Online peer tutoring behaviour in a higher education context

Marijke De Smet

Promotor: Prof. Dr. Martin Valcke

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Voorwoord

Ik ben waar ik nu ben
Op dit ogenblik
Omdat ik hier iets kan leren

Louise Hay (1995)

Doctoreren is een werkwoord. De voorbije vier jaar heb ik aan den lijve mogen ondervinden dat ook haar betekenis meervoudig is: voor een uitdaging staan, de computer te vriend maken, nieuwe mensen ontmoeten, oude gedachten aanvullen met nieuwe, luchthavens trotseren, reizen, mensen toespreken, keuzes maken, zaken uitproberen, schrijven en herschrijven, de juiste woorden zoeken, kritisch en zelfstandig denken, doorzetten, ervaringen delen, hulp vragen, ideeën schrappen, gedrag observeren, mogelijkheden zien, onderzoek opzetten, publiceren, relativeren, en samengevat, heel veel leren. Wat mij betreft is doctoreren de leerschool waarvan ik tot voor kort leerling was. En daar ben ik erg dankbaar om.

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Marijke De Smet
Gent, 4 januari 2008

Chapter 1
General Introduction

The present chapter provides a general introduction to five studies reported in this dissertation on online peer tutoring behaviour in a higher education context. We first present the theoretical background on the concept of peer tutoring and discuss its various definitions. Next, we discuss the theoretical background on computer-supported collaborative learning (CSCL). Particular attention is paid to the need for structure and support in CSCL. A multidimensional, and therefore, situation-specific perspective on online facilitation is of importance in this third section. The literature review on peer tutoring, CSCL, and the need for support in CSCL, repeatedly ends with challenges directing future studies. These challenges are taken into account in the present dissertation. More specifically, the successive studies address determinants of the tutoring behaviour of fourth-year Educational Science students introduced within asynchronous discussion groups. Following, an outline of the focus of this dissertation, the naturalistic research setting and methodology is described. We conclude with the research questions and an overview of the subsequent chapters.

Theory and practice of peer tutoring

Defining peer tutoring

In recent decades, peer tutoring on an organised educational basis has attracted the interest of many researchers and has led to an abundance of empirical studies, particularly in medical education (Kassab, Abu-Hijleh, Al-Shboul, & Hamdy, 2005; Loke & Chow, 2007; Neville, 1999; Sobral, 2002; Solomon & Crowe, 2001; Steiger & Rossi, 1997). However, the effectiveness of peer tutoring within elementary schools, colleges, and higher education is explored in other research fields as well: biochemistry (Carroll, 1996), educational psychology (Cates, 1995; Griffin & Griffin, 1998; Gyanani & Pahuja, 1995; Wright & Cleary, 2006), and computer-supported learning (Hoysniemi, Hamalainen, & Turkki, 2003).

As the concept of peer tutoring has developed over several years - resulting in many different types and formats - defining peer tutoring has become more difficult (Topping, 1996). A number of definitions can be distinguished related to typical characteristics of the peer tutoring setting. Depending upon contextual circumstances, peer tutoring groups may be same-age or cross-age, small or large, fixed or reciprocal, face-to-face or online, and preliminarily trained or not. The peer tutoring concept therefore draws on a wide-ranging review of literature and discussion as described below.

At first, learning in a peer tutoring setting is to be considered as a *specific type of collaborative learning* (Griffin & Griffin, 1998; Topping, 1996). Duran and Monereo (2005) even indicated collaboration as being the core of peer tutoring, explaining both the interpersonal and intrapersonal advantages of this method of learning. According to Verba (1998), peer tutoring is one way of making an active and social constructivist contribution to knowledge acquisition.

Secondly, peer tutoring is *characterised by specific role taking* since one partner is clearly taking a direct pedagogical role (McLuckie & Topping, 2004, p. 566). A more capable, knowledgeable, and experienced peer with a supportive role is called the 'tutor,' while less experienced students receiving help from a tutor are called 'tutees' (Topping, 1998). It is arranged by appointment whether the role taking is either fixed or reciprocal (Duran & Monereo, 2005; Palincsar & Brown, 1984). The peer tutor may adopt the role of facilitator, converting the collaboration into learning opportunities. However, the interpretation of this tutor role merges different perspectives prevalent in the literature. One perspective emphasises the teaching role of the tutor. Damon and Phelps (1989, p. 11) define peer tutoring as "an approach in which one child instructs another child in material in which the first child is an expert and the second is a novice." Another more common perspective emphasises the helping or coaching role of the tutor. From the viewpoint of Goodlad and Hirst (1989) and Topping (1996), peer tutoring is a system of instruction in which learners help each other and learn by teaching. According to Vincent and Ley (1999), peer tutoring is cooperation between two or more students where one individual imparts knowledge to the other(s). In addition, Gyanani and Pahuja (1995) stress that in peer tutoring, pupils coach other pupils, usually in small groups or pairs, carefully organised and coordinated by the teacher. With respect to the particular definition of peer tutors, Falchikov (2001) argues that peer tutors are often defined by what they are not. They do not have a professional qualification so they are not professional teachers, they do not perform activities pertaining to grading, and finally, peer tutors have no control over the curriculum or materials used.

Thirdly, students can be paired or grouped with other students from within their own class group. This variant is called *same-age peer tutoring*. The second variant is called *cross-age peer tutoring* and refers to older and more knowledgeable students tutoring younger students (Gautrey, 1990; Gumpel & Frank, 1999). In the literature, some researchers specifically associate peers' collaboration to learn with a cross-age constellation in which tutors and tutees adopt an asymmetrical role (Carroll, 1996; Fogarty & Wang, 1982; Sobral, 2002; Steiger & Rossi, 1997; Wright & Cleary, 2006). Duran and Monereo (2005), for example, define peer tutoring as a method of collaborative learning, based on the creation of pairs of students with an asymmetrical relation and a common, known, and shared objective, which is achieved through an externally planned framework. Carroll (1996, p. 13) describes peer tutoring as "a fashionable title for a scheme whereby older students are involved in tutoring younger students." As for Pata, Sarapuu, and Lehtinen (2005), more knowledgeable peers influence the learning situation by peer scaffolding. Building on this asymmetrical relationship, Vincent and Ley (1999) mention that cross-age tutoring takes advantage of the higher status inherent in the age difference while still retaining considerable similarity. Besides this, peer tutors often pick up on things teachers could not, simply because of the fact that peers share the similar problems that they experienced a few years earlier.

Fourthly, although the *peer tutoring concept originates from face-to-face settings* it has recently been re-conceptualised in view of online collaborative learning environments. In current research, *online peer tutoring* is brought under more attention in higher and further education (de Vries, Kester, Sloep, van Rosmalen, Pannekeet, & Koper, 2005; Jones,

Garralda, Li, & Lock, 2006; McLuckie & Topping, 2004). To give an example, in their comparative study, Jones et al. (2006) found considerable differences between the interaction dynamics in face-to-face and online peer tutoring sessions. More specifically, it was shown that face-to-face interactions involved more hierarchical encounters whereas written online interactions were more egalitarian.

There is widespread agreement in the literature that students must be *trained* in order to become a proficient tutor (Falchikov, 2001; Jenkins & Jenkins, 1987; Kassab et al., 2005; Parr & Townsend, 2002; Rossi & Steiger, 1997). An increasing number of researchers agree that peer tutoring activities - whether online or not - are less effective without a preceding training program (Falchikov, 2001; Jenkins & Jenkins, 1987; Parr & Townsend, 2002; Rauenbush & Bereiter, 1991; Topping, 1996). In line with Topping (1996), we argue that a preliminary tutor training demands time, reflection on tutorials with other peer tutors, and can be specific or generic or both.

The concept of tutoring

The present review explores the literature that has been developed around the process of tutoring in a face-to-face learning environment. In a face-to-face tutoring context where most learning takes place via spoken group interaction, the tutor is likely to act more as a facilitator than as an active deliverer of knowledge. Additionally, the tutoring concept includes student tutoring, peer tutoring, and staff tutoring, depending on the audience and professional qualifications of the person who engages in tutoring (the person acting the role of tutor).

The former two types of tutoring are relatively sparse with regard to higher education, apart from specific empirical research in problem-based learning (Dolmans, Gijselaers, Moust, De Grave, Wolfhagen, & Van Der Vleuten, 2002; Kassab et al., 2005; Neville, 1999; Solomon & Crowe, 2001; Sobral, 2002). In the view of Dolmans et al. (2002, p. 173), "student tutoring is a process aimed at stimulating constructive, self-directed, situated, and collaborative learning by students". Topping and Hill (1996) clearly distinguish between student tutoring and peer tutoring. Both authors describe *student tutoring* as a method of teaching and learning where students from further and higher education establishments tutor pupils in primary and secondary schools. *Peer tutoring* has been conceptualised as a form of collaborative learning in which "people from similar social groupings who are not professional teachers help each other to learn, and learn themselves by teaching" (Topping, 1996, p. 322). As for Sobral (2002, p. 1066), a student tutor has three functions: (1) to help the tutees in study tasks; (2) to aid the faculty in teaching tasks compatible with his/her knowledge and experience; and (3) to act as a link between teacher and tutees. Neville (1999) puts the aforementioned problem-based learning (PBL) tutor roles into question. The author more specifically starts the debate on the potential of the PBL student tutor to act upon the role of a teacher, facilitator, evaluator, and/or content expert.

What is immediately clear from the specific literature about *staff tutoring* is its association with a multidimensional activity. Simpson (2002) describes two broad areas of staff tutoring support, namely academic and non-academic support. Rose, Moore, VanLehn, and Allbritton (2001) make a clear distinction between a "Socratic" and a "Didactic tutoring style". In

addition, Denis, Watland, Pirotte, and Verday (2004) distinguish four peripheral tutor roles: designer, manager/administrator, co-learner, and researcher. An all-embracing list is presented by Lentell (2003, p. 74): "Tutors need to have knowledge and a broad conceptual understanding of their field. They have to be effective listeners and communicators, coaches, facilitators, mentors, supporters, and resources. They have to listen, to shape, to give feedback, to motivate, to direct, to appreciate – broadly to be developmental and problem solving."

Previous research on peer tutoring: some challenges

A review of the available literature results in a list of critical issues that can be raised about earlier research approaches in the area of peer tutoring. At the same time, this review results in an agenda for future research.

Peer tutoring as a certain type of collaborative learning was initially studied within *face-to-face learning environments* in *compulsory education* (Hoysniemi et al., 2003; Verba, 1998; Wright & Cleary, 2006). It is only since the turn of the century that the research field of CSCL has been discovered as a powerful learning environment for introducing peer tutoring on an organised educational basis. Thus far, research about online peer tutoring remains scarce and particularly limited to higher education (de Vries et al., 2005; Jones et al., 2006; McLuckie & Topping, 2004). It is, however, expected that in the near future the current technological and societal changes that require more distance and continuous learning will increase the chance that educators - at any level of education - integrate online peer tutoring in their curricula. Hence, further research into the implications of introducing online peer tutoring at different educational levels is needed.

Another challenge in the area of peer tutoring is related to the original one-sided focus on *effect studies* (Griffin & Griffin, 1998; Gyanani & Pahuja, 2005; Hoysniemi et al., 2003; Kassab et al., 2005; Sobral, 2002). So far, little attention has been paid to processes underlying the positive outcome effects of introducing peer tutoring in a particular educational context. Many studies have examined the effects of peer tutoring without examining the nature of the collaboration that occurs. Apparently, there is a lack of empirical research to ground the substantial evidence that is currently established around both the theoretical advantages and effectiveness of peer tutoring (Topping, 1996). For instance, the nature of the tutor-tutee interaction during peer tutoring has only been studied to a limited extent (Jones et al., 2006; Verba, 1998). Moreover, only a few studies specifically focus on the quality or nature of the helping task and role of a peer tutor within peer tutoring (Colvin, 2007; King, 1997). Furthermore, qualitative research that aims at gaining insight in the perceptions of those who are actually participating in a peer tutoring setting is relatively underestimated (Solomon & Crowe, 2001).

Finally, although there is widespread agreement that peer tutoring activities are less effective *without prior tutor training* (Falchikov, 2001; Jenkins & Jenkins, 1987; Kassab et al., 2005; Parr & Townsend, 2002; Steiger & Rossi, 1997) many studies have examined the effects of peer tutoring without preparing the tutors. In addition, studies illustrating a practical and comprehensive model for a peer tutoring skills training are only investigated to a limited

extent (Blankenburg & Kariotis, 2000; Chappell, 1995; Nath & Ross, 2001). It further appears that the few tutor training initiatives that are described in previous research concentrate to a lesser extent on peer tutors' need for ongoing in-service supervision and support.

Theory and practice of Computer-Supported Collaborative Learning

Collaboration

A number of authors explain the unique meaning of the term 'collaboration' by drawing attention to *a broad range of features* specifically induced by the collaboration context. Schwarz (2005) and Kirschner (2003) summarise a number of key features characterising collaboration. Taking into account the literature defining peer tutoring as a certain type of collaborative learning (Duran & Monereo, 2005; Griffin & Griffin, 1998; Topping, 1996; Verba, 1998), the following features characterising collaboration are therefore transferable to the context of this dissertation about online peer tutoring behaviour: (1) collaboration refers to negotiation that is sensitive and reliant to others' perspectives, expertise, and cognitions; (2) collaboration is characterised by a common goal to which all participants are accountable for success; (3) collaboration involves being willing to create a shared understanding that none have previously possessed or could have come to on their own; (4) collaboration is a choice to be made from the part of the participants; (5) collaboration is not based on directive but on rather autonomous social interactions; (6) collaboration invites the use of minimised authority for those involved in dialogue; (7) collaboration must be seen as an ongoing and dynamic process that can evolve and improve over time dependent on 'team formation' and 'argumentative skills'; and (8) collaboration requires an atmosphere of trust, respect, confidentiality, and effective communication. According to Jonassen, Lee, Yang, and Laffey (2005, p. 254), "the ability of individuals to collaborate is a function of motivation, abilities to complete the required tasks, adequate support and resources available in the social context, and cohesiveness of the group in pursuing goals".

Collaborative learning

Taking into account that learning occurs through interaction (Vygotsky, 1978), we agree with Dillenbourg (1999) that collaborative learning refers to a situation in which two or more people learn together in the sense that they co-construct knowledge. According to Kirschner (2001, p. 5), "the learning tasks provide the intention for collaborative learning and are the gateway to the knowledge and skills needed for the completion of those tasks." As for Dillenbourg (1999) and many other authors referring to socially oriented theories of knowledge construction, especially the interpersonal activities that trigger intrapersonal cognitive processes and individual cognitive development are claimed to be the strength of collaborative learning.

Many researchers within the more specific area of peer tutoring frequently refer to the strong theoretical emphasis on social interaction and group learning in the Vygotskian social constructivist learning theory. In their empirical studies, different researchers focusing on peer-mediated learning (Duran & Monereo, 2005; Griffin & Griffin, 1998; Topping, 1996;

Verba, 1998) refer to constructivist concepts, like (1) situated learning, (2) socially shared cognition, (3) joint activity, (4) the zone of proximal development, and/or (5) culture, context, and cognition, all summarised and discussed by Samaras and Gismondi (1998).

Collaboration leads to learning not only because of the social interaction (Kreijns, Kirschner, & Jochems, 2003), but rather because the collaborative activities increase the chance that students engage in *interaction supporting learning* (Teasley, 1995). In this respect, a positive impact of collaboration on learning strongly depends on the quality of the discourse, more specifically, on the contents of the arguments and their successive invitation to construct knowledge. As summarised by Kirschner, Beers, Boshuizen, and Gijselaers (in press), collaborative learning is effective because of the processes involved in it (e.g., negotiation of meaning, position, and common ground). In addition to the aforementioned cognitive processes it is assumed that socio-emotional aspects such as group formation and group dynamics are key determinants of effective collaborative learning as well (Kreijns et al., 2003).

Computer-Supported Collaborative Learning

As educators begin to realise the enormous potential for integrating collaboration in education provided by new Information and Communication Technologies (ICT), it is no surprise that interest in this field has expanded dramatically in the previous few years. Most universities have jumped on the bandwagon of globalisation, and are trying to make their courses and programs available to a wider group of potential students. It further seems that the relatively new technologies enable other forms of teaching and learning to come to the fore. In general, there is a growing demand by educators and researchers to understand and take best advantage of environments where Internet and email access are essential components of a collaborative learning process (Bonk, Wisher, & Lee, 2004). This educational practice is commonly described as the field of Computer-Supported Collaborative Learning (CSCL). The phrase *computer-supported* is to be interpreted in the sense that the CSCL-participants may generally not meet face-to-face as they are not required to be in the same location. In contrast with synchronous CSCL-environments, participation in an asynchronous text-based learning environment is not constrained to specific times. This means that any participant could voluntarily spend a given amount of time on any part of the group assignment (Benbunan-Fich, Hiltz, & Turoff, 2002). According to Jonassen et al. (2005, p. 248), CSCL systems enable learners to communicate ideas interactively, access information, and engage in collaborative problem-solving activities. To a large extent, this description clarifies why CSCL is an emerging learning and research field.

Previous research on CSCL: some challenges

Prior research in the area of CSCL reveals issues for further consideration. Again, elements for an agenda for future research can be listed.

A first issue is that CSCL-environments give a high level of *control* to students. However, even when it is shown that CSCL-environments play a successful role in facilitating knowledge construction (e.g., De Wever, Schellens, Van Keer, & Valcke, 2006;

Gunawardena, Lowe, & Anderson, 1997; Weinberger & Fischer, 2006) or higher-order thinking (Garrison, Anderson, & Archer, 2000), this control can be at the expense of developing a personal overview and structure of the discussion, and difficulties in organising the input of information, thus resulting in lower levels of knowledge construction (Schellens, 2004). In this respect, much remains to be learned with regard to the learner's need to discern structure in the written messages (Laurillard, 1998) and as a result, to the availability of support.

It must be taken into account that computer-supported collaborative learning is affected by the *nature* of social interaction. However, interaction as such does not lead to learning (Dillenbourg, 2002; Kreijns et al., 2003; Teasley, 1995). As for Weinberger and Fischer (2006), online learners are supposed to engage in a specific argumentative discourse with the goal of acquiring knowledge. Falchikov (2001) reviewed research reports on peer tutoring in higher education and, with regard to the effectiveness of CSCL, the author concludes that there is an absolute need to empower people who are collaborating online. Other researchers in the field of CSCL emphasise the need for guidance and structure in learning environments that are both text-based, computer-supported, and collaborative (Bonk et al., 2004; Gilbert & Dabbagh, 2005; Laurillard, 1998; McLoughlin & Luca, 2000; Pata et al., 2005). Furthermore, many of these authors suggest that as learners are physically located at a distance from each other, facilitating their task-focused activities is of great importance.

The need for support in CSCL

A multidimensional approach

A review of the burgeoning amount of literature stimulating the actual adoption of support in electronic collaborative learning environments results in a variety of concepts being used to address the roles, tasks, and responsibilities of online facilitators. In addition, the concept of online facilitation encompasses a very broad range of educational approaches and it is not yet clear what their theoretical impact is in the field of CSCL. In general, online facilitation can be described as "the act of managing the learners and the learning through an online medium" and can take many forms (Backroad Connections Pty Ltd, 2002, p. 2). Online facilitators have multidimensional missions which entails that their management and support is multi-faceted; e.g., involving ICT-related, social, and cognitive support. In more specific terms, three central concepts dominate the discussion related to the responsibilities of an online facilitator: *online tutoring, online scaffolding,* and *e-moderating*. Whereas online tutoring and online scaffolding were originally more associated with one-to-one facilitation systems, e-moderating rather supports a constructivist approach towards e-learning communities (Moule, 2007). Below we present an overview of the conceptual boundaries presented in the literature.

Online tutoring

The theoretical frameworks for tutoring blended in with CSCL-environments all have a focus on facilitating learners' process and progress. *Online tutoring* (Bennett & Marsh, 2002;

Macdonald, 2006; Nevgi, Virtanen, & Niemi, 2006) appears to be a concept with a history. Nowadays, there is a growing interest in the concept of online tutoring, whereas in earlier research on tutoring other references to the online medium were adopted: computer-based tutoring (Wood & Wood, 1996), e-mail tutoring (Coogan, 1995), and tutoring in cyberspace (Jordan-Henley & Maid, 1995).

By *online* tutoring, we mean that most participants are geographically isolated but have full access to all of the necessary resources via their Internet connection. Materials and support activities will be provided electronically and interaction will be either synchronous or asynchronous.

Several authors recognise that the specific demands of being an online *tutor* are somewhat different to those of a face-to-face tutor (Jordan-Henley & Maid, 1995; McLuckie & Topping, 2004). In CSCL-environments various kinds of support are necessary and, as a result, a variety of roles, tasks, and responsibilities have been put forward (Mazzolini & Maddison, 2007). To give an example, Denis (2003) distinguishes seven roles of an e-tutor: supporting the start-up, solving technical problems, answering content-related questions, supporting the methodological constraints (organisation, working methods, affective-emotional factors, fostering communication and cooperation), enhancing metacognition (self-reflection), assessment and evaluation, and providing what she calls 'pastoral care.' de Vries and colleagues (2005) propose three - mostly cognitive - student support activities relevant to the responsibilities of a peer tutor involved in e-learning. The authors more specifically distinguish support related to the learning contents, learning processes, and student products.

Online scaffolding

With regard to students' need for assistance in CSCL, the concept of *online scaffolding* is put forward as a support strategy focusing more on structure (e.g., Cagiltay, 2006; Mason, 2000; Pata et al., 2005; Pifarré, 2007; Yelland & Masters, 2005). The metaphorical term scaffolding originates from face-to-face educational support techniques, often presented in the form of adult-child dialogue that is structured by the adult to maximise the growth of the child's intra-psychological functioning (Bruner, 1986). In the more recent view of Pata et al. (2005) scaffolding means providing assistance to students on an as-needed basis with fading out of assistance as competence or mastery increases. This definition is in line with Mason (2000) indicating that the core of scaffolding lies in fading out the structure in activities so that students internalise what teachers are demonstrating.

It appears that there are two reasons why the scaffolding concept fits efficiently in the earlier discussion about (online and/or cross-age) tutoring. At first, peer scaffolding is a specific method of transferring skills from more experienced and knowledgeable peers to less experienced ones (Pata et al., 2005). Secondly, the online scaffolding concept reflects - yet again - a multidimensional activity. According to Cagiltay (2006), four different types of scaffolding are discussed in electronic environments: conceptual scaffolding, metacognitive scaffolding, procedural scaffolding, and strategic-intrinsic scaffolding. In addition, Pata et al.

(2005) distinguish an active and passive tutor scaffolding style during the process of solving environmental dilemmas in a role-play in a network-based synchronous chat environment.

E-moderating

A third concept, discussed in the literature, is *e-moderating* (e.g., Bonk et al., 2004; Paulsen, 1995; Salmon, 2000). This concept is commonly associated with computer-mediated conferencing (CMC) in which e-learning occurs as part of a community (Moule, 2007). A dominant author in this field is Salmon (2000). She presents a five-step model to direct e-moderating skills within online networking and group working. This model will be discussed in detail below.

First, the five-step model for e-moderating has been specifically conceived for use in constructivist e-learning collaborative contexts in higher education (Moule, 2007).

Second, Salmon (2000) connects e-moderating to the need to make the contents and social interactions in CMC meaningful to all participants. Hence, a multidimensional approach to structuring learning activities is presented in which the various e-moderating activities focus on fostering participation, giving orientation and assistance, and promoting process control.

Third, it appears that this model incorporates most of the tutoring and scaffolding roles, tasks, and activities described above about online facilitation.

Fourth, according to Salmon (2000) an e-moderator is not per se a qualified teacher.

Fifth, she reflects on the possible need to support participants with technical skills at different stages (Moule, 2007).

Sixth, her model illustrates the interplay between competence and affective factors such as growing confidence, motivation, and group dynamics (Macdonald, 2006).

Seventh, the model is taxonomical in structure: the initial community building activities are conditional for future moderating activities that - at stage five - result in support for reflective practice. This is in line with the findings of other researchers (Billett, 1996; Garrison et al., 2000) who state that social and emotional presence is of importance to foster cognitive processing.

Finally, the taxonomical structure of the model is helpful in view of designing online courses and/or training e-moderators across many learning disciplines, contexts, and education levels (Salmon, 2000).

The five stages in e-moderation, as shown in Figure 1 and described in more detail below, focus on the development of consecutively more complex e-moderating skills and specific technical skills. Moreover, e-moderation focuses on intensifying the level of interaction between the e-moderator and group members as indicated by the interactivity bar at the right hand side of Figure 1.

