vaardigheden aanleren die het actief en zelfstandig leren in de communities bevorderen.

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Current research interests focus on e-learning and networked learning in organisational and educational contexts. This interest is manifested in two current research projects. The first is a project funded by JISC, which explores the strategies that learners adopt when using various technologies in higher education contexts. The second is an EU project, called ARGUNAUT. The core aim of this project is to develop a method for analysing online discourse, using in part artificial intelligence techniques to monitor and respond to the groups learning. In developing such tools, the goal is to visualise and raise awareness of networked learning activities and consequently improve the quality of the learning experiences and interactions.

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