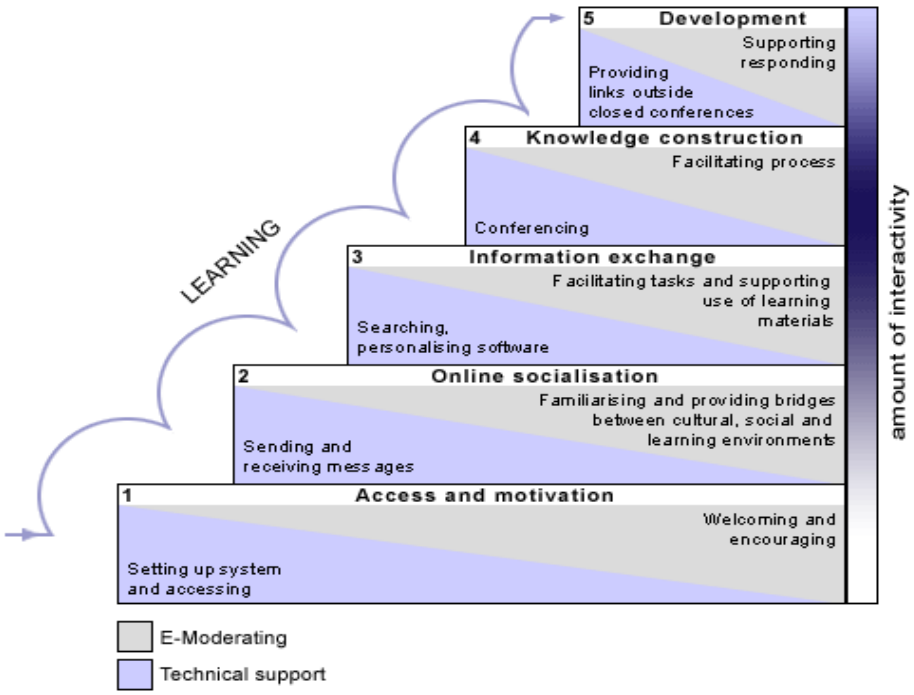

Figure 1. Electronic moderation model (Salmon, 2000)

Salmon (2000) maintains that e-moderating involves a series of stages which include access and motivation, socialisation, information-exchange, knowledge construction, and personal development. The first moderation stage, 'access and motivation,' centres on welcoming participants and offering them technical support to get online. In this respect, online e-moderators pay attention to the participants' readiness to learn in a digital environment. When participants feel comfortable with the medium, they start submitting contributions. Getting to know each other, sharing empathy, and having a clear sense of the 'discussion group audience' are the priorities at the second moderation stage 'online socialisation.' At this stage, e-moderators help establishing a feeling of 'community.' The e-moderator guarantees that everyone feels respected and heeds respect for the input of others. A pleasant and constructive atmosphere is fundamental for further learning. At the third stage of 'information exchange,' learning becomes the more prominent objective. Two typical kinds of interaction are pursued: (1) individual interaction that reflects coping with the course content, and (2) social interaction with other participants, including the e-moderator. At this stage, the role of the e-moderator is to give direction by submitting plenty of messages. The moderator's messages help to focus on the task or problem, shed light on the most relevant topics, and provide supportive content-related information. Central to the fourth stage of 'knowledge construction' are social negotiation and task-related engagement. E-moderating is intrinsic to knowledge construction when participants explore issues, take positions, discuss their positions in an argumentative format, and reflect on and re-evaluate their positions. In this respect, e-moderators have the role of a facilitator, not a transmission role. They ask questions, reformulate input, keep an eye on the structure of the debate, and summarise what has been stated thus far. The overall purpose at this stage is sharing meaning and building common understanding. At the fifth and final stage of 'development,' participants reassess

their own thinking and explore the social learning processes. The key ingredient at this stage of personal development is reflection and becoming responsible for one's own learning. In this respect, e-moderators need to challenge learners' thoughts, for example by playing the devil's advocate and by encouraging critical thinking. The more participants rethink and reconsider their contributions, the more stage five has been reached.

Previous research on the need for support in CSCL: some challenges

In summary, the distinct constructs of online facilitation (e.g., online tutoring, online scaffolding, and e-moderating) build on a skills approach, and shed light on features that are particularly based on the theoretical background of social constructivism. In concrete terms, online facilitation requires *skills* to facilitate students' learning processes, and those skills are: (1) intentional, (2) multidimensional, (3) situated, and (4) trainable (Mazzolini & Maddison, 2007; Salmon, 2000). Among other things contextual circumstances influence the online facilitation skills tutors adopt. However, the interrelationship between the *multidimensional* nature of support in CSCL and contextual circumstances has to be considered in further detail. The aforementioned classification of diverse online facilitation types and roles involves that both tutoring as a process and tutor's behaviour, are partly *situation-specific* (Dolmans et al., 2002). From a theoretical point of view, a great deal of the variety in tutoring refers to assumptions underlying a situated learning approach in education (Billett, 1996; Brown, Collins, & Duguid, 1989; Collins, Brown, & Newman, 1989; Lave & Wenger, 1991). Lave and Wenger's theory (1991) describes learning processes as situated within communities of practice where individuals share and negotiate, on the basis of their experiences, to develop co-constructed knowledge.

A situation-specific perspective on tutoring in particular emphasises that tutoring implies a development over time in tutoring behaviour. It appears that the multidimensionality of tutoring is related to the degree to which a particular point in time, and thus timing, influences one's tutoring behaviour. A situation-specific view on tutoring also reminds us of the importance of learner-centred education. Research into PBL goes along with this social constructivist approach towards learning and instruction. More specifically, the role of the tutor in PBL tutorials is mainly to facilitate the group and to bring the best out of its participants rather than to support a linear model of transmission of knowledge, from the tutor to the tutee(s). As Kassab et al. (2005, p. 521) further argue, "a good tutorial group should gradually become more proficient and function in a self-directed manner". In this respect, it is not surprising that the target of online tutoring and online peer tutoring behaviour can vary over time, dependent on the situated interplay or changes in the tutoring context.

Focus of this dissertation study

Opportunities for peer tutoring in higher education

The influence of the new information and communication technologies (ICT) has been noticeable in the field of education in general, and in higher education in particular. Today it appears that the instructor-learner transmission model is on the verge of being overthrown,

and that in the near future much learning will take place collaboratively and/or computer-supported with the majority of the interaction being learner-oriented and facilitated. Recently, the changing societal expectations towards education and teachers have been translated into various perspectives on higher education, educational goals, and the curriculum. Within the context of the present dissertation, online peer tutoring is introduced in a higher education setting.

From the 1990s, use of peer tutoring appears to have increased in higher education. Sobral (2002) argues that there could be many reasons why undergraduates engage in peer tutoring as a higher education opportunity. Apart from its evidence for improved academic achievement for both tutors and tutees (Topping, 1996), some would consider experiencing the specific tutor role as a chance for students to explore a potential educational career choice (Sobral, 2006). Other educators and researchers integrate peer tutoring activities since the curriculum is based on principles of non-competitive, self-directed, and small-group learning (Carroll, 1996; Solomon & Crowe, 2001). As for Topping (1996) and Sobral (2002), especially the dual requirement to improve teaching quality while "doing more with less" has increased interest in peer tutoring in higher and further education. Hence, it is likely that cost-effectiveness of teaching and learning lies at the basis of introducing peer tutoring in higher education but, so far, more pedagogical motives are behind any option of peer tutoring practice. Recently, higher education staff involved in e-learning are becoming aware of the pedagogical advantages that online peer tutoring can offer (de Vries et al., 2005; McLuckie & Topping, 2004). In particular, a course having an online peer tutor can relieve the feelings of isolation thanks to knowing that somebody is available if there are difficulties.

This dissertation mainly focuses on the promising peer tutoring arrangements that can make the pedagogy of higher education meaningful, while taking into account the blended learning and online tutoring tendencies that currently challenge higher education. According to Macdonald (2006, p. 2), "blended learning is associated with the introduction of online media into a course, while at the same time recognising that there is merit in retaining face-to-face contact". Bearing in mind the research-based evidence concerning the need for support in CSCL, the general topic accounted for throughout this dissertation is the supportive behaviour of cross-age peer tutors (Gautrey, 1990; Gumpel & Frank, 1999). The CSCL-environments under investigation in this dissertation are asynchronous discussion groups.

Basic concepts

In what follows, the main concepts composing the title of this dissertation (i.e., Online peer tutoring behaviour in a higher education context) are defined separately based on the theoretical framework as presented in the previous sections.

By *online*, we mean that most participants are likely to be geographically isolated but have full access to all of the necessary resources via their Internet connection. Materials and support activities will be provided electronically and interaction will be either synchronous or asynchronous. By *peer tutoring behaviour* we refer to acting upon the helping peer tutor role. According to McLuckie and Topping (2004), peers are status equals interacting and learning together. The most established and intensively researched forms of peer learning are peer

tutoring and collaborative learning (Topping, 2005). However, learning in a peer tutoring setting is to be considered as a specific type of collaborative learning (Griffin & Griffin, 1998; Topping, 1996). "Peer tutoring is further characterised by specific role-taking as tutor or tutee, with high focus on curriculum content and usually also on clear procedures for interaction, in which participants receive generic and/or specific training" (Topping, 2005, p. 632). In common use, the tutoring concept in particular often includes a tutor's skills and abilities. Dolmans and colleagues (2002, p. 173) specify tutoring as "a process aimed at stimulating for constructive, self-directed, situated, and collaborative learning by students". Finally, by *higher education* we refer not only to universities, but to all institutions that intend to provide and facilitate knowledge and skills to adult learners. In our research however, only one university setting situated in the knowledge domain of Educational Sciences is studied.

Problem statement

In this dissertation, we build on challenges in the research literature about peer tutoring and CSCL. Particularly, we complicate recent theoretical and empirical evidence of tutoring in problem-based learning (Dolmans et al., 2002; Kassab et al., 2005) and evidence of teachers' professional identity formation (Beijaard, Meijer, & Verloop, 2004). More specifically, our research questions the statement of Dolmans et al. (2002, p. 177) that "a tutor's performance is not a stable characteristic but is partly situation specific". Also Kassab and colleagues (2005) presume situation-specific and tutor-dependent factors contributing to the process of tutoring. This presupposition is supported by ample descriptive literature on the different roles, tasks, and responsibilities of peer tutors participating in a specific research setting (McLuckie & Topping, 2004; Neville, 1999). According to Jonassen and colleagues (2005), the proper role of tutors and the specific nature of their tutoring behaviour, however, remain unvalidated except for generic advice for face-to-face tutoring. Moreover, actual research evidence of distinct variables and processes underlying, affecting, and interplaying with the multidimensional nature of cross-age and/or online tutoring behaviour remains scarce. To give an example, further empirical research is needed to explore factors that could motivate the conclusion of Sobral (2002, p. 1070) that "there is great variation among students regarding time of start, frequency, and breadth of tutoring activity". So far we do not know to what extent peer tutors vary in their tutoring behaviour in accordance with changes in context and tutor characteristics, when they are participating in an electronic environment and facilitating tutees' collaboration.

To structure this variety in processes and variables influencing tutoring behaviour, the expectancy-value model on motivation is rephrased in terms of peer tutor instead of teacher-related determinants. Although the expectancy-value model of Wigfield and Eccles (2000) is not based on an online peer tutoring approach, we build on the conceptual model to frame a broad and diverse body of variables and processes that determine online peer tutoring behaviour in a higher education context. Our objective is neither to present a definite list of factors that influence the nature of tutoring behaviour nor to validate a theoretical model. Inspired by the expectancy-value model, we present a structural model of variables and

processes that could serve as a framework for reflection and development on tutoring behaviour relevant to our particular research context.

In general, the expectancy-value model on motivation (Wigfield & Eccles, 2000) highlights that teachers' behaviour is as much dependent on the external context or work environment, as on their personal beliefs and cognitive processes. According to Valcke, Sang, Rots, and Hermans (in press), who discuss the same model in their literature review on teacher beliefs, beliefs consist of affective components, goal orientations, competency judgements, and perceptions related to the teaching and learning tasks to be carried out. Similarly, Song, Hannafin, and Hill (2007) state that beliefs and experiences influence how instructors teach and how students learn. Cognitive processes refer to perceptions of the social context and interpretations of attributions related to earlier teaching experiences and incidents. The feedback loop between behaviour and external context is of critical importance in the expectancy-value model as this illustrates how behaviour is part of a persistent interplay with other external variables and internal processes. Moreover, the expectancy-value framework holds that people are goal-oriented beings who can vary in the ways they persist and engage in practice (Palmgreen, 1984).

Linking the expectancy-value framework to our research context and bearing in mind the literature about (peer) tutoring and CSCL, we agree that peer tutors' tutoring behaviour in online discussions is part of a persistent interplay with context variables, cognitive processes, and motivational processes. The latter internal processes we later on refer to as individual 'tutor characteristics'. As mentioned before, this particular framework is most useful to structure the variables and processes influencing the types and amount of tutoring behaviour taken into account throughout this dissertation: tutor training, time, tutor thought processes, self-efficacy beliefs, perceived collective efficacy, and personal training evaluation. The rephrased model is depicted in Figure 2. The variables and processes in the dotted rectangles have not been the direct focus of the studies in this dissertation.

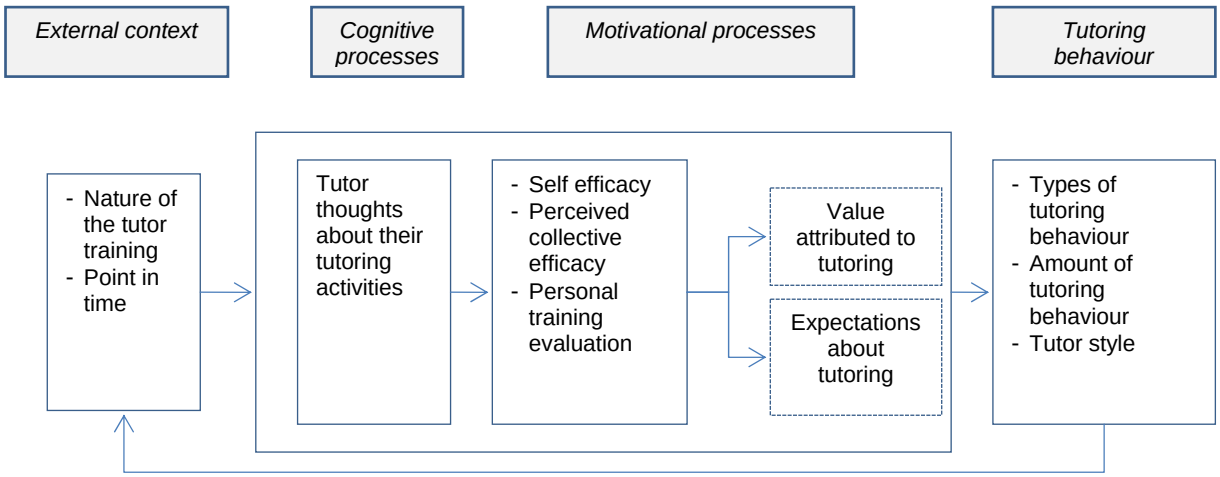

Figure 2. Schematic representation of the variables and processes included in this dissertation, structured by the expectancy-value model on motivation of Wigfield and Eccles (2000)

Research outline

In this dissertation, we focus on possible changes in the amount of tutor activity over time and in the types of online behaviour peer tutors are concerned with. The tutor interventions take a central position and will be discussed in relation to a number of context-specific and tutor-dependent characteristics. In general, these factors are the independent variables or covariates that might explain differences in the *types* and *amount of online peer tutoring behaviour*. The types of tutoring behaviour are studied inspired by authors adopting quantitative content analysis in their empirical research (Garrison et al., 2000; Kumpulainen & Mutanen, 1999; Meyer, 2004; Newman, Johnson, Webb, & Cochrane, 1997; Weinberger & Fischer, 2006). The amount of tutoring behaviour is studied over time inspired by researchers who have stressed that the quantity of participation in a text-based CSCL-environment positively relates to future knowledge construction (Schellens, Van Keer, Valcke, & De Wever, 2007; Weinberger & Fischer, 2006). Based on the expectancy-value model of Wigfield and Eccles (2000), two main clusters of predictors that influence both the quality and quantity of tutoring behaviour are distinguished: external context and internal tutor characteristics. In line with the empirical research of Hakkarainen and Lipponen (1998), we also explore the occurrence of certain *tutor styles* which refer to the tutor-dependent way tutors adopt tutoring behaviour and participate in online discussions. In what follows, we discuss each cluster of predictors for the types and amount of online tutoring behaviour accounted for in this dissertation. Figure 3 depicts and clusters the variables researched in the different studies throughout this dissertation. A number of factors are selected on a theoretical basis to serve as independent variables or covariates that may explain the types, amount, and changes in tutoring behaviour.

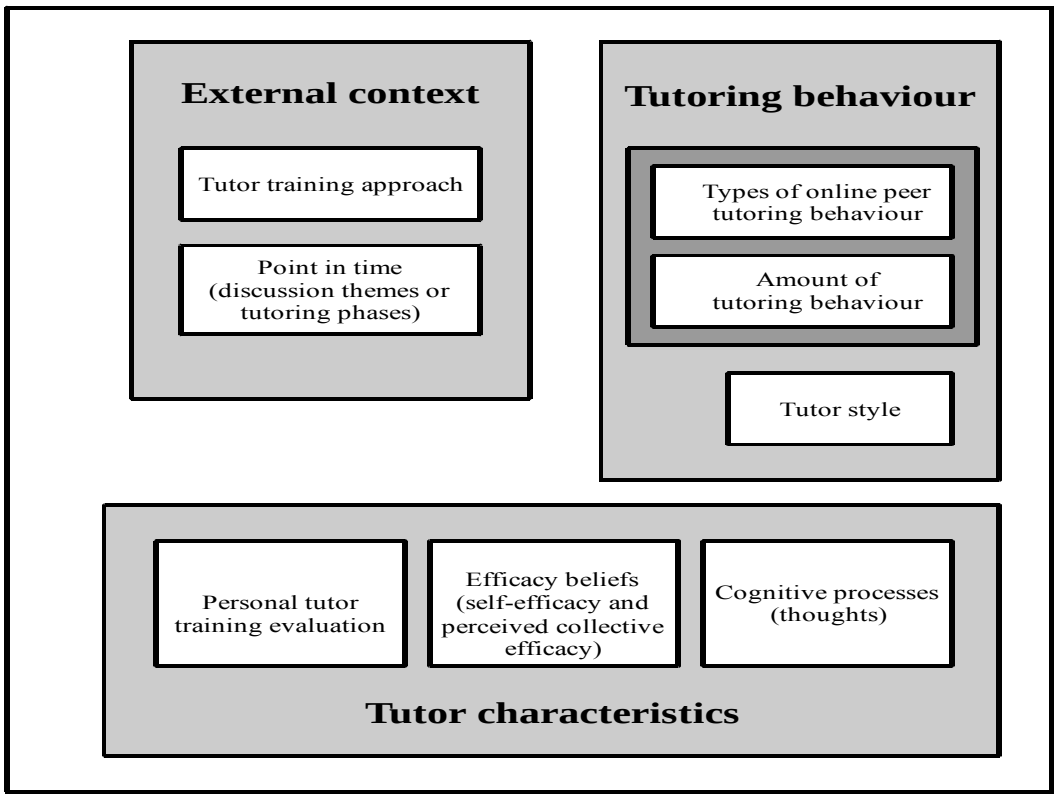

Figure 3. Variables researched in the different studies throughout this dissertation

External context. Concerning the *situation-specificity* of tutoring, Dolmans and colleagues (2002) suggest that the following contextual circumstances influence tutoring behaviour: the quality of the cases, the structure of PBL courses, the link with students' level of prior knowledge, and the functioning of tutorial groups. Whereas Carroll (1996) adds training of the peer tutors to this model, Roscoe and Chi (in press) found that especially the nature of the tutees' questions has a substantial impact on the subsequent integrative activities of the tutors. In this respect, it is shown that tutees play a very important role in shaping the support activities and learning opportunities of the tutors. In our studies, this complete set of contextual determinants for online peer tutoring behaviour is not controlled for. However, the functioning of the tutorial groups is studied from the tutors' viewpoint in relation to their particular tutor training and time. As there is widespread agreement in the literature that students must be trained in order to become proficient tutors (Falchikov, 2001; Jenkins & Jenkins, 1987; Kassab et al., 2005; Parr & Townsend, 2002; Rossi & Steiger, 1997) and taken into account that training can affect and improve particular skills of trainees (Huberty & Davis, 1998), *tutor training* needs to be taken into consideration when examining the predictors of tutoring behaviour. Throughout our successive studies, different tutor training approaches are developed and implemented. Hence, online tutor training delivery has not yet been standardised. Next, *time* has been found to be a critical factor affecting student-facilitators' roles, causing significant tensions between various facilitation roles in online discussions (Wang, in press). According to Wood and Wood (1996), social constructivist principles such as the notion of scaffolding and Vygotsky's more general theoretical concept of the zone of proximal development or ZPD govern tutoring, and consequently, the developmental aspect over time in it. Throughout our successive studies, time is measured in relation to consecutive discussion themes and tutoring phases.

Tutor characteristics. The expectancy-value model (Wigfield & Eccles, 2000) stresses the fact that internal cognitive and motivational processes affect one's behaviour and this in relation to external context variables. With regard to the *tutor-specificity* of tutoring, in their theoretical study Dolmans and colleagues (2002) describe tutors' degree of content-expertise as the only tutor characteristic to influence tutoring behaviour. Within the context of training transfer on the job, Nijman (2004) stresses the influence of trainee characteristics, which he considers a function of four factors: ability, training motivation, personality characteristics, and trainee attitude. If trainees are prospective online peer tutors, these trainee characteristics could be related to tutor characteristics. However, in the present dissertation not the above tutor characteristics but the interrelationship between efficacy beliefs and specific behaviour is studied in line with earlier research in educational settings (Bandura, 1993; Michalski & Cousins, 2000; Pajares, 2004). As beliefs consist of affective components, goal orientations, competency judgements, and perceptions about the tasks to be carried out (Valcke et al., in press), *efficacy beliefs* can be put under this umbrella concept as well. Self-efficacy is a theoretically grounded construct of motivation and refers to a belief that values and affects one's behaviour and engagement (Bandura, 1993; Michalski & Cousins, 2000; Pajares, 2004).

The present study attempts to address this issue by empirically examining online peer tutors' self-efficacy beliefs and perceived collective efficacy over time, at an individual level, and also in relation to the nature of the tutor training. For instance, efficacy beliefs are expected to be fostered by integrating a particular tutor training approach. Inspired by studies in educational evaluation one's *personal tutor training evaluation* is expected to be a tutor characteristic affecting tutoring behaviour as well (Barnard, Veldhuis, & van Rooij, 2001; Huberty & Davis, 1998; Kirkpatrick, 1994). In addition, the expectancy-value model points at cognitive processes, such as perceptions of the social context and interpretations of attributions related to earlier experiences and incidents (Valcke et al., in press). In our research context, peer tutors are framed as online facilitators presumed to adopt a variety of *cognitive processes*, namely thoughts (Kassab et al., 2005; Solomon & Crowe, 2001) and concerns (Chappell, 1995) about their interventions in the online discussions.

Relevance of the studies

Acknowledging that "free collaboration does not systematically produce learning" (Dillenbourg, 2002, p. 61), admitting that support may enable students to engage in more appropriate processing (Collins et al., 1989), and finally, considering the *older peer as a protagonist* in empowering and scaffolding tutees' online learning processes (Falchikov, 2001; Pata et al., 2005; Teasley, 1995), the main interest of our subsequent studies is on the analysis of peer tutors' contributions in asynchronous discussion groups. Building on the awareness that there is variation in people's experiences and conceptions of learning and/or teaching (Palmgreen, 1984; Säljö, 1979; Schmeck, 1988; Wigfield & Eccles, 2002), our studies are designed to investigate which types of support peer tutors actually adopt when introduced in the online discussions of younger tutees, and how peer tutors think about their tutoring in such contexts. Our research also verifies the statement of Dolmans et al. (2002, p. 177) that "a tutor's performance is not a stable characteristic but is partly situation specific". Research about the nature and complexity of online facilitation acts and processes fits in with the approaches adopted in teacher thinking and teaching practice research (Hargreaves & Fullan, 1998; Udvari-Solner, 1996) as well as research exploring beliefs underlying teachers' actions (Samuelowicz & Bain, 2001; Zohar, Degani, & Vaaknin, 2001).

From an empirical point of view, this tutor knowledge can be used by others seeking evidence upon which to base decisions surrounding the facilitation of online peer tutoring experiences. Moreover, capturing a portrait of peer tutors' online tutoring behaviour in higher education, related to a number of context-specific and tutor-dependent components, may contribute to - and goes beyond the limitations of - previous *effect studies* about introducing peer tutoring within a face-to-face setting (Griffin & Griffin, 1998; Gyanani & Pahuja, 2005; Hoysniemi et al., 2003; Kassab et al., 2005; Sobral, 2002).

From both a theoretical and practical point of view, tracing tutors' contributions allows us to gain insight into the *nature* of tutor interventions that are expected to promote high-level interaction and enhanced collaboration. By doing so, we want to create a better understanding of online peer tutoring behaviour, not in terms of acting upon a stringent tutoring script, but in terms of creating learning opportunities for younger peers through social interaction and

having personal agendas of pursuing them. Furthermore, the results can yield *design guidelines* in ameliorating tutor training activities and in enhancing the follow-up of those activities. In this respect, we also intend to offer research-based evidence of improved tutor training practice, based on the distinctive needs of online peer tutors. Although there is widespread agreement that peer tutoring activities are less effective without prior tutor training their quality or effectiveness has seldom been studied.

From a social point of view, online facilitating is an interesting skill to explore since higher education students are expected to be able to participate easily in a community in which information and communication technology (ICT) is of central importance. In this respect, blending in face-to-face lectures with group assignments to be discussed online not only changes traditional styles of pedagogy and instructional techniques, but also gives students opportunities to acquire and apply the degree of *computer literacy* they will need in their later professional life as educator (Stromso, Grottum, & Lycke, 2004).

Research setting

Online tutoring as an educational internship

As is the case in most higher education institutes, Educational Science students at Ghent University (Belgium) participate in an internship during their senior years as a formal part of the curriculum. We agree that internships can offer learning experiences that draw on previous knowledge and skills students gained during the entire educational program (ASHE-ERIC Higher Education Report, 2002). In addition we agree that the real life setting of educationists has changed tremendously during recent years and incorporates instructional processes in electronic learning environments and online distance programs as well (Samuelowicz & Bain, 2001). This implies that Educational Science students should ideally acquire experience with these settings during their university training. However, apart from investigating e-portfolio assessment in an educational context (Gülbahar & Tinmaz, 2006; Mason, Pegler, & Weller, 2004), research focusing on students performing their educational internship within an electronic learning environment is scarce in the literature.

In order to design and implement a high-quality internship in an academic educational setting, *seven design principles* put forward by Chickering and Gamson (1999) were considered: (1) internships encourage contact between faculty and students, (2) they develop collaboration among students, (3) they strive to achieve high expectations, (4) students are exposed to numerous active learning techniques, (5) students receive prompts and feedback about their performance, (6) students spend specific allocated times on their multiple tasks, and (7) internships help students learn to respect diverse talents and ways of learning.

Asynchronous discussion groups

Taking into account the aforementioned aims and design principles, the present dissertation draws on the internship experience of peer tutors in an asynchronous, collaborative learning environment. The implementation of asynchronous discussion groups is based on the social constructivist notion that social dialogue is important to trigger knowledge construction

(Benbunan-Fich et al., 2002; Brewer & Klein, 2006; Jonassen et al., 2005). The discussion groups are organised to endorse first-year students' exchange of ideas and knowledge construction by social interaction and debate on the theoretical concepts dealt with during the weekly face-to-face sessions and in the course manual. The particular choice for asynchronous discussion groups as a specific *type of CSCL* corresponds with the work of Brewer and Klein (2006) integrating small group work in an online higher education setting. Many other authors integrate the use of asynchronous technologies such as e-mail and discussion groups in their educational research as well (Benbunan-Fich et al., 2002; Dewiyanti, Brand-Gruwel, & Jochems, 2005; Kim, Wah, & Lee, 2007). As the participants in an asynchronous environment are free from temporal and spatial constraints, numerous implications of the time and place independent nature of asynchronous discussions are indicated in the literature. For instance, in line with Jonassen et al. (2005), Kim et al. (2007) suggest that asynchronous discussions facilitate self-directed learning since they provide students with extra time to reflect and to search for additional information before contributing to the discussion. According to Brewer and Klein (2006), an asynchronous collaborative learning environment allows for many-to-many, interactive, and text-based communication. Benbunan-Fich et al. (2002, p. 458) furthermore argue that "asynchronous technologies tend to promote richer discussions than face-to-face exchanges but present additional coordination challenges to team members working in this environment." As a result of richer discussions, the authors further conclude that asynchronous groups are able to submit more complete reports, which are more thorough and longer than the ones submitted by face-to-face groups. During the academic years 2004-2005 and 2005-2006, the asynchronous discussion groups were designed with Web Crossing (http://webcrossing.com). Since the academic year 2006-2007, Minerva is used for participating in online discussions at program level (https://minerva.ugent.be).

Introducing peer tutors to empower people collaborating online

The research for this dissertation is carried out in the context of the continuous search for improving teaching and learning in higher education. The peer tutoring design aims at implementing social constructivist principles such as active, authentic, and collaborative learning. All studies are therefore set up in a *naturalistic* or ecologically valid university setting. In our research, online peer tutoring behaviour is observed and monitored during three consecutive academic years, starting from 2004-2005. Online tutors are fourth-year Educational Science students, enrolled in an educational internship during the first semester of the academic year. The internship construct implies that participating in the peer tutoring project is obligatory and that peer tutors are not paid for promoting active discussion. During their internship, fourth-year students take up the role as a peer tutor each supporting an asynchronous discussion group of on average 12 younger students. Tutees are divided at random into discussion groups and group composition remains the same during the complete semester. The asynchronous discussion groups are a formal component of the 'Instructional Sciences' blended course, part of the first-year bachelor of Educational Sciences' curriculum. Both tutors and tutees represent the entire population of respectively fourth- and first-year

students and the majority are females. Concerning their actual role performance, it is assumed that all students 'begin cold' as they are not familiar with peer tutoring. Moreover, it is the first time tutees' participate in an asynchronous learning environment at program level.

Group assignments

The general task for the cross-age peer tutors is e-moderating which means supplying online support including technical help for access, motivation, socialisation, academic advice or information-exchange, and cues for knowledge construction and personal development (Salmon, 2000) during freshmen's task-based collaboration on successive authentic group assignments. The assignments are of more or less equal complexity, as evaluated by some content area experts of the Educational Sciences department, and relate to distinct chapters or themes in the course. Completing each discussion assignment lasts two weeks. After two weeks, the discussion is accessible on a read-only base and a new assignment is presented. The thematic group assignments are identical for all discussion groups and can be characterised as open-ended tasks, implying no standard approach, or single right answers. Additionally, the assignments are quite complex and extensive in order to force group members to join efforts instead of solving tasks on their own.

Tutor Training

To structure and enhance the online tutoring work, and to meet internship quality requirements, a number of *instructional design decisions* inspired by Chickering and Gamson (1999) are taken and implemented (see above).

In general, peer tutors are preliminary trained on the theoretical basis of e-moderating (Salmon, 2000) and introduced in the planned framework organised around their prospective online cross-age tutor role. The introduction of our different pre-service tutor training approaches is based on the few examples found in the peer tutoring literature (Blankenburg & Kariotis, 2000; Chappell, 1995; Nath & Ross, 2001) and on websites from institutions in a Northern American context (see http://www.educ.uidaho.edu/bestpractices/peer_train.html). The design of the tutor training approaches is based on the specific purpose of the task-based asynchronous discussion groups, namely to stimulate freshmen to actively discuss the course contents and relevant external sources to get a grip on the different theoretical concepts introduced in the course. In addition to having a good knowledge of the training contents and the learning environment, an online peer tutor should also feel comfortable online. Therefore, all tutor training approaches - as grounded and described in further detail within the successive studies - end with a demonstration of the technical CSCL-environment. A tutor website is made available as well, summarising practical information such as clarifying the aims of tutoring and the evaluation criteria. A specific guidebook with background information about the respective tutor training approach is distributed. Furthermore, every two weeks focus groups for tutors are organised to discuss tutors' behaviour and to improve their peer tutoring activities. These in-service, face-to-face, and on-campus meetings are set up in small groups of approximately ten peer tutors. Finally, two faculty members are available for discussion and questions during these focus groups and through e-mail.

Methodology

Transcript-based research

A methodological advantage of asynchronous discussion groups is that all exchanges of written communication are stored in the discussion transcripts. In addition, the transcripts can be printed and further used in a number of ways. As for Hara, Bonk, and Angeli (2000) the permanent record of students' argumentations can be used for later reflection and debate. Within the context of this dissertation, various transcripts based on a large set of tutor contribution samples from a previous tutor cohort actually serve as an example to reflect on in the preliminary tutor training. De Wever and colleagues (2006) further argue that students' progress can be better tracked compared to interactions that occur face-to-face. The previous authors also mention that the transcripts can serve as data for research. To give an example of the latter, it appears that transcripts can be converted into numerical codes as in 'quantitative content analysis' researchers establish a set of categories and then count the incidence of each category in transcripts (Silverman, 2001).

Content analysis

Many authors within the field of CSCL tackle the methodological issue of how to measure and analyse small-group online discussion behaviour (Garrison et al., 2000; Kumpulainen & Mutanen, 1999; Meyer, 2004; Newman et al., 1997; Weinberger & Fischer, 2006). By doing so, they either validate or develop a reliable and valid coding scheme which is appropriate for measuring and analysing the nature of online communication. According to Marra, Moore, and Klimczak (2004), these methods or protocols for analysing the transcripts of computer conference interactions are called content analysis. In this dissertation in-depth attention is paid to a specific type of online communication, namely online tutoring behaviour in asynchronous discussion forums. Recently, Salmon (2000) observed five steps of e-moderating that could be inspirational to the question of how to provide assistance to student peers negotiating meaning in CSCL-environments as well as how to analyse this kind of data. Notwithstanding the fact that the Salmon model is frequently mentioned in the literature (Moule, 2007), little research has been set up to study the actual adoption of the proposed stages (e.g., access and motivation, socialisation, information-exchange, knowledge construction, and personal development) in online discussions and the development of e-moderation over time. Accordingly, the five e-moderating skills depicted from the e-moderating framework have not yet been listed on a coding scheme. However, in most of our studies the Salmon model is selected as a framework for content analysis.

Mixed Method Design

The design of this dissertation is based on the results of five studies over a period of three academic years. Throughout our different studies on peer tutoring behaviour in asynchronous discussion groups, a mixed method design in a single dissertation program or inquiry is put forward (Tashakkori & Teddlie, 1998). This implies that triangulation is applied to the methodological research process and the data gathered. Tashakkori and Creswell (2007, p. 4)

define Mixed Methods (MM) as "research in which the investigator collects and analyses, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or program or inquiry." However, there is no thorough agreement yet about terminology. In their recent work, Ercikan and Roth (2006) shed light on some areas of contention by stating that the quantitative and qualitative dichotomy is fallacious and should instead be put on a continuous scale that discusses the level-of-inference (high or low) with respect to both data abstraction, generalisation, and explanation goals.

According to Creswell (1995, p. 177), it appears that we particularly conducted a *Dominant – Less Dominant Sequential Mixed Method Design*. This means that "the researcher conducts the study within a single dominant paradigm with a small component of the overall study drawn from an alternative design." More specifically, a review of the research literature is primarily performed. For instance, in order to define peer tutoring a repeated search is done on the Web of Science, and on the Ebsco and Sciencedirect electronic databases. Key words then adopted are "peer tutoring," "peer tutoring and collaborative learning," "online tutoring," "cross-age tutoring," and "tutor training." Only peer tutoring studies introduced on an organised educational basis are selected for further reading. In a next step, quantitative content analysis is applied to measure online peer tutoring behaviour. To analyse the tutor contributions in most of our studies, a new coding scheme is developed, rooted in the five-step e-moderating model of Salmon (2000). Next, the impact of evolution, different training approaches, and different tutor characteristics on online peer tutoring behaviour is measured by administering self-report questionnaires and by applying quantitative content analysis as well. To analyse the evolution in tutoring behaviour over time, another coding scheme is adopted. Afterwards, the results are analysed by using appropriate statistical software techniques. For instance, the five main categories of the e-moderating model frequently serve as a polytomous nominal dependent variable when performing statistical analyses such as logistic regression. In a final separate phase, a single qualitative approach is performed to understand the complexity of the phenomenon under study. More specifically, stimulated-recall is then applied to study peer tutors' underlying thoughts for their specific tutoring behaviour in the online discussions and to make their concerns explicit.

Research questions and overview of the chapters

Challenges in prior research

In accordance with the challenges of earlier research on both peer tutoring and CSCL, four research objectives are defined in this dissertation. These objectives are formulated on the basis of five distinctive needs that are likely to be approached in future empirical research:

(1) The need to set up peer tutoring studies in higher education;
(2) The need for studies that can ground the substantial evidence that is currently established around both the theoretical advantages and effectiveness of peer tutoring;

(3) The need for studies illustrating a practical and comprehensive model for a peer tutoring skills training;
(4) The need to investigate the quality or nature of facilitation acts in learning environments that are text-based, computer-supported, and collaborative;
(5) The need to examine the relationship between (online) facilitation behaviour and determinants of (online) facilitation behaviour.

Research objectives

In line with the aforementioned agenda for future research, all studies in this dissertation build on the concept of peer tutoring blended in with a CSCL-environment in higher education. Considering the preliminarily trained peer tutor as a protagonist in facilitating tutees' collaborative learning, his/her online tutoring behaviour is of particular interest. Hence, four main research objectives from the tutors' perspective are put forward:

Objective 1: Exploring the amount and types of tutoring behaviour that characterise online peer tutoring activities in higher education.
Objective 2: Investigating the relationship between online peer tutoring behaviour and differential contextual circumstances.
Objective 3: Investigating the relationship between online peer tutoring behaviour, differential contextual and differential tutor characteristics.
Objective 4: Identifying a broad spectrum of peer tutor thoughts underlying their actual adoption of online peer tutoring behaviour.

Research questions

In line with the research objectives put forward, the following seven research questions are central in this dissertation. A schematic representation of the variables and the hypothetical relation between them as they appear in the research questions included in this dissertation is presented in Figure 4. Throughout the subsequent studies, the findings of our earlier studies will also raise additional and more specified research questions. The numbers that appear in Figure 4 correspond to the research questions.

Objective 1: Exploring the amount and types of tutoring behaviour that characterise online peer tutoring activities in higher education.

(RQ1) Which types of support do cross-age peer tutors actually adopt in asynchronous discussion groups, and therefore, to what degree can online peer tutoring behaviour be regarded as multidimensional?
(RQ2) To what degree can online peer tutoring behaviour be regarded as tutor-dependent; thus reflecting a tutor style?

Objective 2: Investigating the relationship between online peer tutoring behaviour and differential contextual circumstances.

(RQ3) To what degree can the types and amount of online peer tutoring behaviour be regarded as differing and evolving over time?

(RQ4) What is the impact of different tutor training approaches on the types and amount of online peer tutoring behaviour?

Objective 3: Investigating the relationship between online peer tutoring behaviour, differential contextual circumstances, and differential tutor characteristics.

(RQ5) To what degree do tutors assigned to a specific tutor training differ with regard to their self-efficacy beliefs, perceived collective efficacy, and personal training evaluation over time?

(RQ6) To what degree do tutor characteristics (e.g., self-efficacy beliefs, perceived collective efficacy, and personal training evaluation) predict the impact of different tutor training approaches on online peer tutoring behaviour?

Objective 4: Identifying a broad spectrum of peer tutor thoughts underlying their actual adoption of online peer tutoring behaviour.

(RQ7) What is the nature of tutor thoughts during their tutoring activities?

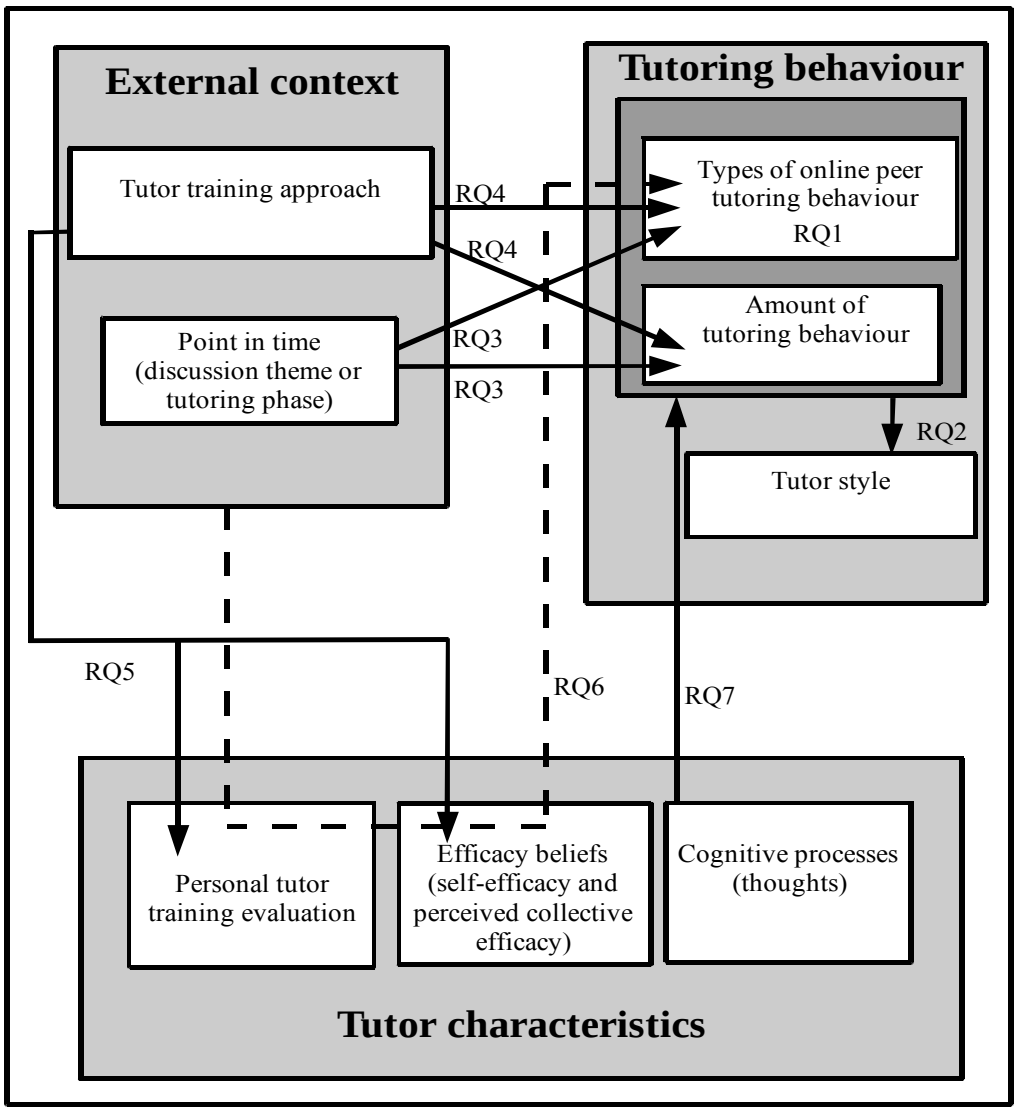

Figure 4. Variables and research questions studied throughout this dissertation

Chapter Overview

In what follows, we present an overview of the research questions addressed in the seven chapters of this dissertation. Apart from the general introduction and the general discussion, the chapters have been published or submitted for publication in international peer-reviewed journals as presented in Table 1. These five chapters or articles have two things in common. First, they attempt to provide research-based evidence to the area of online peer tutoring. Second, the empirical research is conducted in an ecologically valid environment. However, the five chapters differ with regard to a number of methodological issues: the tutor population sizes, the pre-service and in-service tutor training components, the discussion period which was either 12 weeks or 6 discussion themes (e.g., Chapter 2-3) or 8 weeks or 4 discussion themes (e.g., Chapter 4-6), the variables and/or processes controlled for, and the research techniques as represented in Table 2. Online peer tutoring behaviour is observed and monitored during the first semester of three consecutive academic years, from 2004-2005 (e.g., Chapter 2-3, control group in Chapter 4-5) over 2005-2006 (e.g., Chapter 4) to 2006-2007 (e.g., Chapter 5-6). Apparently, part of the large dataset from the academic year 2004-2005 is used in four different studies (e.g., Chapter 2-5).

Table 1. Overview of the research questions addressed by chapter

	RQ1	RQ2	RQ3	RQ4	RQ5	RQ6	RQ7
Chapter 1	*General Introduction*						
Chapter 2[a]	X	X	X				
Chapter 3[b]	X		X				
Chapter 4[c]	X			X	X		
Chapter 5[d]	X			X	X	X	
Chapter 6[e]							X
Chapter 7	*General discussion, implications, limitations, directions for future research, and conclusions*						

[a]Manuscript published in *Computers & Education*

[b]Manuscript accepted for publication in *Instructional Science*

[c]Manuscript submitted for publication in *Journal of Computer Assisted Learning*

[d]Manuscript submitted for publication in *Computers in Human Behavior*

[e]Manuscript submitted for publication in *Higher Education*

Chapter 2 contributes to a better understanding of the supportive interventions of tutors in asynchronous discussion groups. In accordance with RQ1, peer tutor interventions are studied by means of a content analysis scheme based on the e-moderating model of Salmon (2000). Furthermore, we check whether online peer tutoring behaviour is a matter of evolution or a matter of style. This dichotomy deals with the issue of whether tutoring behaviour can be regarded as multidimensional (RQ1) and consequently differing and evolving over time (RQ3), or as tutor-dependent reflecting a tutor's preferred style (RQ2). To verify whether

tutor interventions evolve from introductory social discussions, to contributions reflecting more cognitive processing and critical thinking throughout the six discussion themes, a univariate analysis of variance is applied. Cluster analysis is further adopted to classify the online peer tutors into different subtypes or tutor styles.

In Chapter 3, we shed extra light on the evolution perspective in the peer tutor role and how it relates to the theoretical frameworks of social constructivism, problem-based learning, cognitive apprenticeship, and scaffolding. Each framework reflects a set of ideas about the supportive role of a teacher or tutor, and the development over time when acting upon this role. A content analysis scheme (Garrison et al., 2000; Moust & Schmidt, 1994; Weinberger & Fischer, 2006) is newly developed to analyse tutors' contributions as suggested in RQ1. Full transcripts are coded and units of meaning are chosen as units of analysis. In accordance with RQ1 and RQ3, three aspects of evolution are considered: (1) evolution in the occurrence of the different types of tutor support; (2) evolution from modelling to coaching behaviour; and (3) evolution in addressing individual students or the group as a whole. Multinomial logistic regressions are performed to study the statistical impact of time - in terms of consecutive tutoring phases - on tutors' supportive behaviour.

Chapter 4 and Chapter 5 build on the results and considerations for future research as described in the previous chapters. The main aim of both chapters is to improve and balance peer tutors' supportive contributions through specific tutor training. Furthermore, it is assumed that a number of tutor characteristics affect tutors' support in discussion groups as well.

In Chapter 4, cross-age tutors are randomly assigned to one of the three following tutor training conditions: (1) the labelling experimental condition; (2) the non-labelling experimental condition; and (3) a control condition. At first, again a quantitative content analysis based on the e-moderating framework is performed to explore the types of online peer tutoring support actually adopted in asynchronous discussion groups (RQ1). Attention is focused on the extent to which online peer tutors are capable of labelling their interventions adequately. This means that in a next step there is controlled for agreement between the tutor labels and the objective coding. Thirdly, the differential impact of the tutor training approaches on online peer tutoring behaviour is studied by performing multinomial logistic regressions (RQ4). Finally, the differential impact of the three training conditions on tutors' self-efficacy beliefs and perceived collective efficacy is investigated (RQ5). At this point, self-report questionnaires are administered to explore particular tutor characteristics. In order to analyse and generalise tutors' answers on this tutor survey both an independent *t*-test and a paired *t*-test are performed.

The research methodology as adopted in Chapter 5 follows that of Chapter 4. The main difference between the two chapters is that within the scope of the former chapter, cross-age tutors are randomly assigned to one of the three following tutor training conditions: (1) the

multidimensional support condition; (2) the model/coach condition; and (3) a control condition. The study examines the impact of the three distinctive tutor training approaches on peer tutors' support in discussion groups (RQ4) and on tutors' characteristics in terms of their self- and collective efficacy beliefs and their personal training evaluation (RQ5). Besides investigating the impact of tutor training on the actual tutoring behaviour and on various tutor characteristics, tutor characteristics over time are controlled for as well when studying the impact of tutor training on tutoring behaviour (RQ6). To explore actual tutoring behaviour, we focused on both the occurrence of five e-moderating activities and the evolution from modelling to coaching (RQ1). To respond to the research questions in the results section, quantitative content analysis is combined with multinomial logistic regression analyses.

Chapter 6 differs from the previous ones in the sense that it describes a qualitative interpretative study of peer tutors' thought processes during online peer tutoring (RQ7). Stimulated-recall interviews are applied to study tutors' thoughts underlying their specific tutoring behaviour in the online discussions and to make their concerns explicit. A qualitative grounded theory approach is used to analyse the interview transcripts.

Chapter 7 integrates the findings of the successive chapters against the theoretical background and the main objectives of this dissertation. It provides an overview of the answers to the research questions formulated above and discusses the results and their practical implications. Next to listing a number of conclusions, it presents the limitations of the studies together with directions for future research.

Table 2. Overview of the chapters, research design, and research techniques

Chapter	Research overview	Research design	Research techniques
Chapter 1	*Theoretical background*. Peer tutoring, CSCL, support in CSCL. *Five challenges*. (1) Peer tutoring in higher education, (2) substantial evidence underlying the positive outcomes of peer tutoring effect studies, (3) a practical and comprehensive tutor training, (4) the need to empower people collaborating online, (5) a number of elements determine the nature of online facilitation. *Research focus*. Online peer tutoring behaviour and its relationship with context-specific and tutor-dependent determinants (Dolmans et al., 2002). *Our research setting*. Cross-age peer tutoring blended in with asynchronous discussion groups. *Methodology*. Quantitative studies > Qualitative study. *Relevance.* Opportunities for online peer tutoring in higher education influenced by current technological and societal changes. *Research objectives, research questions, and chapter overview.*		Review of the literature as general introduction
Chapter 2	Studying subtypes of online peer tutoring behaviour and exploring distinctive tutor styles.	(1) Exploratory study (2) Testing theories	Quantitative content analysis (1) Hierarchical and k-means cluster analysis (2) (M)ANOVA
Chapter 3	Exploring evolution in online peer tutoring behaviour.	(1) Testing theories	Quantitative content analysis (1) Multi- and binomial logistic regressions
Chapter 4	(1) Measuring the impact of labelling introduced to improve and balance peer tutors' supportive contributions. (2) Studying the impact of labelling requirements on tutors' self-efficacy beliefs and perceived collective efficacy.	(1) Quasi experimental design, involving two experimental groups and a control group (2) Tutor survey in a pretest posttest design	(1) Quantitative content analysis (1) Multinomial logistic regressions (2) Factor analysis (2) Independent and paired *t*-test
Chapter 5	(1) Comparing three tutor training approaches (e.g., multidimensional, model-coach, control group) introduced to improve and balance online peer tutoring behaviour. (2) Studying the differential impact of tutor characteristics (e.g., self-efficacy, perceived collective efficacy, and personal training evaluation).	(1) Quasi experimental design, involving two experimental groups and a control group (2) Tutor survey in a pretest posttest design	(1) Quantitative content analysis (1) Multi- and binomial logistic regressions (2) Factor analysis (2) Independent and paired *t*-test
Chapter 6	Studying thought processes and concerns of online peer tutors.	Stimulated-recall interviews	Purposeful sampling Grounded theoretical approach
Chapter 7	Conclusions, practical implications, limitations, and considerations for future research.		Integration of research findings as general discussion

References

ASHE-ERIC Higher Education Report (2002). *Implementing and Assessing Internships, 29*, 65-76.

Backroad Connections Pty Ltd. (2002). *Effective Online Facilitation* (Version 2.00), Australian Flexible Learning Framework Quick Guides series, Australian National Training Authority.

Bandura, A. (1993). Perceived Self-Efficacy in Cognitive Development and Functioning. *Educational Psychologist, 28,* 117-148.

Bandura, A. (2000). Exercise of Human Agency Through Collective Efficacy. *Current Directions in Psychological Science, 9*, 75-78.

Barnard, Y. F., Veldhuis, G. J., & van Rooij, J. (2001). Evaluation in Practice: Identifying factors for improving transfer of training in technical domains. *Studies in Educational Evaluation, 27,* 269-290.

Beijaard, D., Meijer, P. C., & Verloop, N. (2004). Reconsidering research on teachers' professional identity. *Teaching and Teacher Education, 20*, 107-128.

Benbunan-Fich, R., Hiltz, S. R., & Turoff, M. (2002). A comparative content analysis of face-to-face versus asynchronous group decision making. *Decision Support Systems, 34,* 457-469.

Bennett, S., & Marsh, D. (2002). Are we expecting online tutors to run before they can walk? *Innovations in Education and Teaching International, 39*, 14-20.

Billett, S. (1996). Situated learning: Bridging sociocultural and cognitive theorising. *Learning and Instruction, 6*, 263-280.

Blankenburg, J., & Kariotis, G. (2000). *College Online Peer Tutor Training*. Paper presented at the TechEd 2000, Orlando.

Bonk, C. J., Wisher, R. A., & Lee, J-Y. (2004). Moderating Learner-Centred E-Learning: Problems and Solutions, Benefits and Implications. In Roberts T.S. (Ed.), *Online Collaborative Learning: Theory and Practice*, 54-85. Hershey: Information Science Publishing.

Brewer, S., & Klein, J. D. (2006). Type of Positive Interdependence and Affiliation Motive in an Asynchronous, Collaborative Learning Environment. *Educational Technology Research & Development, 54,* 331-354.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18,* 32-42.

Bruner, J. (1986). *Actual Minds, Possible Worlds*. Cambridge, MA: Harvard University Press.

Cagiltay, K. (2006). Scaffolding strategies in electronic performance support systems: types and challenges. *Innovations in Education and Teaching International, 43*, 93-103.

Carroll, M. (1996). Peer Tutoring: Can Medical Students Teach Biochemistry? *Biochemical Education, 24*, 13-15.

Cates, G. L. (2005). Effects of peer versus computer-assisted drill on mathematics response rates. *Psychology in the Schools, 42,* 637-647.

Chappell, V. A. (1995). Theorizing in Practice: Tutor Training "Live, from the VAX Lab". *Computers and Composition, 12*, 227-236.

Chickering, A. W., & Gamson, Z. F. (1999). Development and Adaptations of the Seven Principles for Good Practice in Undergraduate Education. *New Directions for Teaching & Learning, 80,* 75-82.

Collins, A., Brown, J. S., & Newman, S. E. (1989). Cognitive apprenticeship: Teaching the crafts of reading, writing, and mathematics. In L. B. Resnick (Ed.), *Knowing, learning, and instruction: Essays in honor of Robert Glaser* (pp. 453-494). Hillsdale, NJ: Lawrence Erlbaum Associates.

Colvin, J. (2007). Peer tutoring and social dynamics in higher education. *Mentoring & Tutoring: Partnership in Learning, 15,* 165-181.

Coogan, D. (1995). E-mail tutoring, a new way to do new work. *Computers and Composition, 12,* 171-181.

Damon, W., & Phelps, E. (1989). Critical distinctions among three approaches to peer education. *International Journal of Educational Research, 13*, 9-19.

de Vries, F., Kester, L., Sloep, P. B., van Rosmalen, P., Pannekeet, K, & Koper, R. (2005). Identification of critical time-consuming student support activities in e-learning. Retrieved August, 13, 2007, from: http://www.scribd.com/doc/14986/Online-Learning-Support-through-Peer-Tutoring-OpenUniversiteitNederland-2006.

De Wever, B., Schellens, T., Valcke, M., & Van Keer, H. (2006). Content analysis schemes to analyze transcripts of online asynchronous discussion groups: A review. *Computers & Education, 46,* 6-28.

Denis, B. (2003). Quels rôles et quelle formation pour les tuteurs intervenant dans des dispositifs de formation à distance? *Distances et savoirs, 1*, 24-29.

Denis, B., Watland, P., Pirotte, S., & Verday, N. (2004). *Roles and Competencies of the e-Tutor*. Paper presented at the Networked Learning Conference 2004**,** 5-7 April 2004, Lancaster: Lancaster University.

Dewiyanti, S., Brand-Gruwel, S., & Jochems, W. (2005). Applying reflection and moderation in an asynchronous computer-supported collaborative learning environment in campus-based higher education. *British Journal of Educational Technology, 36*, 673-676.

Dillenbourg, P. (1999). What do you mean by 'collaborative learning'? In P. Dillenbourg (Ed.), *Collaborative-learning: Cognitive and Computational Approaches* (pp. 1-15). Amsterdam: Pergamon.

Dillenbourg, P. (2002). Over-scripting CSCL: The risks of blending collaborative learning with instructional design. In P.A. Kirshner (Ed.), *Three worlds of CSCL: Can we support CSCL?* (pp. 61-91). Heerlen: Open Universiteit Nederland.

Dolmans, D., Gijselaers, W., Moust, J., De Grave, W., Wolfhagen, I., & Van Der Vleuten, C. (2002). Trends in research on the tutor in problem-based learning: conclusions and implications for educational practice and research. *Medical Education, 24*, 173-180.

Duran, D., & Monereo, C. (2005). Styles and sequences of cooperative interaction in fixed and reciprocal peer tutoring. *Learning and Instruction, 15*, 179-199.

Ercikan, K., & Roth, W. M. (2006). What good is polarizing research into qualitative and quantitative? *Educational Researcher, 35*, 14-23.

Falchikov, N. (2001). *Learning together. Peer tutoring in higher education.* London: Routledge/Falmer.

Fogarty, J. L., & Wang, M. C. (1982). An investigation of the cross-age peer tutoring process: Some implications for instructional design and motivation. *Elementary School Journal, 82,* 451-469.

Garrison, R. D., Anderson, T., & Archer, W. (2000). Critical Inquiry in a text-based environment: computer conferencing in higher education. *The Internet and Higher Education, 2*, 87-105.

Gautrey, F. (1990). Cross-Age Tutoring in Frankley. *Reading, 24*, 21-27.

Gilbert, P. K., & Dabbagh, N. (2005). How to structure online discussions for meaningful discourse: A case study. *British Journal of Educational Technology, 36*, 5-18.

Goodlad, S., & Hirst, B. (1989). *Peer Tutoring: A Guide to Learning by Teaching*. London: Kogan Page.

Griffin, B. W., & Griffin, M. M. (1998). An Investigation of the Effects of Reciprocal Peer Tutoring on Achievement, Self-Efficacy, and Test Anxiety. *Contemporary Educational Psychology, 23*, 298-311.

Gülbahar, Y., & Tinmaz, H. (2006). Implementing Project-Based Learning and E-Portfolio Assessment in an Undergraduate Course. *Journal of Research on Technology in Education, 38*, 309-327.

Gumpel, T. P., & Frank, R. (1999). An expansion of the peer-tutoring paradigm: Cross-age peer tutoring of social skills among socially rejected boys. *Journal of Applied Behavior Analysis, 32*, 115-118.

Gunawardena, C. N., Lowe, C. A., & Anderson, T. (1997). Analysis of a global online debate and the development of an interaction analysis model for examining social construction of knowledge in computer conferencing. *Journal of Educational Computing Research, 17*, 397-431.

Gyanani, T. C., & Pahuja, P. (1995). Effects of peer tutoring on abilities and achievement. *Contemporary Educational Psychology, 20*, 469-475.

Hakkarainen, K., & Lipponen, L. (1998). *Epistemology of inquiry and computer supported collaborative learning.* Paper presented at the American Educational Research Association (AERA) Annual Meeting, San Diego, April 13-17, 1998.

Hara, N., Bonk, C. J., & Angeli, C. (2000). Content analysis of online discussions in an applied educational psychology course. *Instructional Science, 28*, 115-152.

Hargreaves, A., & Fullan, M. (1998). *What's Worth Fighting for Out There.* New York: Teachers' College Press.

Höysniemi, J., Hämäläinen, P., & Turkki, L. (2003). Using peer tutoring in evaluating the usability of a physically interactive computer game with children. *Interacting with Computers, 15,* 203-225.

Huberty, C. J., & Davis, E. J. (1998). Evaluation of a state critical thinking skills training program. *Studies in Educational Evaluation, 24*, 45-69.

Jenkins, J. R., & Jenkins, L. M. (1987). Making peer tutoring work. *Educational Leadership, 44,* 64-68.

Jonassen, D. H., Lee, C. B., Yang, C.C., & Laffey, J. M. (2005). The collaboration principle in multimedia learning. In R. E. Mayer (Ed.), *Cambridge Handbook of Multimedia Learning,* pp. 247-270. Cambridge University Press.

Jones, R. H., Garralda, A., Li, D., & Lock, D. (2006). Interactional dynamics in on-line and face-to-face peer-tutoring sessions for second language writers. *Journal of Second Language Writing, 15*, 1-23.

Jordan-Henley, J., & Maid, B. M. (1995). Tutoring in Cyberspace: Student Impact and College/University Collaboration. *Computers and Composition, 12*, 211-218.

Kassab, S., Abu-Hijleh, M. F., Al-Shboul Q., & Hamdy, H. (2005). Student-led tutorials in problem-based learning: Educational outcomes and students' perceptions. *Medical Teacher, 27*, 521-526.

Kim, T., Wah, W., & Lee, T. (2007). Asynchronous Electronic Discussion Group: Analysis of Postings and Perception of In-Service Teachers, *Turkish Online Journal of Distance Education, 8,* 33-42.

King, A. (1997). ASK to THINK-TEL WHY®©: A model of transactive peer tutoring for scaffolding higher level complex learning. *Educational Psychologist, 32,* 221-235.

Kirkpatrick, D. L. (1994). *Evaluating training programs: The four levels.* San Francisco: Berrett-Koehler.

Kirschner, P. A. (2001). Using integrated electronic environments for collaborative teaching/learning. *Research Dialogue in Learning and Instruction, 2,* 1-9.

Kirschner, P.A., Beers, P. J., Boshuizen, H., & Gijselaers, W. H. (in press). Coercing shared knowledge in collaborative learning environments. *Computers in Human Behavior*.

Kreijns, K., Kirschner, P. A., & Jochems, W. (2003). Identifying the pitfalls for social interaction in computer-supported collaborative learning environments: A review of the research. *Computers in Human Behavior, 19*, 335-353.

Kumpulainen, K., & Mutanen, M. (1999). The situated dynamics of peer group interaction: an introduction to an analytic framework. *Learning and Instruction, 9*, 449-73.

Laurillard, D. (1998). Multimedia and the learner's experience of narrative. *Computers & Education, 31,* 229-242.

Lave, J., & Wenger, E. (1991). *Situated Learning: legitimate peripheral participation.* Cambridge: Cambridge University Press.

Lentell, H. (2003). The Importance of the Tutor in Open and Distance Learning. In A. Tait & R. Mills (Eds.), *Rethinking Learner Support In Distance Education,* pp. 64-76. London: Routledge Falmer Press.

Loke, A., & Chow, F. (2007). Learning partnership-the experience of peer tutoring among nursing students: A qualitative study. *International Journal of Nursing Studies, 44*, 237-244.

Lycke, K. H., Stromso, H., & Grottum, P. (2003). *Tracing the tutor role in knowledge building. Analytical phases and results*. Paper presented at the 10th European Conference for Research on Learning and Instruction (EARLI), Padova, Italy, August, 2003.

Macdonald, J. (2006). *Blended Learning and Online Tutoring: A Good Practical Guide.* Hampshire: Gower.

Marra, R. M., Moore, J. L., & Klimczak, A. (2004). Content Analysis of Online Discussion Forums: A Comparative Analysis of Protocols. *Educational Technology Research & Development, 52,* 23-40.

Mason, J. (2000). Asking mathematical questions mathematically. *International Journal of Mathematical Education in Science and Technology, 31,* 97-111.

Mason, R., Pegler, C., & Weller, M. (2004). E-portfolio's: An assessment tool for online courses. *British Journal of Educational Technology, 36*, 717-727.

Mazzolini, M., & Maddison, S. (2007). When to jump in: The role of the instructor in online discussions forums. *Computers & Education, 49*, 193-213.

McLoughlin, C., & Luca, J. (2000). Cognitive engagement and higher order thinking trough computer conferencing: We know why but do we know how? In A. Herrmann and M.M. Kulski (Eds), *Flexible Futures in Tertiary Teaching.* Proceedings of the 9th Annual Teaching Learning Forum, 2-4 February 2000. Perth: Curtin University of Technology. Retrieved September, 18, 2004, from: http://lsn.curtin.edu.au/tlf/tlf2000/mcloughlin2.html.

McLuckie, J., & Topping, K. J. (2004). Transferable skills for online peer learning. *Assessment & Evaluation in Higher Education, 29*, 563-584.

Meyer, K. (2004). Evaluating online discussions: Four different frames of analysis. *JALN, 8*, 101-114.

Michalski, G. M., & Cousins, J. B. (2000). Differences in stakeholder perceptions about training evaluation: A concept mapping/pattern matching investigation. *Evaluation and Program Planning, 23,* 211-230.

Moule, P. (2007). Challenging the five-step model for e-learning: A new approach. *ALT-J, Research in Learning Technology, 1*, 37-50.

Moust, J. H. C., & Schmidt, H. G. (1994). De effectieve tutor: meer dan alleen een vakinhoudelijke deskundige? *Tijdschrift voor Hoger Onderwijs, 2*, 95-114.

Nath, L. R., & Ross, S. M. (2001). The Influence of a Peer-Tutoring Training Model for Implementing Cooperative Groupings with Elementary Students. *Educational Technology Research & Development, 49,* 41-56.

Nevgi, A., Virtanen, P., & Niemi, H. (2006). Supporting students' collaborative learning in technology-based environments. *British Journal of Educational Technology, 37,* 937-947.

Neville, A. J. (1999). The problem-based learning tutor: Teacher? Facilitator? Evaluator? *Medical Teacher, 21*, 393-401.

Newman, D. R., Johnson, C., Webb, B., & Cochrane, C. (1997). Evaluating the Quality of Learning in Computer Supported Co-Operative Learning. *Journal of the American Society for Information Science, 6,* 484-495.

Nijman, D. J. (2004). *Supporting Transfer of Training. Effects of the Supervisor. Doctoral Dissertation.* Enschede, The Netherlands: University of Twente.

Pajares, F. (2004). Psychometric Analysis of Computer Science Help-Seeking Scales. *Educational and Psychological Measurement, 64*, 496-513.

Palincsar, A. S., & Brown, A. L. (1984). Reciprocal teaching of comprehension-fostering and comprehension-monitoring activities. *Cognition and Instruction, 2*, 117-175.

Palmgreen, P. (1984). Uses and gratifications: A theoretical perspective. In: Bostrom, R.N. (Ed.), *Communication Yearbook 8 (61-72*). Beverly Hills, CA: Sage Publications.

Parr, J. M., & Townsend, M. A. R. (2002). Environments, processes, and mechanisms in peer learning. *International Journal of Educational Research, 37,* 403-423.

Pata, K., Sarapuu, T., & Lehtinen, E. (2005). Tutor scaffolding styles of dilemma solving in network-based role-play. *Learning and Instruction, 15,* 571-587.

Paulsen, M. F. (1995). Moderating Educational Computer Conferences, In ZL Berge and MP Collins (Eds.), *Computer-mediated Communication and the On-line Classroom in Distance Education.* Cresskill, NJ: Hampton Press.

Pifarré, M. (2007). Scaffolding through the Network: Analysing the Promotion of Improved Online Scaffolds among University Students. *Studies in Higher Education, 32,* 389-408.

Rauenbusch, F., & Bereiter, C. (1991). Making Reading More Difficult: A Degraded Text Microworld for Teaching Reading Comprehension Strategies. *Cognition and Instruction*, *8*, 181-206.

Roscoe, R. D., & Chi, M. T. H. (in press). The tutor learning effect: Why do students learn by tutoring other students? *Review of Educational Research.*

Rose, C. P., Moore, J. D., VanLehn, K., & Allbritton, D. (2001). *A Comparative Evaluation of Socratic versus Didactic Tutoring*. Proceedings of Cognitive Sciences Society. Retrieved June, 6, 2007, from: http://www.cs.cmu.edu/~cprose/pubweb/cogsci01.pdf.

Rossi, E., & Steiger, J. (1997). Evaluation of the clinical skills lab in the Pediatrics Department of University of Essen (Germany). *Monatsschrift Kinderheilkunde, 145*, 519-525.

Säljö, R. (1979). Learning in the learner's perspective. I. Some common-sense conceptions. *Reports from the Institute of Education*, University of Gothenburg, 76.

Salmon, G. (2000). A model for CMC in education and training. *E-moderating. The key to teaching and learning online.* London: Kogan Page.

Samaras, A., & Gismondi, S. (1998). Scaffolds in the field: Vygotskian interpretation in a teacher education program. *Teaching and Teacher Education, 14*, 715-733.

Samuelowicz, K., & Bain, J. D. (2001). Revisiting academics' beliefs about teaching and learning. *Higher Education, 41*, 299-235.

Schellens, T. (2004). *Studying in a blended learning environment: Researching congruency between learning environment and student characteristics and the impact of CSCL on knowledge construction.* Unpublished doctoral dissertation. Ghent: Ghent University.

Schellens, T., Van Keer, H., Valcke, M., & De Wever, B. (2007). Learning in asynchronous discussion groups: A multilevel approach to study the influence of student, group, and task characteristics. *Behaviour & Information Technology, 26,* 55-71.

Schmeck, R. (Ed.) (1988). *Learning Strategies and Learning Styles*. New York: Plenum Press.

Schwarz, B. B. (2005). Do EU funded projects enable collaboration between scientists? The case of R&D in web-based collaborative learning environments. *Computers & Education*, *45,* 375-382.

Silverman, D. (2001). *Interpreting qualitative data. Methods for analysing talk, text and interaction*. London: SAGE Publications.

Simpson, O. (2002). *Supporting Students in Open and Distance Learning*. London: Kogan.

Sobral, D. (2002). Cross-year peer tutoring experience in a medical school: Conditions and outcomes for student tutors. *Medical Education, 36*, 1064-1070.

Sobral, D. (2006). Influences on choice of surgery as a career: A study of consecutive cohorts in a medical school. *Medical Education, 40*, 522-529.

Solomon, P., & Crowe, J. (2001). Perceptions of student peer tutors in a problem-based learning programme. *Medical Education, 23*, 181-186.

Song, L., Hannafin, M. J., & Hill, J. R. (2007). Reconciling beliefs and practices in teaching and learning. *Educational Technology Research & Development, 55*, 27-50.

Tashakkori, A., & Teddlie, C. (1998). *Mixed methodology: Combining qualitative and quantitative approaches.* Thousand Oaks: Sage Publications.

Tashakkori, A., & Creswell, J. W. (2007). Editorial: The New Era of Mixed Methods. *Journal of Mixed Methods Research, 1,* 242 - 266.

Teasley, S. D. (1995). The role of talk in children's peer collaborations. *Developmental Psychology, 31*, 207-220.

Topping, K. J. (1996). The effectiveness of peer tutoring in further and higher education: A typology and review of the literature. *Higher Education, 32*, 321-345.

Topping, K. J. (1998). The effectiveness of peer tutoring in further and higher education: a typology and review of the literature. In S. Goodlad (Ed.), *Mentoring and tutoring by students*. London: Kogan Page.

Topping, K. J., & Hill, S. (1996). Capability through Student Tutoring: Research on effectiveness. *The Journal of Higher Education for Capability, 2*, 30-38.

Udvari-Solner, A. (1996). Examining Teacher Thinking. *Remedial & Special Education, 17*, 245-255.

Valcke, M., Sang, G., Rots, I., & Hermans, R. (in press). Taking prospective teachers' beliefs into account in teacher education. In E. Baker, B. McGaw, and P. Peterson (Eds.), *International Encyclopedia of Education*, 3rd edition, pp. xxx-yyy. Oxford: Elsevier.

Verba, M. (1998). Tutoring interactions between young children: How symmetry can modify asymmetrical interactions. *International Journal of Behavioral Development, 22,* 195-216.

Vincent, S., & Ley, J. (1999). *The multigrade classroom: A resource handbook for small, rural schools. Book 5: Instructional delivery and grouping.* Retrieved April, 24, 2006, from: http://www.nwrel.org/ruraled/publications/multig3.pdf.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes.* Cambridge, MA: Harvard University Press.

Wang, Q. (in press). Student-facilitators' roles in moderating online discussions. *British Journal of Educational Technology*.

Weinberger, A., & Fischer, F. (2006). A Framework to Analyze Argumentative Knowledge Construction in Computer-Supported Collaborative Learning. *Computers & Education, 46,* 71-95.

Wigfield, A., & Eccles, J. S. (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology, 25*, 68-81.

Wood, D., & Wood, H. (1996). Vygotsky, Tutoring, and Learning. *Oxford Review of Education, 22,* 5-16.

Wright, J., & Cleary, K. S. (2006). Kids in the tutor seat: Building schools' capacity to help struggling readers through a cross-age peer tutoring program. *Psychology in the Schools, 43,* 99-107.

Yelland, N., & Masters, J. (2005). Rethinking scaffolding in the information age. *Computers & Education, 48*, 362-382.

Zohar, A., Degani, A., & Vaaknin, E. (2001). Teachers' beliefs about low-achieving students and higher order thinking. *Teaching and Teacher Education*, *17*, 469-485.

Chapter 2*

Blending asynchronous discussion groups and peer tutoring in higher education: An exploratory study of online peer tutoring behaviour

Abstract

In the present study cross-age peer tutoring was implemented in a higher education context. Fourth-year students (*N*=39) operated as online tutors to support freshmen in discussing cases and solving authentic problems. This study contributes to a better understanding of the supportive interventions of tutors in asynchronous discussion groups. Peer tutor interventions were studied by means of a content analysis scheme based on the e-moderating model of Salmon (2000). The descriptive results revealed that the type of tutor activities varies over the consecutive discussion themes. No evidence was however found for a significant evolution from introductory and social talk to contributions eliciting cognitive processing along the themes. Tutors' social support seemed to be of continuous importance. Further, cluster analysis resulted in a classification of the tutors into three different subtypes or tutor styles (motivators, informers, and knowledge constructors), which was interpreted as confirmation of tutor-dependent online peer tutoring behaviour.

Introduction

During the last decade, a growing body of empirical studies has been published considering the task and role of facilitators in the context of computer-supported collaborative learning (CSCL) (Bonk, Wisher, & Lee, 2004; Garrison, Anderson, & Archer, 2000; Rickard, 2004; Salmon, 2000). The discussion about the role of facilitators in CSCL is related to a debate about the critical potential of collaboration in online learning contexts. It has been argued that collaboration does not systematically produce learning (Dillenbourg, 2002). In this respect, the present CSCL-debate focuses especially on the conditions that foster productive interactions, leading to higher order cognition and enabling learners to develop as independent thinkers (McLoughlin & Luca, 2000). Recent studies discuss for instance the need for guidance and structure (Bonk et al., 2004; Johnson & Johnson, 1996; Laurillard, 1998), scaffolding (McLoughlin & Marshall, 2000; Mercer & Wegerif, 1999; Rickard, 2004), or facilitation (Clouston, 2005) as mutually dependent factors facilitating meaningful online discourse. Based on a number of both theoretical and empirical arguments, it can be argued that tutors can play a beneficial role in this context.

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* Based on: De Smet, M., Van Keer, H., & Valcke, M. (2008). Blending asynchronous discussion groups and peer tutoring in higher education: An exploratory study of online peer tutoring behaviour. *Computers & Education*, *50*, 207-223.

As to the importance of structured activity in online collaboration, it should be taken into account that although interactive media are seen as giving much greater freedom of control to the user, this self-control can lead to difficulties in organising the input of information, in structuring the discussion, and in developing a personal overview, resulting in lower levels of knowledge construction (Schellens & Valcke, 2005). In this respect, some authors point at a critical precondition to consider the learner's need to discern structure in the messages (Laurillard, 1998). Johnson and Johnson (1996) for example underscore that, whether the cooperative setting makes use of technology or not, structuring the activity is essential for academic success. Moreover, Cohen (1994) stresses that tutors can play a compensating role in low-level interactions, since the structuring interventions of tutors can raise the level of the discourse and can ensure that disengaged students get reconnected.

A second and related critical factor to foster productive interactions in collaborative settings is the explicit student need for assistance. The need for guidance and online support in CSCL settings is comparable to the need of classroom support in face-to-face settings (Lazonder, Wilhelm, & Ootes, 2003). Bonk and his colleagues (2004) state that the guidance and moderating skills of the instructor are vital for online team success. Falchikov (2001) refers to the importance of helping behaviour to empower students to learn and collaborate online. In this respect, scaffolding, which plays a critical role in Vygotsky's zone of proximal development (Vygotsky, 1978), can be considered as a central concept. Scaffolding is provided to learners by a more capable expert, teacher, or peer helping the learners to perform a task they would normally not be able to accomplish by working independently. It advances the learners' activity from a current level of understanding to a point where support is no longer required (McLoughlin & Marshall, 2000). Research of McLoughlin and Marshall (2000) points at the legitimate nature of scaffolding offered by peers in computer conferences to support cognitive development. This is consistent with the statement of Jaramillo (1996), who describes how learners progress from zone to zone with the help of the scaffolds they present to one another. Moreover, it appears that the similar role position of peers supporting one another as compared to staff support entails beneficial effects on motivation (Neville, 1999).

Building on the empirical base regarding the importance of structured and guided collaboration, a research study was set up integrating cross-age peer tutoring into the context of asynchronous discussion groups. Peer tutoring can be defined as 'people from similar social groupings who are not professional teachers, helping each other to learn, and learning themselves by teaching' (Topping, 1996, p. 322). A more capable, knowledgeable, and experienced peer with a supportive role is called the 'tutor', while less experienced students receiving help from a tutor are called 'tutees' (Topping, 1998). As to the definition of peer tutors, Falchikov (2001) argues that peer tutors are often defined by what they are not. They do not have a professional qualification, they do not have a formal evaluation role, and finally, peer tutors have no control over the curriculum or materials used. Two large categories of peer tutoring can be distinguished. Students can be paired with other students from within their own class groups. This variant is called same-age peer tutoring. The second

variant is called cross-age peer tutoring and refers to older and more knowledgeable students tutoring younger students.

Theoretical background

In the context of the present research, cross-age peer tutors were introduced to provide structure and scaffolds in order to foster cognitive development in online group discussions. Taken into account the definition of peer tutoring (Topping, 1996, 1998), tutors were expected to help less experienced tutees to learn in a collaborative context. The principle of co-construction of meaning, which is linked to learning in collaborative settings, is in line with Vygotsky's socio-cultural theory, focusing on the assumption that 'action is mediated and cannot be separated from the milieu in which it is carried out' (Wertsch, 1991, p. 18). As to the description of how mediation takes place, Vygotsky (1978) proposed the concepts of internalisation and zone of proximal development. In the present study, the milieu in which peer tutors adopt the role of mediator is characterised by student interactions in a CSCL-setting. In this respect, it should be taken into account that the demands of being an online tutor are somewhat different than those of a face-to-face tutor (Duggleby, 2000; Falchikov, 2001). Next to the specific needs for online facilitation according to the context in which the facilitation is carried out, the gradual shift of students moving to a next zone of development as a consequence of guided exchange and internalisation has been put forward in literature. The idea of mediation pertains to the concept of peer tutoring since a cross-age peer tutor may adopt the role of mediator, converting his exchanges into learning opportunities for the tutees. The gradual shift of students moving to a next zone of development as a consequence of a guided exchange activity and internalisation has also been put forward in the context of online learning. For instance, Salmon (2000) presents a five-step model to direct e-moderating skills that is taxonomical in structure. Hence, the initial e-moderating activities are conditional for future support. The model aims at guided exchange activity that - at stage five - results in self-regulated contributions of students in the collaborative environment.

In the following paragraphs, the consecutive roles and tasks of e-moderators as grounded in the hierarchical model are explained in more detail. The model can help to get a better understanding of online peer tutoring behaviour. Nevertheless, transferring the model for e-moderating to a peer tutoring context has raised the question whether tutoring behaviour is a matter of evolution in contrast with studies reporting that tutors apply person-specific tutor styles.

E-moderating

A review of the literature focusing on support approaches in electronic collaborative learning environments results in a variety of concepts (e.g., e-tutoring, online mentoring, e-coaching, e-moderating) being used to address the roles, tasks, and responsibilities of online facilitators. E-moderating is indicated as a central concept (Bonk et al., 2004; Fahy & Ally, 2005; Salmon, 2000) commonly associated with computer-mediated conferencing (CMC). In this respect, Salmon (2000) connects e-moderating to the need of making the content and social

interactions in CMC meaningful to all participants. A multi-faceted approach to direct e-moderating skills is presented in a taxonomical five-step model. In addition, the specific structure of the model is especially helpful in view of training peer tutors in discussion groups.

The first moderation stage '*access and motivation*' centres on welcoming participants and offering them technical support to get online. In this respect, online e-moderators pay attention to the participants' readiness to learn in a digital environment. When participants feel comfortable with the medium, they start submitting contributions. Getting to know each other, sharing empathy, and having a clear sense of the 'discussion group audience' is the priority at the second moderation stage '*online socialisation*'. At this stage, e-moderators help establishing a feeling of 'community'. The e-moderator guarantees that everyone feels respected and heeds respect for the input of others. A pleasant and constructive atmosphere is fundamental for further learning. At the third stage of '*information exchange*', learning is becoming the more prominent objective. The role of the e-moderator is giving direction by submitting plenty of messages. The moderator's messages help to focus on the task or problem, shed light on the most relevant topics, and provide supportive content-related information. Central at the fourth stage *'knowledge construction'* are social negotiation and task-related engagement. Knowledge construction occurs when participants explore issues, take positions, discuss their positions in an argumentative format, and reflect on and re-evaluate their positions. In this respect, e-moderators have the role of a facilitator, not a transmission role. They ask questions, reformulate input, keep an eye on the structure of the debate, and summarise what has been stated thus far. The overall purpose at this stage is sharing meaning and building common understanding. At the fifth and final stage *'personal development'*, participants reassess their own thinking and explore the social learning processes. Key ingredient at this stage of personal development is reflection and becoming responsible for one's own learning. In this respect, e-moderators need to challenge learners' thoughts, for example by playing the devils' advocate and by encouraging elaboration. The more participants rethink and reconsider their contributions, the more stage five has been reached.

Peer tutoring: a matter of evolution?

The taxonomical model of Salmon (2000) is consistent with literature indicating that social and planning behaviour is of central importance to foster knowledge construction and reflective thinking in a CSCL-setting (Billett, 1996; Garrison, Anderson, & Archer, 2000; Schellens & Valcke, 2005). Referring to the model for e-moderating, this means that although every phase in the model is important, in the long run one should reach the highest phases in the negotiation. Notwithstanding the fact that the Salmon model is frequently mentioned in the literature, little research has been set up to study the actual adoption of the proposed stages in online discussions. The development of e-moderation over time neither is examined empirically.

McLoughlin and Marshall (2000) argue that tutors' scaffolds are rather dynamic than fixed considering the full complexity of collaborative learning in online discussions.

According to Lycke, Stromso, and Grottum (2003), computer-supported problem-based learning implies contextual circumstances that may affect tutoring behaviour. Further, previous research suggested that development in tutors' behaviour refers to the extent to which tutors' supportive interventions interact with task, group, and individual student characteristics (Johnson & Johnson, 1996; Schellens & Valcke, 2005; Slavin, 1995). In line with these interaction effects on the nature of online facilitation, it could be hypothesized that Salmon's taxonomical model takes the situation-specificity of tutoring behaviour (Lycke et al., 2003) into account. As can be derived from the model, a distinction can be made between beginning and advancing in the role of e-moderator. Moreover, during computer-mediated conferencing, e-moderators are assumed to move along the five stages of e-moderating dependent on contextual variables. With regard to the dynamic characteristics of e-moderators, the present study focuses on and explores the nature of peer tutors' scaffolds over time.

Peer tutoring: A matter of style?

As mentioned above, e-moderating can be described as a multidimensional concept, which is assumed to be dynamic dependent on the assignment features and students' discourse acts and needs. Furthermore, e-moderating is supposed to be dependent on individual traits, especially those of the moderator himself (Lycke et al., 2003). In this respect, we are interested in whether peer tutors, in the role of e-moderators, develop a certain tutor style when facilitating the interaction and learning processes in asynchronous discussion groups. The work of Hakkarainen and Lipponen (1998) has already reported that tutors apply person-specific tutor styles. Recently, Pata, Sarapuu, and Lehtinen (2005) supported the notion of person-related scaffolding styles in network-based role-play. More specifically, they report a passive and active tutor style. The passive tutor style consisted of less frequent process and content scaffolding acts with the tutor not in the dominating role. In the case of the active tutor style, the tutor used frequent scaffolding acts and led the decision-making process by keeping the initiative. These findings of more or less stable and individual tutor styles can be compared to what has been studied in the field of 'approaches to studying' (Entwistle, Tait, & McCune, 2000), 'student learning styles' (Fahy & Ally, 2005; Kolb, 1993), and 'approaches to teaching' (Kember, 1997), where certain *styles* have been identified. Grasha (2002) identified the following teaching styles as a description of prevalent aspects of teacher presence in the classroom: expert, formal authority, personal model, facilitator, and delegator. For Pratt (2002) most teachers have only one or two perspectives as their dominant view of teaching: transmission, developmental, apprenticeship, nurturing, and social reform. The different styles have been developed and used in varying educational contexts to explain and accommodate individual differences in the organisation of teaching and learning practices.

Research objective

Building on the theoretical framework, the aim of the present study was to explore cross-age peer tutoring behaviour in asynchronous discussion groups. Taken into account Salmon's

five-step model for e-moderating, it may be expected that tutor interventions evolve from - initially - introductory and social talk to - finally - contributions eliciting cognitive processing along consecutive discussion themes. Related to our view that the five-step model for e-moderating on the one hand interacts with task and group characteristics and on the other hand with individual student (incl. tutor) characteristics, there is the idea of tutors preferring a certain tutor style, reflected by specific tutoring behaviour. This argumentation introduces the present research question whether tutoring behaviour can be regarded as *dynamic* and consequently evolving and differing over time or rather as *tutor-dependent* reflecting a tutor's preferred style.

Method

Participants and setting

The present study was set up in a naturalistic higher education setting at Ghent University in Belgium. The online discussion groups were a formal component of a 5-credit freshman course 'Instructional Sciences', which is part of the first-year curriculum of students studying Pedagogical Sciences. This introductory course is set up in a blended format. Next to the weekly face-to-face sessions, all first-year students (N=257) had to participate in asynchronous discussion groups in order to discuss problems and cases building on the theoretical base. In the discussion groups, peer tutors supported the work of the students. Tutors were fourth-year Educational Sciences' students performing the e-moderating activities as a part of their educational and teaching internship (a 6-credit course). 39 fourth-year peer tutors were involved in the study. They worked in 18 pairs and 1 group of three tutors to support asynchronous discussion groups. The majority of the peer tutors (90%) were female, aged between 22 and 24 years. Both tutors and tutees represented the entire population of fourth- and first-year students enrolled for the first semester of the academic year 2004-2005. Nine to eleven freshmen were enrolled in each discussion group. Tutor pairs were composed on a voluntary base as opposed to the 257 tutees who were randomly assigned to a discussion group. We opted for co-tutorship in the peer tutoring setting to reduce the workload of the internship. However, this did not imply that the two tutors gave support simultaneously. One of both tutors took turns to support the members of their asynchronous discussion group. The non-active tutor worked in the background, followed closely the interaction, and shared ideas with the co-tutor in view of the tutoring activities.

Procedure

Group assignments. During 12 weeks, peer tutors supported the freshmen in discussing six successive authentic cases and problems, related to central themes in the Instructional Sciences course: behaviourism, cognitivism, constructivism, instructional design, and evaluation. In line with the constructivist principles, the discussions were based on real-life situations. Moreover, relevant links to websites and supplementary questions were added to refine and structure the task completion. The students were expected to work during two weeks on each discussion assignment. After two weeks, the discussion was only accessible on

a read-only base and a new discussion theme was presented for each discussion group. As the peer tutors worked in dyads, the tutors alternated the support of the discussion group with their co-tutors. In this respect, three pairs of discussion themes can be distinguished: each tutor moderated a discussion group for the first time during the first or second discussion theme, led their group through the third or fourth discussion assignment, and completed their internship during the fifth or last discussion theme.

Tutor Training. There is a widespread agreement in the peer tutoring literature that students must be trained in order to become a proficient tutor (Duggleby, 2000; Falchikov, 2001; Parr & Townsend, 2002; Van Keer, 2004). Peer tutoring activities are less effective without a preceding training (King, 1997; Palincsar & Brown, 1984). In the present study, preliminary training was organised two weeks before the onset of the asynchronous discussion groups. Guidelines were given collectively in a face-to-face setting during two three hour sessions. By the end of this training, participants received a manual including practical examples and reminders. The tutor training was grounded in the theoretical models and frameworks for training coaches (Costa & Garmston, 1994; Irwin, Hanton, & Kerwin, 2004), tutors (Lentell, 2003; Moust & Schmidt, 1998), mentors (Jonson, 2002; Rickard, 2004), and e-moderators (Bonk et al., 2004; Salmon, 2000). In this respect, the five-step model for e-moderating of Salmon (2000) was discussed. Furthermore, tutors were encouraged to go through the first year course as well as through transcripts of previous discussion groups in which freshmen negotiated course contents without peer tutor assistance. Additionally, responding to content mistakes, conflicts, unclear arguments, and tutees' non-participation in the discussion group was exercised.

Focus groups. In order to foster the peer tutoring activities, focus groups with the fourth-year tutors were organised on a regular base. In addition, they were asked to write a personal internship logbook consisting of critical reflections and the identification of indicators of personal progress (Seale & Cann, 2000). This requirement for tutor reflection is grounded theoretically in the literature concerning professional development of teachers (Rueda & Monzo, 2002).

Content analysis

Content analysis was applied to analyse the complete dataset of 114 transcripts generated during the asynchronous discussions (19 groups x 6 discussion themes).

Unit of analysis. The 'unit of meaning' in a message was chosen as the unit of analysis. Following Chi (1997) a unit of meaning is defined as a unit that represents a consistent idea, argument chain, or discussion topic. Since tutoring is a multidimensional activity and units of meaning were chosen as the unit of analysis, it is clear that the tutor contributions can reflect a variety of tutoring categories within a single message. The identification of the units of meaning was carried out by three trained and independent coders. As suggested by Strijbos, Martens, Prins, and Jochems (2006), a procedural distinction was made between the segmentation process into units of analysis and the content analysis and coding process.

Coding scheme. To explore the tutor contributions, a new coding scheme was developed, rooted in the five-step model of Salmon (2000). Seventeen categories, representing the five stages, were distinguished as concrete and operational indicators of tutoring behaviour. Table 1 represents and exemplifies the coding categories.

Table 1. Coding scheme based on the five-step model for e-moderating (Salmon, 2000)

E-moderating	Indicators of tutoring behaviour	Examples
Access and motivation	Elucidating the digital learning environment as well as conceptions about the tutor role	*Please, use the reply button.* *I have to challenge all of your thoughts.*
	Being accessible to computer-related problems	*Maybe, you can use the quick edit help link.* *I send the text in an attachment to your personal inbox.*
	Encouraging participating and wishing good luck	*Please, do not hesitate to login.* *Good luck!*
Socialisation	Informal talk	*I would like to wish you a nice New Year's Eve.*
	Appreciating and confirming contributions	*Interesting discussion! Well done! Very good! Thanks for the explanation!*
	Showing commitment	*Kind regards. Indeed, this is a difficult learning task.*
Information exchange	Modelling and illustrating the contents with examples, personal views, and concepts	*The theory of PDP describes the following idea …*
	Bringing in other content information	*You can draw inspiration from the media mentioned in the course book and on the Internet.* *I would like to advise this website.*
	Organisational arrangements and planning	*We are reaching the end of the discussion theme, so it is time for finishing contributions.* *From Tuesday until Monday, we can make the comparison between behaviourism and cognitivism.*
	Unravelling the learning task	*Tutors repeat or divide the assignments in parts.*
	Explaining the learning task	*I think that they mean to point out some arguments.*
Knowledge construction	Asking for content explanations and clarification	*Please, can you give an example?* *So, the point is that …, can you rephrase …*

	Asking to summarise	*It would be nice that someone makes a scheme of the given arguments.*
	Giving feedback about learning and social processes, giving suggestions to both the individuals and the group	*During this discussion theme you all have done the best to motivate each other, to cooperate, to answer my questions, to add extra information, and to present personal experiences.*
Personal development	Call for further reflection	*Well, if you try to work with advance organisers, what might happen then with the declarative, procedural, and/or metacognitive knowledge?*
	Elaboration. This is a type of communication that invites students to put earlier ideas in another or new context.	*Pictures make propositions less complex. Can someone draw the link between this assumption and the information processing model?*
	Playing devil's advocate. This is a type of communication that creates doubts during contributing. For example, tutors prompt counterarguments, reverse the reasoning, and/or posit 'what if' questions.	*Imagine that you are a teacher, how should you react now? Going back to your own school context, does the model stay attractive?*

Reliability analysis. Three independent coders received a training to carry out the segmentation procedure. A sample of 151 tutor contributions was segmented in units of meaning by each individual coder. Next, the researchers compared and discussed the segmented units of meaning in order to reach consensus about the segmentation process. In addition to the segmentation training, the coders also received a training to apply the seventeen subcategories grounded in Salmon's five-step model (Salmon, 2000). The three hour training resulted in a high level of inter-rater reliability. The reliability sample consisted of 508 units of meaning or 9% of the full sample and we calculated overall percent agreement (.91) as well as Krippendorff's alpha (.84). The overall agreement rate shows the overall percentage agreement of the three coders across all subcategories. Krippendorff's alpha demonstrates the level of agreement beyond chance between the three coders (De Wever, Schellens, Valcke, & Van Keer, 2006). Both indices were calculated and reported since there is no general agreement on which should be used. Percent agreement is considered an overly liberal index by some researchers, whereas the indices, such as Krippendorff alpha, which do account for chance agreement, are considered overly conservative and restrictive (De Wever et al., 2006).

Results

Descriptive results

During the 12 weeks and 6 consecutive themes, tutors posted 1955 messages. As can be derived from Table 2, the highest number of messages was posted during the second discussion theme. There is a gradual decrease in the average number of tutor contributions.

Within the 1955 messages, the coders identified 5552 units of meaning. As presented in Table 3, it is apparent that although triggering reflection is hardly present, peer tutors appear to use a variety of tutoring activities as suggested in the preliminary training. A high proportion of tutoring behaviour focuses on exchanging information. In the vast majority (almost 30%) of the units of meaning within tutors' contributions, tutors pay attention to planning, separating, and explaining the learning tasks, bringing in additional sources, and modelling the discussion. In about 27% of the units of meaning in tutor postings, tutors concentrate on the creation of a motivating learning environment. Further, in about 24% of their contributions they watch over discourse clarity and they structure the discussion in order to facilitate students' knowledge construction. Peer tutors show a clear social commitment in 18% of their messages. Finally, in only 1 percent of the interventions, tutors stimulate personal development and reflection.

Table 2. Absolute number of messages per theme (*N*=39 tutors), means and standard deviations per tutor per theme

	Theme 1	Theme 2	Theme 3	Theme 4	Theme 5	Theme 6	Total
Sum	388	461	368	312	210	216	1955
Mean	20.42	24.26	19.37	16.42	11.05	11.37	17.15
SD	7.69	8.08	6.49	6.74	6.11	5.83	8.26

Table 3. Percentages of the occurrence of the five categories from Salmon (2000) identified within the tutor messages per theme

Theme	Access & Motivation	Socialisation	Information exchange	Knowledge construction	Development
1	29.80	14.90	29.50	24.90	0.90
2	22.90	16.20	31.70	28.20	1.00
3	24.10	17.60	28.60	27.90	1.80
4	29.90	17.70	30.30	21.10	1.00
5	27.10	21.70	28.10	21.40	1.70
6	26.50	26.50	28.00	17.70	1.30
Total	26.60	18.10	29.60	24.40	1.20

Can tutoring behaviour be regarded as dynamic? Is there an evolution over time?

With regard to the question whether tutoring evolves over time, we refer to Table 3. The results indicate that 'information exchange' occurs most often within each discussion theme in comparison with the other e-moderating stages and this from theme 2 on. The number of tutor contributions with regard to 'development' is relatively stable over time. Remarkably, the incidence of contributions focusing on 'socialisation' increases over time, while a declining trend can be seen in contributions stimulating knowledge construction. In order to

test the changes in the proportions of tutoring behaviour throughout the successive discussion themes, chi-square analysis was applied.

Table 4. Results of the χ^2-analyses with regard to the evolution of the occurrence of contributions in the five categories (Salmon, 2000) as indicator of tutoring behaviour over time

Evolution in tutoring behaviour over time	χ^2	df	p
Evolution from theme 1 to theme 6	38.47	4	.000
Evolution from theme 1 to theme 2	15.01	4	.005
Evolution from theme 2 to theme 3	5.30	4	.258
Evolution from theme 3 to theme 4	17.77	4	.001
Evolution from theme 4 to theme 5	6.12	4	.191
Evolution from theme 5 to theme 6	5.13	4	.274

As can be observed in Table 4, significant changes occur in tutors' behaviour over the six themes in general, and between theme 1 and 2 and between theme 3 and 4 in particular. Looking in more detail at the evolution between the first and the second discussion theme, a decrease in contributions concerning 'access and motivation' is found in favour of an increase of units of meaning encouraging tutees' knowledge construction. In the transition from theme 3 to 4 on the other hand, an opposite trend can be noticed. In this respect, it can be concluded that there is some evolution in tutoring behaviour over time. However, this development is not consistent and does not reflect a gradual increase in higher levels of peer tutoring activities as reflected in the Salmon model.

To refine the analysis, two broad types of tutor communication within the Salmon model were identified. On the one side, tutors reflect social and emotional communication (SEC), which encompasses all tutoring interventions focusing on 'access and motivation' and 'online socialisation'. Secondly, the remaining types of e-moderating interventions are combined and labelled as communication about cognitive processing (CPC). To verify whether tutor interventions evolve from introductory and social talk to contributions reflecting cognitive processing, a univariate analysis of variance (ANOVA) was applied. The proportion of SEC-interventions was included as the dependent variable; discussion theme was included as the independent variable. The results reveal a significant upward trend in social and emotional communication and thus a significant downward trend as to the level of communication concerning cognitive processing throughout the six discussion themes ($F = 3.51$; $df = 5$; $p < .01$). However, post hoc analyses (Sheffe's criterion), only reveal a single significant difference between the second and the last discussion theme ($p = .022$). These results question the idea of a gradual shift in the nature of tutoring behaviour and imply that each new discussion theme appears to require a mixture of different tutoring interventions.

Can tutoring behaviour be regarded as tutor-dependent? Is it possible to distinguish different tutor styles?

This question focuses on exploring tutor styles on the basis of tutoring behaviour during the subsequent discussions. To examine tutor styles, cluster analysis was carried out. The purpose of cluster analysis is to derive a classification scheme for grouping a number of individuals or

objects into clusters, so that individuals or objects within a cluster are more similar to each other than those from other clusters (Aldenderfer & Blashfield, 1984; Gore, 2000). The purpose of the analysis is thus to arrange objects into relatively homogeneous groups based on multivariate similarity (Gore, 2000). Since no a priori assumptions regarding the number of relevant clusters could be derived from the literature, an exploratory hierarchical cluster analysis was carried out. Hierarchical cluster methods proceed by stages producing a sequence of partitions each corresponding to a different number of clusters. They can be either 'agglomerative', meaning that groups are gradually merged until one large cluster is formed, or 'divisive', starting with all cases in one cluster, which is partitioned into smaller clusters at each stage. Hierarchical agglomerative cluster analysis techniques, as used in SPSS, start with each case representing a separate cluster. Cases close to one another, as assessed by their correlational Euclidean distance, or other similarity measures are joined, forming progressively more inclusive groups or clusters. This process is repeated until all cases form a superordinate cluster. A decision must then be made regarding which number of clusters best represents the data (Beauchaine & Beauchaine, 2002). In the present study, the Ward hierarchical method was adopted, which implies that within-cluster differences are minimised (Hair, Anderson, Tatham, & Black, 1998). The squared Euclidean distance was used as a similarity measure. To determine the optimal number of clusters, the agglomeration schedule coefficients were examined. For a good cluster solution, one should look at a sudden jump in the distance coefficient or a sudden drop in the similarity coefficient between two adjacent sets. In addition to reviewing the changes in clustering coefficients at each step, the number of clusters was also verified by visual inspection of the dendograms and of the individual and group styles within and across clusters. The hierarchical cluster analysis was performed on 6 classification measures, reflecting tutors' process of moderating the asynchronous discussion groups. More specifically, the following variables were included in the analyses: the proportions of tutors' contributions in the different stages of e-moderating distinguished by Salmon (2000) (i.e. access and motivation, online socialisation, information exchange, knowledge construction, and development) and tutors' presence throughout the different discussion themes, as reflected in the total number of messages posted during the discussions. The data were not standardised prior to using the squared distance measure, since the scale measurements were comparable for all classification measures.

As to the results of the analysis, the agglomeration schedule indicates a large increase in the distance coefficients when moving from a three cluster to a two cluster solution. Therefore, a three cluster solution was chosen and consequently three tutor styles were distinguished, consisting of respectively 28.2%, 38.5%, and 33.3% of the tutors. Table 5 presents the mean scores and standard deviations of the six classification measures of each cluster. The styles, labelled as 'motivators', 'informers' and 'knowledge constructors', are displayed in Figure 1. Except for the rather rare occurrence of tutor contributions stimulating freshmen's personal development in all clusters, the clearly different course of the three styles indicates that tutors' behaviour differs both in quantity and in quality of the contributions.

Table 5. Means and standard deviations of the classification measures per cluster (Hierarchical clustering)

Classification measure	Cluster 1 'Motivators' (*N*=11)	Cluster 2 'Informers' (*N*=15)	Cluster 3 'Knowledge Constructors' (*N*=13)
Access & motivation	32.47 (4.80)	26.90 (4.14)	22.64 (6.31)
Socialisation	21.51 (4.30)	17.16 (4.24)	18.76 (6.51)
Information exchange	23.81 (5.56)	33.43 (4.71)	27.02 (4.83)
Knowledge construction	20.11 (5.38)	21.46 (2.93)	30.19 (4.91)
Development	2.09 (3.46)	1.05 (1.25)	1.39 (1.37)
Presence	12.00 (3.14)	19.72 (3.39)	18.86 (6.22)

The first tutor style (*N*=11) is primarily characterised by a low level of presence in the ongoing discussions and a high proportion of contributions with regard to gaining access and stimulating freshmen to participate in the asynchronous discussion groups. Further, tutors in this cluster show average proportions of online socialisation contributions, whereas postings reflecting information exchange and knowledge construction occur less frequently than in the other clusters. The second cluster (*N*=15) shows a quite different pattern and is characterised by a high proportion of exchanging information tutoring behaviour on the one hand and a low proportion of online socialisation messages. This implies that these tutors attach great importance to illustrating the content with examples and their personal point of view, add alternative sources to the discussion, plan the discussion activities, and unravel and explain the learning task. The main focus of the third cluster of tutors (*N*=13) is on eliciting knowledge construction. Further, these tutors demonstrate average proportions of contributions with regard to gaining access and stimulating participation and with regard to information exchange. A rather low engagement in contributions reflecting appreciation, confirmation, and commitment is shown.

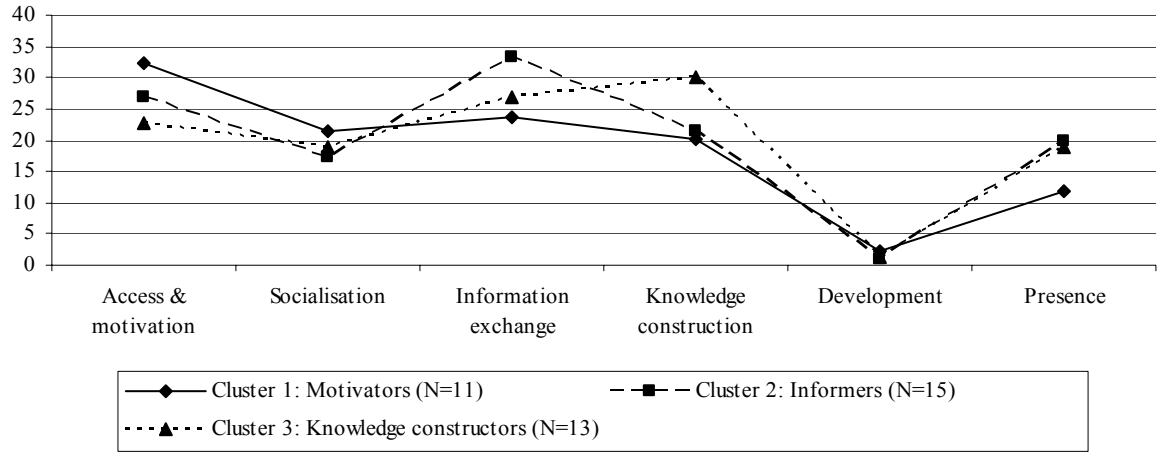

Figure 1. Mean scores of the six classifications measures per cluster

Multivariate analysis of variance (MANOVA) was used to test the differences in tutoring types statistically. The tutor styles were entered as independent variables to compare the five Salmon tutoring interventions and the degree of tutor presence in each cluster. Based on the Wilks' lambda criterion, the multivariate test shows a significant cluster effect ($F(10, 64) =$

8.454; $p < .001$; partial $\eta^2 = .569$). The corresponding ANOVA's also reveal significant effects on the proportions of tutors' contributions with regard to access to the learning environment and motivation ($F(2, 36) = 10.942$; $p < .001$; partial $\eta^2 = .378$), information exchange ($F(2, 36) = 12.712$; $p < .001$.; partial $\eta^2 = .414$), knowledge construction ($F(2, 36) = 19.615$; $p < .001$.; partial $\eta^2 = .521$), and tutors' presence throughout the discussion themes ($F(2, 36) = 10.656$; $p = .001$; partial $\eta^2 = .372$). No significant differences between the three clusters were found when considering tutor contributions about online socialisation ($F(2, 36) = 2.303$; $p = .114$; partial $\eta^2 = .113$) and development, ($F(2, 36) = 0.765$; $p = .473$; partial $\eta^2 = .041$). The partial η^2 indicates that the clusters explain respectively 38%, 41%, 52%, and 37% of the occurrence of tutors' contributions with regard to access to the learning environment and motivation, information exchange, knowledge construction, and 37% of tutors' presence throughout the discussion themes. Significant post hoc analyses (Scheffe criterion) associated with the effect of the variable cluster are summarised in Table 6.

Table 6. Overview of significant differences of the post-hoc analysis between the clusters per classification measure

Classification measure	Multiple comparisons			
	Clusters	Mean difference	Standard Error	*p*
Access & motivation	1-2	5.57	2.04	.033
	1-3	9.83	2.10	.000
Information exchange	1-2	-9.62	1.98	.000
	2-3	6.41	1.89	.007
Knowledge construction	1-3	-10.08	1.80	.000
	2-3	-8.73	1.67	.000
Presence	1-2	-7.72	1.78	.001
	1-3	-6.86	1.84	.003

As recommended by Borgen and Barnett (as cited in Gore, 2000) and Gore (2000) the hierarchical cluster analysis, which can be regarded as a data exploration tool, was supplemented with a k-means partitioning method to confirm the previously established cluster solutions. The k-means clustering was performed with the same variables as in the hierarchical clustering (the proportions of tutors' contributions in the five stages of e-moderating and tutors' presence throughout the different discussion themes). The results showed three parallel tutor styles, consisting of respectively 33.3% 'motivators', 53.8% 'informers', and 12.8% of 'knowledge constructors'. Table 7 presents the mean scores of the six classification measures of each style as distinguished by k-means clustering. In both clustering methods most tutors fit into the second style, which is mainly characterised by information exchange. The three cluster distribution for the two distinct methods of clustering is outlined in Table 8. For only ten out of thirty-nine online peer tutors, dissimilarity in the cluster allocation was observed between the hierarchical and k-means clustering.

Table 7. Means of the classification measures per cluster (k-means clustering)

Classification measure	Cluster 1 'Motivators' (*N*=13)	Cluster 2 'Informers' (*N*=21)	Cluster 3 'Knowledge constructors' (*N*=5)
Access & motivation	31.22	25.64	22.14
Socialisation	21.47	18.76	12.94
Information exchange	22.32	32.33	29.15
Knowledge construction	23.08	21.99	34.73
Development	1.91	1.28	1.05
Presence	12.00	19.73	20.53

Table 8. Cross-classification of the hierarchical and k-means clustering

		Hierarchical clustering			Total
		'Motivators'	'Informers'	'Knowledge constructors'	
k-means clustering	'Motivators'	9	0	4	13
		23.1%	.0%	10.3%	33.3%
	'Informers'	2	15	4	21
		5.1%	38.5%	10.3%	53.8%
	'Knowledge constructors'	0	0	5	5
		.0%	.0%	12.8%	12.8%
Total		11	15	13	39
		28.2%	38.5%	33.3%	100.0%

In order to check whether the three distinguished tutor styles are stable in time and thus mainly tutor-dependent, k-means clustering was performed on the three pairs of discussion themes. In this respect, the stability of the clusters throughout the tutorship is tested from the start (theme 1 and 2), over the intermediate (theme 3 and 4), to the closing discussion themes (theme 5 and 6). The results are presented in Table 9. The three successive cluster analyses all resulted in three final cluster centres matching to the overall three styles of both the hierarchical and k-means clustering. Looking in more detail to the clustering centres and to the evolution within a cluster over time, it appears that in the last themes the 'motivators' show a predominant increase in socialisation (mean = 36.23) next to their constant high proportion of contributions with regard to gaining access and stimulating freshmen to participate in the asynchronous discussion. As to the 'informers', the tutor contributions remain mainly characterised by information exchange. However, in theme 3 and 4 they additionally show a high proportion of interventions in the fourth stage of e-moderating, namely eliciting knowledge construction (mean = 30.63). Finally, whereas tutors belonging to cluster 3 primarily focus on knowledge construction, they also fluctuate in the sense of having considerably more contributions aiming at the lowest stages of e-moderating beginning from the third theme.

Table 9. Means of the classification measures per cluster and per tutorship phase (k-means clustering)

Discussion theme	Classification measure	Cluster 1 'Motivators'	Cluster 2 'Informers'	Cluster 3 'Knowledge constructors'
Theme 1-2 Starting	Access&Motivation	36.35	21.00	23.08
	Socialisation	17.89	15.19	16.63
	Information Exchange	23.95	39.14	26.34
	Knowledge Construction	19.37	24.53	32.39
	Development	2.44	.15	1.55
	Presence	18.58	31.44	20.18
	N	12	9	17
Theme 3-4 Intermediate	Access&Motivation	34.46	21.48	12.89
	Socialisation	18.52	14.29	34.36
	Information Exchange	27.94	31.67	24.79
	Knowledge Construction	18.22	30.63	27.17
	Development	.86	1.94	.79
	Presence	14.24	23.79	16.00
	N	21	14	3
Theme 5-6 Closing	Access&Motivation	30.93	25.22	30.62
	Socialisation	36.23	23.12	17.69
	Information Exchange	19.65	33.53	16.49
	Knowledge Construction	10.12	17.17	32.51
	Development	3.07	.96	2.69
	Presence	6.71	13.82	8.33
	N	7	22	9

Finally, to deal with the question whether tutoring behaviour is tutor-dependent reflecting a tutor's preferred style, we controlled the cluster allocation at the start, intermediate and closing discussion themes for each individual tutor. In this respect it appears that 30% of the tutors do shift from cluster in all discussion themes. 65% of the tutors keeps the same typology two times, while only 5% of the tutors reflect the same preferred style during the starting, the intermediate, and closing phase of their tutorship.

Discussion

The present study aimed at gaining insight into the tutoring behaviour of cross-age peer tutors in asynchronous discussion groups. Training was set up to allow peer tutors to adopt a rich mixture of tutoring behaviour that aims at shared knowledge construction and reflective behaviour in tutees. From the descriptive results it can be argued that cross-age peer tutors perform a blend of tutoring activities, with a slight predominance of giving additional information, clarifying the learning task, and planning activities.

With regard to the evolution in peer tutoring behaviour, it can be concluded that the nature of the overall tutoring behaviour is not completely stable over time. The results more specifically point at peer tutoring as a dynamic process in which task specificity plays a role. This is consistent with findings from the literature on problem-based learning (Moust & Schmidt, 1998). The significant decrease in 'access and motivation' tutoring behaviour from theme 1 to theme 2 can be explained by the students getting acquainted with the CSCL

learning environment. In the light of Salmon's taxonomical model, it was expected that from the third theme on more peer tutoring activities would be directed towards 'knowledge construction'. However, a significant decrease in this type of tutoring behaviour was observed when comparing discussion theme 3 and 4. This can probably be attributed to the nature of the fourth discussion theme. In this theme, all knowledge from the previous three themes had to be considered when solving the task. This discussion assignment was extensive and complex for the freshmen, necessitating the peer tutors to invest again in tutoring activities such as 'access and motivation' and 'information exchange'. This is in line with the findings of Solomon and Crowe (2001) who also observed how peer tutors convey a permanent sense of worry and a feeling of responsibility for ensuring that their colleagues addressed the objectives adequately.

Further, it was explored whether peer tutor contributions would evolve over time from introductory and social talk (SEC) to contributions reflecting cognitive processing (CPC). Univariate analysis of variance however rejected this prediction. This finding suggests that each new discussion theme requires a mixture of all types of peer tutor support as distinguished in the e-moderating model of Salmon (2000). The continuous importance of motivating and social interventions also confirms the lowest phases in the hierarchical structure of the model. In addition, the finding can be linked to the studies of others on non-peer tutor support (Billett, 1996; Garrison et al., 2000) who state that social and emotional presence are of continuous importance to foster cognitive processing. Next to these empirical and theoretical explanations for the initial e-moderating activities being conditional for future support, arguments can be added building on the nature of the asynchronous learning environment. First, tutors and tutees do not see and know each other while interacting. As a consequence building a feeling of community is a prerequisite in the text-based learning environment. Hammond (2000) therefore highlights that a communicative approach within online forums always remains both task-centred and personal. Second, it can be hypothesized that social and emotional communication is attractive tutoring behaviour to start with during the first experience of helping peers. This can be connected to an opportunistic point of view in which some tutors primarily prefer to focus on socialisation when intervening on the one hand and to peer tutors' difficulty to diagnose low levels of knowledge construction within the discourse on the other hand. As a result, they tend to agree with the contents of the discussion and thus praise when contributing. 'Students being too friendly to one another' has been mentioned by other authors to be a problem in e-learning settings (Bonk et al., 2004). These authors suggest providing online facilitators with reflection schemas or question guides in order to encourage tutor and tutee reflection. Thirdly, the discussion task might have been too complex and extensive to be able to deal with during the two negotiation weeks. The period might have been too brief for peer tutors to be able to go beyond a focus on communication to a more cognitive oriented focus. Additionally, since each discussion theme was based on a new body of knowledge, little transfer in contributions aiming at knowledge construction from a former discussion theme could occur (Schellens & Valcke, 2005).

In addition to the study of the evolution in peer tutoring behaviour, the purpose of the present study was to explore whether different types of cross-age peer tutors can be

distinguished in order to confirm the construct of personal tutor style. Three distinct clusters emerged from the analysis showing quantitative and qualitative differences in the types of e-moderating as distinguished by Salmon (2000) and their presence during the discussions. In addition, comparable clusters were found along the successive discussion themes. The slight variability in cluster appearance over the different discussion themes as presented in Table 9 is an interesting finding since this confirms the notion of relatively consistent instead of completely consistent tutor styles over time. Notwithstanding the small variation in the characteristics of the tutor styles throughout the discussion themes, it appears that for the majority of the peer tutors tutoring behaviour can be regarded as tutor-dependent: 70% of the peer tutors holds on to their cluster in at least two phases of the tutorship. This finding confirms earlier research recognising learning and teaching styles as individual, consistent, and measurable (Fahy & Ally, 2005; Grasha, 2002; Kolb, 1993; Pratt, 2002). As to the specification of each tutor style, in the first cluster or 'motivators' style we could observe few messages and low frequencies of knowledge construction oriented tutoring behaviour. This is in line with research of Pata et al. (2005) distinguishing a passive scaffolding cluster in which process and content scaffolding was performed less frequently than in the active scaffolding cluster. The low presence and high proportion of contributions with regard to 'access and motivation' might be related to the quality and/or the duration of the training provided to the peer tutors. This training might have been too restricted to stimulate a subgroup of peer tutors to go beyond a certain type of tutoring behaviour. Moreover, we could use information obtained from the cluster solution to optimise tutor training. For example, the pros and cons of all three tutor styles as well as their expected influence on students' discourse acts could be outlined in more detail. As suggested by Gore (2000), it is advisable to consider the cluster study as a first step and not as an end in itself.

In summary, the present study affiliates with the idea of Lycke et al. (2003) that contextual circumstances may be reflected in tutoring behaviour. However, the rather prominent differences in tutor activity do not seem overly contextual, but fairly appear to be the result of a person-related tutor style. Nevertheless, more research is needed to replicate these results and to study the peer tutor typology in more detail. In this respect, additional attention should be paid to indicators of peer tutors' preferred style in online interaction, such as their role perceptions during activity and their efficacy beliefs.

Limitations, implications and directions for future research

The present study reflects a number of limitations. First, the study has been conducted in a particular setting with a medium-size group of peer tutors, studying a specific freshman course in only one university setting. Future research should try to replicate the findings involving other student populations, and set up in alternative instructional settings or knowledge domains. Follow-up research could also focus on the question whether the peer tutor activities found in this study would be different for non-peer tutors.

The present research is also limited since solely quantitative approaches have been adopted in the research design. Content analysis has been used in order to gain insight in

tutor's behaviour to support students' negotiation of subject-matter in asynchronous discussion groups. In order to increase the validity of interpreting the dynamics of online tutor action, triangulation of research methods is needed. Network analysis could, for instance, focus on the structure of the interaction that is (or is not) induced by the peer tutors. Tutors might be interviewed to study their perceptions about being/becoming a coach (Cossentino, 2004).

A third comment centres on the need for replication studies that focus on the validation of the content analysis instrument used in the present study (De Wever et al., 2006). A new content analysis instrument was developed for this study, based on the five-step e-moderating model of Salmon (2000). To our knowledge, no alternative analysis scheme is currently available to study the tutoring interventions in parallel. Future studies could aim at studying the concurrent validity of the applied instrument, and moreover, all subcategories could be explored separately to figure out their distinct appearance and evolution within and along the successive discussion themes.

Fourth, a shortcoming of the cluster analysis technique has to do with the fact that the selection of classification measures is critical for the results. Although there is no clear-cut rule of thumb determining the variables to include in a cluster analysis, Gore (2000) argues that studies guided by theory will have an advantage in specifying which variables are most likely to contribute to a meaningful cluster solution. The present study is built on Salmon's stages of e-moderating (Salmon, 2000). More specifically, the proportion of tutors' contributions in the different stages, and tutors' presence throughout the different discussion themes were included in the analysis. To validate the applied coding scheme based on the work of Salmon (2000) and the identified clusters, additional research employing alternative coding schemes is however necessary. Another critical issue in cluster analysis is how many clusters should be extracted. Since there is no generally accepted statistical criterion for this, the choice must primarily be based on the meaningfulness of the clusters. However, based on the agglomeration schedule coefficients and visual inspection of the dendograms, three well-defined tutor styles could be discriminated.

Parallel to a number of methodological limitations, suggestions can be made that inspire follow-up research. Peer tutors differ in behaviour and shift their supportive activities due to a mix of task, group, and individual student variables that we did not figure out in more detail (e.g., task complexity, discussion time per theme, degree of group cohesion, freshmen's level of prior knowledge, tutor style, tutor's efficacy or role beliefs, etc.). With respect to individual tutor characteristics, it is also important to realise that although the peer tutors involved in the study are all fourth-year students, they do not represent a homogenous group. The following individual characteristics could be considered: gender, age, experience in working with groups, and ICT knowledge and skills. Accordingly, design characteristics such as the constellation of intervening alone while working in pairs and the preliminary training could have influenced the observed diversity in tutoring behaviour. In this respect, future research should investigate the distinct as well as mixed effects of contextual circumstances on tutoring behaviour in more detail since results are always better understood in the light of the background and setting in which they take place. Moreover, similar studies with larger sample

sizes and a wider range of higher education tutors can help to better understand the impact of these inter-individual differences on peer tutoring behaviour (Irwin et al., 2004).

The present study is to be considered as a pilot study. At present, the tutor typology should be regarded as exploratory and descriptive rather than as an explanatory typology that is grounded in a peer tutoring theory. More research is needed to confirm whether the number and the tutoring types are stable and are also to be found in other groups of peer tutors and other tutoring settings. According to Aldenderfer and Blashfield (1984), this cross-validation is important to verify whether the cluster solution found has a certain degree of generality. If the cluster structure in the present study is stable, similar clusters should re-emerge in the analysis of other samples.

Further, it will be interesting to examine the relationship between tutoring behaviour, the peer tutor typology and the nature, and the quality of the tutees' contributions in asynchronous discussion groups. These new studies could finally also focus on impact on the quality of the knowledge constructed in the discussion groups and the resulting performance on tests, tasks, or evaluation activities.

Conclusion

Although the findings of this study provide mixed evidence for the contextual influences of tutoring behaviour, it is clear that they cannot provide robust support for the expected evolution in time when analysing tutors' transcripts. According to the results, tutors' interventions differ throughout consecutive discussion themes, but they do not significantly evolve from introductory and social talk to contributions eliciting cognitive processing. Whereas there is no apparent tendency in the orientation of tutors' contributions, the results further reveal peer tutoring behaviour as being tutor-dependent reflecting a tutor's preferred style. As a result of cluster analysis methods, the following tutor styles were distinguished inspired by Salmon (2000): 'motivators', 'informers', and 'knowledge constructors'. Apart from future research on larger sample sizes and contextual influences on tutoring behaviour, additional studies should also focus on exploring those three peer tutor styles according to more specific research questions.

References

Aldenderfer, M. S., & Blashfield, R. K. (1984). *Cluster analysis.* Beverly Hills, CA: Sage.

Beauchaine, T. P., & Beauchaine, R. J. III. (2002). A Comparison of Maximum Covariance and K-Means Cluster Analysis in Classifying Cases Into Known Taxon Groups. *Psychological Methods, 7,* 245-261.

Billett, S. (1996). Situated learning: bridging sociocultural and cognitive theorising. *Learning*

Bonk, C. J., Wisher, R. A., & Lee, J-Y. (2004). Moderating Learner-Centred E-Learning: Problems and Solutions, Benefits and Implications. In Roberts T.S. (Ed.), *Online Collaborative Learning: Theory and Practice*, 54-85. Hershey: Information Science Publishing.

Chi, M. T. H. (1997). Quantifying Qualitative Analyses of Verbal Data: A Practical Guide. *The Journal of the Learning Sciences, 6*, 271-315.

Clouston, T. J. (2005). Facilitating tutorials in problem-based learning: students' perspectives. In P. Hartley, A. Woods, & M. Pill (Eds.), *Enhancing Teaching in Higher Education* (pp. 48-58). Oxon, Routledge.

Cohen, E. G. (1994). Restructuring the classroom: conditions for productive small groups. *Review of Educational Research, 64*, 1-35.

De Wever, B., Schellens, T., Valcke, M., & Van Keer, H. (2006). Content analysis schemes to analyze transcripts of online asynchronous discussion groups: a review. *Computers & Education, 46,* 6-28.

Dillenbourg, P. (2002). Over-scripting CSCL: The risks of blending collaborative learning with instructional design. In P.A. Kirshner (Ed.), *Three worlds of CSCL: Can we support CSCL?* (pp. 61-91). Heerlen: Open Universiteit Nederland.

Duggleby, J. (2000). *Supporting learners through the course*. Hampshire: Gower.

Entwistle, N., Tait, H., & McCune, V. (2000). Patterns of response to approaches to studying inventory across contrasting groups and contexts. *European Journal of Psychology of Education, 15*, 33-48.

Fahy, P., & Ally, M. (2005). Student Learning Style and Asynchronous Computer-Mediated Conferencing (CMC) Interaction. *The American Journal of Distance Education, 19*, 5-22.

Falchikov, N. (2001). *Learning together. Peer tutoring in higher education*. London: Routledge/Falmer.

Garrison, R. D., Anderson, T., & Archer, W. (2000). Critical Inquiry in a text-based environment: computer conferencing in higher education. *The Internet and Higher Education, 2*, 87-105.

Gore, P. A. Jr. (2000). Cluster analysis. In H. E. A. Tinsley & S. D. Brown (Eds.), *Handbook of applied multivariate statistics and mathematical modeling* (pp. 297-321). San Diego, CA: Academic Press.

Grasha, A. F. (2002). *Teaching with style: a practical guide to enhancing learning by understanding teaching and learning styles*. San Bernandino, CA: Alliance Publishers.

Hammond, M. (2000). Communication within on-line forums: the opportunities, the constraints and the value of a communicative approach. *Computers & Education, 35*, 251-262.

Hair, J. F. Jr., Anderson, R. E., Tatham, R. L., & Black. W. C. (1998). *Multivariate data analysis* (5th ed.). Upper Saddle River, NJ: Prentice Hall.

Hakkarainen, K., & Lipponen, L. (1998). *Epistemology of inquiry and computer supported collaborative learning.* Paper presented at the American Educational Research Association (AERA) Annual Meeting, San Diego, April 13-17, 1998.

Irwin, G., Hanton, S., & Kerwin, D. G. (2004). Reflective practice and the origins of elite coaching knowledge. *Reflective Practice, 5*, 425-442.

Jaramillo, J. A. (1996). Vygotsky's Sociocultural Theory and contributions to the development of constructivist curricula. *Education, 117*, 133-140.

Johnson, D. W., & Johnson, R. T. (1996). Cooperation and the use of technology. In D. Jonassen (Ed.), *Handbook of Research for Educational Communications and Technology* (pp.1017-1044), London: MacMillan.

Jonson, K. F. (2002). *Being an effective mentor. How to help beginning teachers succeed*. California: Corwin Press Inc.

Kember, D. (1997). A reconceptualisation of the research into university academic's conceptions of teaching. *Learning and Instruction, 7*, 255-276.

King, A. (1997). ASK to THINK-TEL WHY®©: A model of transactive peer tutoring for scaffolding higher level complex learning. *Educational Psychologist*, *32*, 221-235.

Kolb, D. (1993). *Learning Style Inventory.* Boston: McBer and Company.

Laurillard, D. (1998). Multimedia and the learner's experience of narrative. *Computers & Education*, *31*, 229-242.

Lazonder, A. W., Wilhelm, P., & Ootes, S. A. W. (2003). Using sentence openers to foster student interaction in computer-mediated learning environments. *Computers & Education, 41*, 291-308.

Lycke, K. H., Stromso, H., & Grottum, P. (2003). *Tracing the tutor role in knowledge building. Analytical phases and results.* Paper presented at the 10th European Conference for Research on Learning and Instruction (EARLI), Padova, Italy, August, 2003.

McLoughlin, C., & Luca, J. (2000). Cognitive engagement and higher order thinking trough computer conferencing: We know why but do we know how? In A. Herrmann and M.M. Kulski (Eds), *Flexible Futures in Tertiary Teaching.* Proceedings of the 9th Annual Teaching Learning Forum, 2-4 February 2000. Perth: Curtin University of Technology. Retrieved September, 18, 2004, from: http://lsn.curtin.edu.au/tlf/tlf2000/mcloughlin2.html

McLoughlin, C., & Marshall, L. (2000). Scaffolding: A model for learner support in an online teaching environment. In A. Herrmann and M.M. Kulski (Eds), *Flexible Futures in Tertiary Teaching.* Proceedings of the 9th Annual Teaching Learning Forum, 2-4 February 2000. Perth: Curtin University of Technology. Retrieved September, 18, 2004, from: http://lsn.curtin.edu.au/tlf/tlf2000/mcloughlin2.html

Mercer, N., & Wegerif, R. (1999). Children's Talk and the Development of Reasoning in the Classroom. *British Educational Research Journal, 25*, 95-112.

Moust, J., & Schmidt, H. (1998). *Probleemgestuurd onderwijs.* (Problem Based Education). Groningen: Wolters-Noordhoff.

Neville, A. J. (1999). The problem-based learning tutor: Teacher? Facilitator? Evaluator? *Medical Teacher, 21*, 393-401.

Palincsar, A. S., & Brown, A. L. (1984). Reciprocal teaching of comprehension-fostering and comprehension-monitoring activities. *Cognition and Instruction, 1*, 117-175.

Parr, J. M., & Townsend, M. A. R. (2002). Environments, processes, and mechanisms in peer learning. *International Journal of Educational Research*, *37*, 403-423.

Pata, K., Sarapuu, T., & Lehtinen, E. (2005). Tutor scaffolding styles of dilemma solving in network-based role-play. *Learning and Instruction*, *15*, 571-587.

Pratt, D. (2002). Good Teaching: One Size Fits All? *New Directions for Adult and Continuing Education, 93*, 5-15.

Rickard, K. (2004). E-mentoring and pedagogy: a useful nexus for evaluating online mentoring programs for small business? *Mentoring and Tutoring, 12*, 383-401.

Rueda, R., & Monzó, L. D. (2002). Apprenticeship for teaching: professional development issues surrounding the collaborative relationship between teachers and paraeducators. *Teaching and Teacher Education, 18,* 503-521.

Salmon, G. (2000). A model for CMC in education and training. *E-moderating. The key to teaching and learning online.* London: Kogan Page.

Schellens, T., & Valcke, M. (2005). Collaborative learning in asynchronous discussion groups: What about the impact on cognitive processing? *Computers in Human Behavior*, *21*, 957-975.

Seale, J. K., & Cann, A.J. (2000). Reflection on-line or off-line: the role of learning technologies in encouraging students to reflect. *Computers & Education, 34*, 309-320.

Slavin, R. E. (1995). *Cooperative learning: Theory, research and practice.* Boston: Allyn & Bacon.

Solomon, P., & Crowe, J. (2001). Perceptions of student peer tutors in a problem-based learning programme. *Medical Education, 23*, 181-186.

Strijbos, J-W., Martens, R. L., Prins F. J., & Jochems, W. M. G. (2006). Content Analysis: What Are They Talking About? *Computers & Education, 46*, 29-48.

Topping, K. J. (1996). Effective peer tutoring in further and higher education: A typology and review of the literature. *Higher Education, 32,* 321-345.

Topping, K. J. (1998). The effectiveness of peer tutoring in further and higher education: a typology and review of the literature. In S. Goodlad (ed.), *Mentoring and tutoring by students*. London: Kogan Page.

Van Keer, H. (2004). Fostering reading comprehension in fifth grade by explicit instruction in reading strategies and peer tutoring. *British Journal of Educational Psychology, 74,* 37–70.

Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. Cambridge, MA: Harvard University Press.

Wertsch, J. V. (1991). *Voices of the mind: A sociocultural approach to mediated action.* Cambridge, MA: Harvard University Press.

Chapter 3*

Cross-age peer tutors in asynchronous discussion groups: A study of the evolution in tutor support

Abstract

The present study answers the need for further research on the facilitation processes of peer tutors in CSCL-environments. Cross-age peer tutors were introduced in asynchronous discussion groups to facilitate freshmen's knowledge building and negotiation. The aim of this article was tracing tutors' on-line supportive behaviour over time. More specifically, tutors' activities were studied during successive tutoring phases. Tutor contributions were explored by means of a content analysis scheme quantifying tutors' specific type of support. Additionally, we studied to what extent tutors evolved from model to coach. Further, tendencies in tutors' orientation on the individual students or on the entire group were considered. As to the type of tutor contributions, it can be concluded that peer tutors use a variety of interventions, covering organisational and social messages, as well as messages concerning learning content and supporting knowledge construction. Moreover, although the results showed a gradual decline in the amount of tutor contributions, peer tutors did not evolve from supplying working examples to calling for input. Conversely, in the closing tutoring phase they even acted more in the role of model than coach. Finally, tutors always preferred addressing their interventions to the group instead of to individual students.

Introduction

Learning in a peer tutoring setting can be considered a specific type of collaborative learning (Griffin & Griffin, 1997; Topping, 1996) in which participants are assumed to negotiate meaning on a regular basis either in small groups or in fixed pairs and in which one peer clearly takes a supportive role as peer tutor. The research literature identifies numerous benefits for both peer tutors and tutees in this type of learning (Millis & Cottell, 1998). Falchikov (2001) lists multiple benefits, such as generic skills development, reinforced subject knowledge, and personal satisfaction, for undergraduate tutors in particular. Tutor interventions also appear to benefit tutees in various ways. Nath and Ross (2001), for example, report (meta)cognitive advantages of just-in-time or relatively immediate corrective feedback provided by a human facilitator of students' argumentations during peer-assisted collaboration. Additionally, Vincent and Ley (1999) note that many tutors function as (cognitive) role models for their tutees, implying that peer tutors can effectively model study

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skills such as concentrating on the material, organising work habits, and asking questions. In the view of Parr and Townsend (2002), the interplay between peer influences and learning is largely related to the cognitive benefits of informal talk, often unrecognised by teachers or staff tutors.

Notwithstanding the importance of the interaction between students in peer-led learning environments, most peer tutoring studies to date have been effect studies conducted within face-to-face contexts (e.g., Carroll, 1996; Duran & Monereo, 2005; Topping, 1996; Webb, 1992). Studies focusing on the quality or nature of peer assistance and on peer tutors' roles are comparatively sparse in the research literature. Moreover, the latter research focus is especially scarce in online learning contexts. An exception is the study of McLuckie and Topping (2004), which discusses transferable skills for online peer learning. The present study contributes to this latter research by focusing on the nature of peer tutor support within an online context.

Theoretical framework

Peer tutoring

Peer tutoring has been conceptualised as a form of collaborative learning (Griffin & Griffin, 1997) in which "people from similar social groupings who are not professional teachers help each other to learn, and learn themselves by teaching" (Topping, 1996, p. 322). In this context, we assume Bereiter's (2002) definition of "learning" as "knowing and helping others to know" (p. 68), which can be distinguished from "knowledge building" associated with "creating a knowledge object" (p. 68). Recently, Duran and Monereo (2005) indicated collaboration as the central core of peer tutoring and explained both inter- and intrapersonal advantages which result from it. Researchers investigating collaborative learning in general and peer support in particular frequently refer to frameworks building on Vygotsky's social-constructivist theory.

Vygotsky's theory emphasises that, at any given age, full cognitive development requires social interaction through problem solving under adult supervision or in collaboration with more capable peers (Falchikov, 2001). More specifically, Vygotsky (1978) emphasises that knowledge is interpersonal before it becomes intrapersonal, and in order to foster the construction of the former, social interaction is crucial. Consequently, the presence of peer collaboration and task-oriented social interaction can be regarded as an important benefit of collaborative learning in general and of peer tutoring in particular. Further, Vygotsky's theory on the 'zone of proximal development' (hereafter ZPD) appears to be connected with the effectiveness of peer collaboration. The ZPD is "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Jaramillo, 1996, p. 139). It pertains to peer tutoring since this type of collaborative learning is characterised by the adoption of specific roles, where one partner clearly takes a direct pedagogical role (McLuckie & Topping, 2004). A more capable and knowledgeable peer with a supportive role is called the 'tutor', while less experienced

students receiving help are called ‘tutees’ (Topping, 1996). In this respect, the tutor is considered to adopt the role of facilitator, converting collaboration into learning opportunities. Within the scope of this study, the fixed supportive role of peer tutors is the central focus.

Evolution in tutor support

According to Vygotsky’s (1978) social-constructivist idea of knowledge being interpersonal before becoming intrapersonal, peer tutors’ supportive contributions should evolve over time, implying a gradual transition from tutor-centred activities to student-centred learning activities. This gradual transition is interesting to explore since it appears to be intertwined with helping processes intended to make sure that all members in a learning group benefit from the ‘zone of proximal development’ (Pata, Sarapuu, & Archee, 2005).

The literature concerning teachers’ tutoring roles in problem-based learning environments (Moust & Schmidt, 1994) has extensively discussed evolution in tutor support over time. In order to pronounce upon a development in tutoring behaviour, research on problem-based learning (hereafter PBL) frequently refers to the Cognitive Apprenticeship paradigm (Brown, Collins, & Duguid, 1989), which emphasises the social base of knowledge construction and relates students’ learning to a dynamic enculturation process wherein facilitators gradually fade out their prominent presence. Therefore, facilitators’ presence can be interpreted as a human tool to help students become independent learners. Building on social constructivism, Cognitive Apprenticeship theory emphasises ‘learning-through-guided-experience’ in order to help learners acquire an integrated set of (meta)cognitive skills through processes of observation and supported practice (Collins, Brown, & Newman, 1989). Following the explorations of Moust and Schmidt (1994) in tutor roles in PBL, it is to be noted that tutors’ assistance switches from ‘model’ to ‘coach’ when students become more experienced and skilful in structuring the discourse. More specifically, the tutor is expected to be a ‘model’ when students’ contributions are still insufficient to support the social construction of knowledge. At this stage the tutor clearly exemplifies how the learning activities within the discussion group can be facilitated, for example by summarising dialogues, by concretizing theoretical concepts, by rephrasing, and by pointing to discrepancies and similarities. A tutor acting as a ‘coach’, on the other hand, no longer models. Instead, s/he elicits response and makes suggestions to improve the discourse while students themselves take the lead in the discussion. The coach should only intervene in cases of misunderstanding. Finally, a tutor in the role of ‘consultant’ should challenge students with ‘tricks of the trade’.

In addition to the Cognitive Apprenticeship paradigm, the dynamic nature of peer tutor support can be related to research building through Bruner’s (1986) scaffolding concept. In the view of Pata, Sarapuu, and Lehtinen (2005) scaffolding means providing assistance to students on an as-needed basis with fading out of assistance as competence increases. Mason (2000) indicates that the core of scaffolding lies in fading out the structure in activities so that students internalise what teachers are demonstrating. Mason sees the process of scaffolding and fading as a process of moving from explicit through indirect prompts by the teacher to spontaneous use by the students. Moreover, the purpose of fading is to encourage students to integrate useful ways of thinking into their own functioning. Initially, the facilitator mainly

focuses on explicit questions which gradually turn into more indirect prompts until they disappear and become part of the students' inner system. This process endorses the "model-coach-consultant" progression as described by Moust and Schmidt (1994), and is also in line with Bruner's (1986) initial use of the term scaffolding to describe the teacher doing for the student what the student could not currently do for him or herself.

Tutor support in CSCL

In recent decades, it has been shown that computer-supported collaborative learning (hereafter CSCL) environments can play a successful role in facilitating knowledge construction (Gunawardena, Lowe, & Anderson, 1997; Weinberger & Fisher, 2006) and higher-order thinking (Garrison, Archer, & Anderson, 2000). However, much remains to be learned with regard to the quality and nature of the supportive process in response to the need to empower people who are collaborating online (Falchikov, 2001).

Although there is some theoretical evidence to suggest that peer tutors should take online facilitation as a multidimensional activity in which they supply various degrees of assistance depending on the learners' progress (Packham, Jones, Miller, & Thomas**,** 2004; Rickard, 2004; Salmon, 2000), more empirical research is needed. As learners' abilities grow, the available assistance should be withdrawn gradually until they can learn independently (Mason, 2000). In line with the search for meaningful support in CSCL, a particular challenge for online facilitators - peer tutors in this study - lies in deciding when and how interventions can promote tutees' knowledge construction (Weinberger & Fisher, 2006) without actually taking over the group process. In this context, Mazzolini and Maddison (2007) note that the facilitating role in asynchronous discussion forums can vary from being the prominent 'sage of the stage', to a more constructivist 'guide on the side', or even an observing 'ghost in the wings'. Further, they emphasise that a supervisor does not need to respond to every student post but instead should determine the appropriate time to jump in, make a comment, ask another question, or redirect the discussion. Online discussions that are progressing well, they believe, are best left largely alone.

In addition to the evolution of tutors' degree of assistance, a supplemental indicator of varied online tutor support is whether peer tutors' individual assistance alternates with group support. More specifically, since peer interaction is viewed as a resource for learning in groups, it is desirable that the tutor alternates the checking of understanding of individuals' ideas with the redirecting of input to the group in general (Christensen, 1991).

Research objective and research questions

This study examines cross-age peer tutors' contributions in asynchronous discussion groups. Building on the theoretical framework, it explores the extent to which online peer tutors change and gradually withdraw their assistance over time. More specifically, we focus on the following research questions:

- Which types of support characterise cross-age peer tutors' interventions in asynchronous discussion groups?

- Do peer tutors' interventions in this setting evolve over time? In particular, we examine three aspects of evolution. One is the evolution in the occurrence of the different types of tutor support. Another is evolution from modelling to coaching behaviour, especially the extent to which peer tutors fade out their assistance over time and evolve from modelling and exemplifying how to facilitate the learning activities to eliciting responses and giving suggestions to improve the discourse while students themselves take the lead in the discussion. Third, we examine evolution with respect to who is addressed (individual students or the group as a whole).

Method

Participants and setting

This study was conducted in a naturalistic higher education setting at Ghent University, with 19 pairs of fourth-year students, each pair tutoring one discussion group involving 9 to 11 freshmen. The discussion groups were a formal component of a 5-credit blended course in 'Instructional Sciences', part of the first-year Educational Sciences curriculum. Tutors were fourth-year Educational Sciences students, performing these support activities as an element of their educational internship (a 6-credit course). Peer tutors were aged between 22 and 24 years. The vast majority (90%) was female. Both tutors and tutees represented the entire population of fourth and first-year students respectively enrolled for the first semester of the academic year 2004-2005. The present study is thus similar in focus to that of Carroll (1996), who also examines cross-age peer tutoring where older students are involved in tutoring younger students. The tutors' task was to stimulate tutees' knowledge construction and self-directed learning during online interaction.

Procedure

Group assignments. Throughout the first semester (12 weeks), peer tutors supported freshmen working on six successive authentic assignments. Five of these related to specific themes in the course: behaviourism, cognitivism, constructivism, instructional design, and evaluation in educational settings. The sixth featured an integrative theme in which tutees were required to incorporate key principles of different learning theories into their support activities. Negotiating and completing each assignment lasted two weeks after which time it was accessible on a read-only base and a new assignment of similar difficulty was presented to each group. The assignments were identical for all discussion groups in the study and can be characterised as open-ended tasks in that they implied neither standard approach nor single 'right answers'. Furthermore, they were quite complex and extensive, so that a single group member could not solve the task on his/her own. For the purposes of our research objectives, the six discussion themes were clustered in three tutoring phases and tutors' scaffolds are examined below in initial (themes 1 and 2), intermediate (themes 3 and 4), and closing (themes 5 and 6) tutoring phases.

Tutor Training. There is widespread agreement in the literature that peer tutoring activities are less effective without prior tutor training (Falchikov, 2001; Jenkins & Jenkins, 1987; Parr & Townsend, 2002). Accordingly, preliminary training was organised in a three hour face-to-face group session two weeks before the onset of the discussion groups. The session was compulsory for all peer tutors and was developed and provided by the first author of this article. Inspired by the work of Collins et al. (1989), Rickard (2004), and Salmon (2000), the tutors were trained to be confident about the expected evolution in their behaviour and to acquire the necessary organisational, (meta)cognitive, and social strategies to moderate discussion groups. They were introduced to the multidimensional nature of tutoring so that they could master a relevant mix of tutoring skills, and were informed about and practiced functional skills such as socialisation (Pelliccione & Albon, 2004) and community building (Rourke, Anderson, Garrison, & Archer, 2001; Rovai, 2002), asking questions (Fishbein, Eckart, Lauver, Van Leeuwen, & Langmeyer, 1990; Strong & Baron, 2004), triggering reflection (Korthagen, 1993; Seale & Cann, 2000), and providing descriptive feedback (Narciss, 2004). In addition, “examples of good practice” were discussed with the aim of promoting transfer of the skills covered (Halpern, 1998). At the end of the session, the CSCL-environment was demonstrated and participants received a manual which included hands-on examples and reminders. Additional practical information (e.g., internship rules, group composition, and planning) was also made available on a tutor website.

Focus groups. To afford the tutors ongoing support and to improve their peer tutoring activities, focus groups were organised every two weeks. These meetings took place in small groups of about ten tutors. In addition, tutors were required to keep an internship logbook consisting of critical reflections on freshmen’s performance and on their own progress in providing assistance. Such tutor reflection is grounded theoretically in the literature concerning the professional development of teachers (Rueda & Monzo, 2002).

Content analysis

Coding scheme. Our analysis of tutors’ contributions employed quantitative content analysis. This research technique, designed for the "objective, systematic, and quantitative description of the manifest content of communication" (Berelson, 1952, p. 18), is a traditional method of studying mass media messages. In content analysis, researchers establish a set of categories and then count the incidence of each category in transcripts (Silverman, 2001).

In this study, following a literature review of essential competencies for online tutors (Ally, 2004; Garrison et al., 2000; Nath & Ross, 2001; Weinberger & Fisher, 2006), a coding scheme was developed. This scheme makes use of two existing instruments for the analysis of online collaborative discourse: Argumentative Knowledge Construction in CSCL (Weinberger & Fisher, 2006) and the Community of Inquiry Coding Template (Garrison et al., 2000). Both models build on social-constructivist principles which highlight the computer as an interesting tool for worthwhile moderating and learning transactions.

In CSCL-environments various kinds of support are necessary, and a variety of roles, tasks, and responsibilities have been put forward (Packham, Cramphorn, & Miller, 2001;

Packham, Jones, Miller, & Thomas**,** 2004; Rowntree, 2005). What is clear from the theoretical and empirical literature is that online facilitation is described as a multidimensional activity (Garrison et al., 2000; Tagg, 1994). Recently, Weinberger and Fisher (2006) pointed out four process dimensions of argumentative knowledge construction that are of particular relevance to the questions of how to provide assistance to students' negotiation and knowledge construction in CSCL-environments and how to analyse these data. These dimensions are the participative, the epistemic, the argumentative, and the social. Also of relevance to online collaborative learning environments is Garrison and colleagues' (2000) argument that the element in the Community of Inquiry model most basic to success in higher education is cognitive presence. Hence, social presence primarily functions as a support for cognitive presence, whereas teacher presence deals with organisational and design issues in a text-based educational context (Garrison et al., 2000).

In view of the above considerations and the specific tutoring context of the present study, the content analysis scheme we developed focuses on four process dimensions. These are (1) tutors' social and organisational support in the learning community, (2) their domain-specific support with regard to both the learning content and the group task, (3) their individual or group support through modelling or eliciting tutees' knowledge construction, and (4) their off-task behaviour.

Of central importance is the subdivision of the third dimension into tutor contributions directed at individual students and those directed at the group as a whole. With regard to the distinction between tutor contributions aimed at modelling knowledge construction and those aimed at coaching it, this study, in accordance with the literature (Mason, 2000; Moust & Schmidt, 1994), categorises peer tutors' explicit prompts such as summarising and providing examples as modelling behaviour, while indirect prompts or invitations to contribute a summary, theoretical argument, or examples to the discussion are categorised as coaching behaviour. Table 1 presents and exemplifies the subcategories of the coding scheme in more detail.

Table 1. Coding scheme for quantitative content analysis of tutor support

Process dimensions in peer tutor support	Addressing the group or an individual
Organisational and Social Support	
Introduces oneself. *Personalising and getting tutees acquainted with peer tutoring.*	Group
Provides participation guidelines. *Providing posting guidelines, deadlines, planning, establishing ground rules and structure.*	Group
Monitors participation guidelines. *Monitoring posting guidelines, deadlines, planning, and ground rules.*	Group
Deals with non-participants. *Controlling for non-participation.*	Group
Encourages enduring participation. *Stimulating participation and dialogue.*	Group
Reinforces good discussion behaviour. *Making learners compliments for good interventions and recognising appropriate behaviour.*	Group

Evaluates the collaboration. *Giving feedback on group cohesion and group dynamics.*	Group
Provides technical help. *Resolving technical difficulties or referring to a specialist.*	Group
Facilitating the Learning Contents	
Segments the assignment. *Providing structure in the assignment or dividing it in topics.*	Group
Clarifies the group assignment. *Giving additional information with regard to the assignment formulation and purpose.*	Group
Keeps dialogue considering the assignment on track. *Focusing the discussion on the group task.*	Group
Refers learners to supplemental reading material in addition to the handbook. *Providing or referring supplemental reading material in addition to the handbook.*	Group
Refers learners to supplemental materials in order to solve the assignment. *Providing or referring supplemental reading material in addition to the handbook.*	Group
Clarifies concepts in the handbook. *Clarifying meaning and/or use of concepts in the handbook.*	Group
Clarifies concepts in the assignment. *Clarifying meaning and/or use of concepts in the assignment.*	Group
Facilitating Knowledge Construction	
Controls or invites to control for argument understanding. *Clarifying, reformulating, paraphrasing, requesting responses.*	Group; Individual
Gives or invites to give a personal opinion. *Providing a personal view.*	Group; Individual
Gives or invites to give an example. *Qualifying the argument with an example or personal experience.*	Group; Individual
Elaborates or invites to elaborate on the argument(s). *Situating the given argument in a new context.*	Group; Individual
Supplies or invites to supply a warrant for the argument(s) coming from the handbook. *Situating the argument in the handbook.*	Individual
Summarises or invites to summarise the arguments. *Reducing the arguments by summarising them.*	Group
Links or invites to link contributions together. *Analysing and integrating contributions.*	Group
Articulates or invites to articulate a group decision. *Articulating a group solution.*	Group
Discusses or invites to discuss process, progress and results. *Evaluating during discussion.*	Group
Introduces a new topic for discussion. *Playing devil's advocate to spark debate.*	Group
Off-task informal talk apart from learning in discussion groups	

Unit of analysis and reliability. The full transcripts of tutor contributions were coded by means of the abovementioned analysis scheme. Three trained coders performed the coding independently. Since tutoring and e-moderating area multidimensional activities (Packham, Jones, Miller, & Thomas**,** 2004; Salmon, 2000), a variety of tutoring categories were

inevitably instantiated within any one single message. Therefore, the units of analysis chosen were units of meaning. Following Chi (1997), a unit of meaning is defined as a unit that represents a consistent idea, argument chain, or discussion topic. In our analysis, each unit received only one code. Notwithstanding this segmentation and coding process, tutor contributions were also considered as part of the larger ongoing discussion. A three-hour training was provided for all coders and included: (a) an explanation of the segmentation and coding process; (b) written guidelines elucidating the segmentation and coding procedure; (c) authentic examples illustrating each code; and (d) practice with sample data. Group discussion helped the coders to get acquainted with the particularities of the coding scheme and to reach mutual agreement. The reliability sample consisted of 508 units of meaning, which is 9% of the full sample of 5552 units of meaning. A moderate Krippendorff's alpha (.64) was calculated, indicating the level of agreement between the three coders beyond chance (see De Wever et al. (2006), who regard an alpha between .40 and .80 as corresponding to 'fair to good agreement beyond chance').

Statistical analysis. For an overview of the occurrence of the different types of tutor interventions, frequencies of the incidence of all subcategories in the content analysis coding scheme were recorded. Further, logistic regressions were performed to study the differences in tutoring behaviour over time. The different components of tutoring behaviour served as dependent variable and were treated as nominal. The three tutoring phases served as the independent variable, comprising the three categories of starting, intermediate, and closing tutoring phase. Tables 3 and 4 present the results of the logistic regressions. They show the estimated parameters (estimate), the standard error (SE), the Wald statistic (Wald), the p-values (p) of the Wald test, the odds ratio (OR = exp (est)), the inverse odds ratio (OR^{-1} = exp (-est)) in case the odds ratio is smaller than 1, and the 95% confidence interval (CI) for the odds ratio, comprising a lower bound (LB95%CI) and an upper bound (UB95%CI).

Results

During the 12 weeks of three consecutive tutoring phases, the 19 pairs of fourth-year tutors posted a total of 1955 messages. Within those tutor messages, 5552 units of meaning were identified.

Which types of support characterise cross-age peer tutors' interventions in asynchronous discussion groups?

First, we present an overview of the occurrence of the four dimensions of tutor support. In the majority (56.4%) of the units of meaning distinguished in tutors' contributions, far more than any other dimension, tutors instantiate organisational and social support such as monitoring participation, providing technical help, and reinforcing good discussion behaviour. In 16.3% of the units in tutor postings, tutors instantiate facilitating the learning contents by elucidating the group assignment and clarifying theoretical concepts. Further, 22.7% of the units show tutors watching over discourse clarity and structuring discussion in order to facilitate tutees' knowledge construction. Only 4.4% of the units in tutor postings instantiate off-task talk.

Table 2. Overview of the occurrence of tutoring behaviour split up in separate process dimensions and indicators

Process dimensions	Tutor support indicators per category	%
Organisational and social support		
	Introduces oneself.	10.5
	Provides participation guidelines	13.2
	Monitors participation guidelines	1.7
	Deals with non-participants	1.6
	Encourages enduring participation	13.0
	Reinforces good discussion behaviour	13.7
	Evaluates the collaboration	0.5
	Provides technical help	2.2
	Total[a]	56.4 (3181)
Facilitating the learning contents		
	Segments the assignment	5.9
	Clarifies the group assignment	5.0
	Keeps dialogue considering the assignment on track	2.5
	Refers learners to supplemental reading material in addition to the handbook	0.2
	Refers learners to supplemental materials in order to solve the assignment	1.2
	Clarifies concepts in the handbook	0.9
	Clarifies concepts in the assignment	0.6
	Total[a]	16.3 (874)
Facilitating knowledge construction		
Sublevel: Modelling behaviour addressed to an individual	%	*Sublevel: Coaching behaviour addressed to an individual*	%
Controls for argument understanding	1.7	Invites to control for argument understanding	3.3
Supplies a warrant for the argument(s) coming from the handbook	0	Invites to supply a warrant for the argument(s) coming from the handbook	0.1
Gives a personal opinion	0.5	Invites to give a personal opinion	0
Gives an example	0.2	Invites to give an example	0.7
Elaboration on the argument(s)	0	Invites to elaborate on the argument(s)	0.1
Sublevel: Modelling behaviour addressed to the group		*Sublevel: Coaching behaviour addressed to the group*	
Controls for argument understanding	1.0	Invites to control for argument understanding	6.1
Gives an example	0.3	Invites to give an example	1.2
Elaboration of the argument(s)	0.1	Invites to elaborate of the argument(s)	0.2
Gives a personal opinion	0.4	Invites to give a personal opinion	0.4
Summarises the arguments	0.3	Invites to summarise the arguments	0.6
Links contributions together	0.2	Invites to link contributions together	0.3
Articulates a group decision	0.3	Invites to articulate a group decision	0.5
Discusses process, progress, and results	3.0	Invites to discuss process, progress and results	0.6
Introduces a new topic for discussion	0.6		
	Total[a]		22.7 (1297)
Off-task	Total[a]		4.4 (189)
Non-definable	Total[a]		0.2 (11)
	Total[a]		100 (5552)

[a] Percentage and total number of units of meaning.

As to the occurrence of the different subcategories for facilitating organisational and social support, Table 2 indicates that the incidence of indicators varies per subcategory. The proportions of contributions coded as 'provides participation guidelines' (13.2%), 'encourages enduring participation' (13%), and 'reinforces good discussion behaviour' (13.7%) are notably higher than the other subcategories. Further, it appears that peer tutors' facilitation of the learning contents mainly consists of 'segmenting the group assignment' (5.9%) and 'clarifying the group assignment' (5%). As to the occurrence of tutors' facilitation for knowledge construction, Table 2 presents the incidence of the indicators along the subcategories 'modelling' versus 'coaching behaviour' and 'individual' versus 'group support'. In the next paragraph, we present the most important findings concerning these subcategories.

As regards the occurrence of modelling behaviour, contributions coded as 'discusses process, progress, and results' appear to occur most frequently (3%). This category fits into modelling behaviour addressed to the group, whereas another popular modelling intervention is 'controlling for argument understanding' addressed to individuals (1.7%). Further, Table 2 shows that the most prominent type of coaching behaviour is 'controlling for argument understanding'. Both individual students and the group as a whole are regularly (3.3% and 6.1% respectively) invited to clarify or reformulate their point of view. In addition, we observe that peer tutors clearly preferred to invite tutees to check their understanding of arguments rather than to control the understanding of arguments themselves. Finally, it appears that asking for examples (0.7% for individual students and 1.2% for the group) occurs only occasionally, in contrast to the other indicators for facilitating knowledge construction.

Do peer tutors' interventions in asynchronous discussion groups evolve over time?

In order to obtain an overview of the evolution in tutors' contributions, the overall occurrence of the main process dimensions of tutor support was studied over time. Below, results for the three components of this research question are presented separately.

The first part of this question considers variation in types of tutor support over time. The descriptive results for the three tutoring phases show an ongoing downward tendency of the occurrence of organisational and social support. A similar declining tendency is found in the occurrence of tutor contributions stimulating knowledge construction. On the other hand, the incidence of tutor interventions facilitating the domain-specific learning content and off-task informal talk increases over time.

To test the significance of these differences in the occurrence of the various types of tutor support across the three tutoring phases, multinomial logistic regressions were performed. The likelihood ratio test confirms an overall significant effect of tutoring phase (χ^2 (6) = 97.642, $p < .001$). Since the descriptive results in Table 2 show a predominance of organisational and social support (56.4%) and the constant prevalence of this behaviour over time, this process dimension was chosen as reference category for the dependent variable in a more comprehensive multinomial logistic regression analysis. The intermediate tutoring phase was selected as reference category for the independent variable.

Table 3 indicates that both the odds of supporting the learning contents and the odds of

off-task talk versus organisational and social support increase considerably per tutoring phase ($p < .01$). However, no significant evolution in occurrence is found when comparing support for knowledge construction with organisational and social support over time. More particularly, it appears that during the intermediate phase, the odds of supporting the learning content versus organisational and social support are 1.27 higher than in the starting phase, whereas in the last phase they are 1.39 times higher than in the intermediate phase. With regard to off-task behaviour versus organisational and social support, the evolution is more pronounced. Compared to the intermediate phase, the odds of tutors' off-task behaviour are 2.93 times lower in the starting phase and 3.17 times higher in the closing phase.

Table 3. Multinomial logistic regression estimates indicating the differences between the tutoring phases with regard to the occurrence of the four main dimensions of tutor support

Process dimension	Tutoring phase	Est.	Std. error	Wald	df	Sig.	OR	OR^{-1}	LB95 %CI	UB95 %CI
Learning contents[a]	Intercept	-1.551	.136	130.914	1					
	Start	-.238	.092	6.653	1	.010	.788	1.269	.658	.944
	Intermediate	ref.cat								
	Closing	.329	.109	9.099	1	.003	1.389		1.122	1.719
Knowledge construction[a]	Intercept	-1.102	.116	90.560	1					
	Start	.004	.078	.003	1	.955	1.004		.863	1.169
	Intermediate	ref.cat								
	Closing	-.001	.101	.000	1	.993	.999	1.001	.820	1.217
Off-task[a]	Intercept	-2.477	.288	74.015	1	.000				
	Start	-1.075	.267	16.224	1	.000	.341	2.933	.202	.576
	Intermediate	ref.cat								
	Closing	1.153	.193	35.773	1	.000	3.168		2.171	4.623

[a] The reference category is 'Organisational and social support'.

The second interest concerning differences in peer tutors' interventions over time is the evolution from model to coach. In order to study this, a distinction was made between interventions which supplied input and those which fostered knowledge construction. Overall, it was found that tutors appeared more in the role of 'coach' than in the role of 'model' (61.3% versus 38.7%). This general finding is reflected in the figures for the starting and intermediate phases (66% versus 34% and 61.3% versus 38.7% respectively), but not in those for the closing tutoring phase (46.8% versus 53.2%).

In order to check the significance of the differences over time in tutors' modelling or coaching support for knowledge construction, binomial logistic regressions were performed. With respect to stimulating tutees' knowledge construction, Table 4 indicates significant differences in the occurrence of modelling as opposed to coaching behaviour across the three tutoring phases (χ^2 (2) = 34.500, $p < .001$). It appears that the odds of modelling versus coaching increase significantly per tutoring phase. When compared to the intermediate tutoring phase, they are about 1.31 times lower in the starting tutoring phase but about 2.29 times higher in the closing tutoring phase.

Table 4. Binomial logistic regression estimates indicating the differences between the tutoring phases with regard to the occurrence of modelling towards coaching and addressing individuals or addressing the group within the knowledge construction dimension of tutor support

Process dimension	Tutoring phase	Est.	Std. error	Wald	df	Sig.	OR	OR^{-1}	LB95 %CI	UB95 %CI
Model[a]	Intercept	-1.044	.220	22.550	1	.000				
	Start	-.271	.132	4.249	1	.039	.762	1.312	.589	.987
	Intermediate	ref.cat								
	Closing	.826	.183	20.502	1	.000	2.285		1.598	3.268
Individual[b]	Intercept	-.821	.231	12.616	1	.000				
	Start	-.095	.136	.490	1	.484	.909	1.100	.696	1.187
	Intermediate	ref.cat								
	Closing	-.677	.212	10.162	1	.001	.508	1.968	.335	.770

[a] The reference category is 'Coaching tutoring behaviour within the knowledge construction dimension'.
[b] The reference category is 'Group support within the knowledge construction dimension'.

In addition to evolution in the type of intervention, we consider evolution in the sheer number of tutor messages to be a complementary indicator of evolution in the tutor's role. For example, a gradual decline in the average number of tutor messages would indicate an evolution from model to coach. And indeed, the highest number of tutor messages (849 = 43.4%) was posted during the first tutoring phase. Subsequently, a gradual decrease in the number of tutor contributions is found. In the intermediate phase it was 680 (34.8%) and in the closing phase it was 426 (21.8%). As a test on the significance of the differences in the amount of tutor intervention per tutoring phase, a univariate analysis of variance was performed. The results reveal significant differences (F = 16.09; df = 2; p < .001). More specifically, post hoc analyses (Sheffe's criterion) disclose a significant decline in postings between the first and the final tutoring phase (p = .000) and between the intermediate and the final tutoring phase (p = .006).

The final parameter used to explore the evolution in peer tutors' interventions over time was the balance of tutors' addressing individuals and their addressing the group. It was found that, in general, peer tutors prefer to address the group (71.2%) in interventions focusing on fostering knowledge construction. Although this finding applies across all three tutoring phases, a significant difference was found in the occurrence of tutors' individual versus group support between one and another (χ^2 (2) = 10.727, p < .01). As can be seen in Table 4, group support is chosen as reference category for the dependent variable in order to perform the binomial logistic regressions. Although, no significant differences in individual versus group support were revealed when comparing the starting and intermediate phases, the odds of the former versus the latter are 1.97 times lower in the closing tutoring phase than in the intermediate one.

Discussion

Considering the tutor as a protagonist in facilitating tutees' learning processes, the present study has concentrated on the analysis of peer tutors' online contributions. This focus on the tutor's perspective fits in with the need to inquire into the process of peer facilitation and peer

support for students working together in CSCL-environments. Taken the view that studying the ongoing processes and evolution in peer tutor support should precede effectiveness studies, the first aim of the study was to explore the types of support characterising peer tutors' interventions in asynchronous discussion groups. Our second research question focused on evolution in peer tutor support. More specifically, we examined: evolution in types of support, evolution from modelling behaviour to coaching behaviour stimulating students to take the lead in the discussion themselves, and evolution in addressing individual students versus addressing the group as a whole. A content analysis coding scheme was developed to explore tutors' activities over time during tutees' discussions on group assignments. Multinomial logistic regressions were applied to study the relation between tutoring phases and tutors' behaviour. The results indicate that tutoring phase, as an indicator of a person's growing experience in tutoring over time, has an effect on the relative occurrence of facilitating learning content, facilitating knowledge construction, and off-task talk compared to organisational and social support. Moreover, the starting, intermediate, and closing tutoring phase is of considerable importance in the occurrence of modelling versus coaching behaviour, and individual versus group support over time. Below, we discuss the results in more detail.

Training was given to encourage peer tutors to adopt a rich mix of tutoring behaviours. As to the first research question, on types of support, the descriptive results confirm that cross-age peer tutors do perform a blend of tutoring activities. However, there appears to be a persistent predominance of giving organisational and social support in the form of providing participation guidelines, encouraging enduring participation, and reinforcing good discussion behaviour. The enduring occurrence of organisational and social support corroborates the work of Hammond (2000), highlighting that a communicative approach within online forums should always remain both task-centred and personal. In addition, it can also be concluded that tutor interventions do not evolve from talk elucidating the learning environment through support for the learning contents to contributions stimulating tutees' knowledge construction. This finding is in line with an earlier study on online peer tutoring behaviour (De Smet, Van Keer, & Valcke, 2008). It also confirms the findings of Billett (1996), Garrison et al. (2000), and Salmon (2000) who all believe that social and emotional presence are of continuous importance in fostering cognitive processing. During informal evaluative final face-to-face sessions in small groups, the freshmen reported they benefited and felt supported by their cross-age tutors for several social and motivational reasons. It seemed that particularly tutors' peer understanding, get-at-able presence, and relatively immediate feedback (Nath & Ross, 2001) were beneficial for tutees' perceived self- and collective efficacy. However, further research is necessary to shed light on the issue of tutees' subjective experience.

In addition to exploring variety in the nature of tutor support, the present study focused on evolution in tutors' interventions. As defined by Mason (2000), the process of scaffolding and fading tends to be a process of moving from explicit through indirect prompts to spontaneous use by the students. Therefore, in the present study a distinction was made between modelling

and coaching as means of fostering tutees' knowledge construction. Peer tutors' direct input, such as summarising and providing examples, was categorised as modelling, while indirect prompts or invitations to contribute a summary or an example to the discussion were categorised as coaching behaviour. Our results show that, apart from the last tutoring phase, peer tutors act more in the role of coach than in the role of model. It can also be concluded that peer tutors did not evolve from modelling high-quality discussion behaviour to eliciting this in the tutees (coaching). In fact, an upward trend of modelling behaviour was found over time, reaching a slight predominance in the last phase. These results do not confirm what was expected from the literature (Brown et al., 1989; Collins et al., 1989; Moust & Schmidt, 1994). Although the analyses indicate that tutors significantly fade out the quantity of their assistance in the last tutoring phase - that is, they participate less (Pata et al., 2005), it appears that when tutors do intervene, they opt for modelling.

A first explanation for the growing occurrence of modelling interventions in the last themes might be that the discussion tasks were too complex and extensive for the students to deal with in only two negotiation weeks. Additionally, since each discussion theme was based on a body of knowledge which for freshmen was entirely new, little transfer in knowledge construction from a former discussion theme could occur (Schellens & Valcke, 2005). A final reason for the strong modelling function of peer tutors in the last tutoring phase could have been the fact that there was a tendency for tutees to drop out of the groups at this time, provoking tutors into making special efforts to keep knowledge construction on track. A temporary difficulty of freshmen being busy with other activities during the final themes (Christmas holidays and exams in January) could be connected to this drop-out hypothesis. The finding of increasing proportions of off-task behaviour by tutors could also be connected to tutees' demanding agenda.

The predominance of coaching behaviour as found in the starting and intermediate tutoring phase can be explained as well. Coaching was highlighted in the preliminary training session, during which it was stressed that tutors should not be overly directive so that tutees could take full responsibility for their own learning process and progress. This emphasis might have meant that, when first embarking on their tutor roles, the 4th year students were especially keen to make coaching rather than modelling interventions but that this enthusiasm waned as time went on. Support for this possibility can be found in tutors' perceptions and expectations at the start of their internship. As reported in the two-weekly focus groups, it appears that peer tutors overestimated the capacities of the first-year tutees and so began by interceding in a very indirect manner. With regard to the decline in tutor postings, tutors explicitly stated in the focus groups that they consciously faded out participation over time in order to create opportunities for tutees to become independent learners. Some tutors remarked it was not easy to stay in the background as much as they would have liked.

With regard to the balance of tutors addressing individual students and addressing the group as a whole, the results indicate that tutors at all times preferred addressing their interventions to the group. This finding can be understood in light of the collaborative aspect of online discussions. Building on their preparatory training, it is clear that peer tutors focus on promoting dialogic interchange (McLuckie & Topping, 2004).

Finally, the results yield design guidelines for improving training activities for online peer tutors. More particularly, a future tutor training should shed light on different elements of tutors' evolution from model to coach. In addition to reducing the number of their messages, tutors must be aware of the desirable development of moving from supplying working examples to calling for input. In addition, they are expected to achieve the right balance between individual and group support. Exercises on discussion groups among previous student populations could help them to develop these capacities.

Limitations, implications, and directions for future research

The present study has a number of limitations. First, the study has been conducted in a particular setting with a medium-size group of peer tutors, studying a specific freshman blended course in only one university setting. Future research should try to verify the findings by involving other student populations, alternative instructional settings or other knowledge domains. It is further a challenge to find out whether, and how, the strategies adopted by the peer tutors in this study may be different from those of online staff tutors.

The present research is also limited in that it employs only a quantitative approach. Quantitative content analysis and logistic regressions have been used in order to gain insight into tutors' behaviour when supporting tutees' negotiation of subject-matter in asynchronous discussion groups. In order to increase the validity of interpretation of the dynamics of online tutor interaction, triangulation of research methods is needed. Discourse analysis could, for instance, focus on the structure of the interaction that is or is not induced by peer tutors. In addition, the possibilities of stimulated recall interviews (Calderhead, 1981; Lyle, 2003) to explore the perspectives and intentions underlying tutor interventions are promising. Tutees' learning experiences and perceptions within the peer tutoring constellation might also nourish a prospective qualitative design.

There is also a need for replication studies that focus on the validation of the coding scheme used in the present study (De Wever et al., 2006). A new content analysis instrument was developed for this study. To our knowledge, no alternative analysis scheme is currently available to study peer tutoring interventions in general or to explore the distinction between modelling and coaching behaviour in particular. In view of the plea of De Wever et al. (2006) for the reinforcement of the empirical base of content analysis instruments, future studies should aim at studying the concurrent validity of the applied instrument.

Next to the abovementioned research desiderata, an additional suggestion for follow-up research can be made. Peer tutors differ in behaviour and change their supportive activities due to a mix of task, group, and individual student variables (e.g., task complexity, degree of group cohesion, freshmen's level of prior knowledge, tutor style, tutor's efficacy or role beliefs) that we did not allow for in this study. According to recent work on scaffolding (Cagiltay, 2006; Pata, Sarapuu, & Lehtinen, 2005), for example, it appears that when new or more complex material is introduced, some types of scaffolding could be more necessary than others. Whereas Pata et al. (2005) made a distinction between process scaffolding and content

scaffolding, Cagiltay (2006) distinguishes four different types of scaffolding within electronic learning environments: conceptual (supportive), metacognitive (reflective), procedural, and strategic-intrinsic. Future research could build on this idea. More specifically, the occurrence of the different types of scaffolding over time (whether cyclic or not) could be explored when investigating the dynamic nature of online peer tutor support in relation to the complexity of the learning materials.

With regard to individual tutor characteristics, it is also important to bear in mind that although the peer tutors involved in this study were all fourth-year students, they were not a homogenous group. In future research, individual characteristics such as gender, age, experience in working with groups, and ICT knowledge and skills, can be considered. Similarly, design characteristics of this study such as co-tutoring and the fact and nature of the preliminary training could have influenced tutors' behaviour. In this respect, future research should explore the distinct as well as cumulative effects of contextual circumstances on tutoring behaviour in more detail. For example, it is to be stressed that the expected evolution in tutoring behaviour should not be seen as a one-sided decision on the part of the tutor or the mere result of following a strict protocol as presented in tutor training. Tutoring is the result of an interaction process between tutor and tutees and builds on the evolving demands and grounding acts of the tutees (Pata et al., 2005). Therefore, we expect that differences and evolution in tutoring behaviour occur due to observed differences in the task execution of the group and their growth in knowledge construction and collaborative effectiveness.

References

Ally, M. (2004). Staff training and development for open and distance learning. *Distance Education in China , 3,* 23-30.

Bereiter, C. (2002). *Education and Mind in the knowledge age*. Mahwah: Erlbaum.

Berelson, B. (1952). *Content Analysis in Communicative Research*. New York: Free Press.

Billett, S. (1996). Situated learning: Bridging sociocultural and cognitive theorising. *Learning and Instruction, 6,* 263-280.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18,* 32-42.

Bruner, J. (1986). *Actual Minds, Possible Worlds*. Cambridge, MA: Harvard University Press.

Cagiltay, K. (2006). Scaffolding strategies in electronic performance support systems: types and challenges. *Innovations in Education and Teaching International, 43*, 93-103.

Calderhead, J. (1981). A method for research on teaching. *British Journal of Educational Psychology, 51*, 211-217.

Carroll, M. (1996). Peer Tutoring: Can Medical Students Teach Biochemistry? *Biochemical Education, 24*, 13-15.

Chi, M. T. H. (1997). Quantifying Qualitative Analyses of Verbal Data: A Practical Guide. *The Journal of the Learning Sciences, 6*, 271-315.

Christensen, C. R. (1991). "The Discussion Teacher In Action: Questioning, Listening, and Response." In C. R. Christensen, D. A. Garvin, & A. Sweet (Eds.), *The Artistry of Discussion Leadership* (pp. 153-172). Boston: Harvard Business School Press.

Collins, A., Brown, J. S., & Newman, S. E. (1989). Cognitive apprenticeship: Teaching the crafts of reading, writing, and mathematics. In L. B. Resnick (Ed.), *Knowing, learning, and instruction: Essays in honor of Robert Glaser* (pp. 453-494). Hillsdale, NJ: Lawrence Erlbaum Associates.

De Smet, M., Van Keer, H., & Valcke, M. (2008). Blending Asynchronous Discussion Groups and Peer Tutoring in Higher Education: An Exploratory Study of Online Peer Tutoring Behaviour. *Computers & Education, 50,* 207-223.

De Wever, B., Schellens, T., Valcke, M., & Van Keer, H. (2006). Content analysis schemes to analyze transcripts of online asynchronous discussion groups: A review. *Computers & Education, 46,* 6-28.

Duran, D., & Monereo, C. (2005). Styles and sequences of cooperative interaction in fixed and reciprocal peer tutoring. *Learning and Instruction, 15*, 179-199.

Falchikov, N. (2001). *Learning together. Peer tutoring in higher education*. London: Routledge Falmer.

Fishbein, H., Eckart, T., Lauver, E., Van Leeuwen, R., & Langemeyer, D. (1990). Learners' questions and comprehension in a tutoring setting. *Journal of Educational Psychology, 82,* 163-170.

Garrison, R. D., Anderson, T., & Archer, W. (2000). Critical Inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education, 2,* 87-105.

Griffin, B. W., & Griffin, M. M. (1997). The effects of reciprocal peer tutoring on graduate students' achievement, test anxiety, and academic self-efficacy. *The Journal of Experimental Education, 65*, 197-209.

Gunawardena, C. N., Lowe, C. A., & Anderson, T. (1997). Analysis of a global online debate and the development of an interaction analysis model for examining social construction of knowledge in computer conferencing. *Journal of Educational Computing Research, 17*, 397-431.

Halpern, D. F. (1998). Teaching Critical Thinking for Transfer Across Domains. Dispositions, Skills, Structure Training, and Metacognitive Monitoring. *American Psychologist, 53,* 449-455.

Hammond, M. (2000). Communication within online forums: The opportunities, the constraints and the value of a communicative approach. *Computers & Education, 35*, 251-262.

Jaramillo, J. A. (1996). Vygotsky's Sociocultural Theory and contributions to the development of constructivist curricula. *Education*, *117*, 133-140.

Jenkins, J. R., & Jenkins, L. M. (1987). Making peer tutoring work. *Educational Leadership*, *44*, 64-68.

Korthagen, F. (1993). Two modes of reflection. *Teaching and Teacher Education, 9*, 317-326.

Lyle, J. (2003). Stimulated Recall: A report on its use in naturalistic research. *British Educational Research Journal, 29*, 861-878.

Mason, J. (2000). Asking mathematical questions mathematically. *International Journal of Mathematical Education in Science and Technology, 31*, 97-111.

Mazzolini, M., & Maddison, S. (2007). When to jump in: The role of the instructor in online discussions forums. *Computers & Education, 49,* 193-213.

McLuckie, J., & Topping, K. J. (2004). Transferable skills for online peer learning. *Assessment & Evaluation in Higher Education, 29*, 563-584.

Millis, B. J., & Cottell, P. G. Jr. (1998). *Cooperative learning for higher education faculty*. Phoenix, Arizona: American Council on Education and Oryx Press.

Moust, J. H. C., & Schmidt, H. G. (1994). De effectieve tutor: meer dan alleen een vakinhoudelijke deskundige? *Tijdschrift voor Hoger Onderwijs, 2*, 95-114.

Narciss, S. (2004). The Impact of Informative Tutoring Feedback and Self-Efficacy on Motivation and Achievement in Concept Learning. *Experimental Psychology, 51*, 214-228.

Nath, L. R., & Ross, S. M. (2001). The Influence of a Peer-Tutoring Training Model for Implementing Cooperative Groupings with Elementary Students. *Educational Technology Research & Development, 49*, 41-56.

Packham, G. Cramphorn, C., & Miller, C. (2001) Module Development Through Peer Assisted Student Support: An initial evaluation. *Mentoring & Tutoring*, *9*, 113 – 124.

Packham, G., Jones, P., Miller, C., & Thomas, B. (2004, April). *Perceptions of Effective E-moderation: A Tutors Viewpoint*. Paper presented at the Networked Learning Conference Lancaster University, Lancaster.

Parr, J. M., & Townsend, M. A. R. (2002). Environments, processes, and mechanisms in peer learning. *International Journal of Educational Research, 37*, 403-423.

Pata, K., Sarapuu, T., & Lehtinen, E. (2005). Tutor scaffolding styles of dilemma solving in network-based role-play. *Learning and Instruction, 15*, 571-587.

Pata, K., Sarapuu, T., & Archee, R. (2005, June). *Collaborative scaffolding in synchronous environment: Congruity and antagonism of tutor/student facilitation acts*. Paper presented at the 5th International Conference on Computer-Supported Collaborative Learning, Taipei, Taiwan.

Pelliccione, L., & Albon, R. (2004). Beyond the comfort zone: Using informal mentoring to create lifelines for students in disequilibrium. In R. Atkinson, C. McBeath, D., Jonas-Dwyer, & R. Phillips (Eds), *Beyond the comfort zone: Proceedings of the 21st ASCILITE Conference* (pp. 770-776). Perth, 5-8 December. Retrieved July 2, 2005, from http://ascilite.org.au/conferences/perth04/procs/pelliccione.html

Rickard, K. (2004). E-mentoring and pedagogy: A useful nexus for evaluating online mentoring programs for small business? *Mentoring & Tutoring, 12*, 383-401.

Rourke, L., Anderson T., Garrison R. D., & Archer W. (2001). Assessing Social Presence in Asynchronous Text-based Computer Conferencing. *American Journal of Distance Education*. Retrieved May 17, 2006, from http://communitiesofinquiry.com

Rovai, P. (2002). Sense of community, perceived cognitive learning, and persistence in asynchronous learning networks. *Internet and Higher Education, 5*, 319-332.

Rowntree, D. (2005). *The tutor's role in teaching via computer conferencing*. Milton Keynes: The Open University. Retrieved April 25, 2006, from http://www-iet.open.ac.uk/pp/D.G.F.Rowntree/Supporting%20online.htm

Rueda, R., & Monzó, L. D. (2002). Apprenticeship for teaching: Professional development issues surrounding the collaborative relationship between teachers and paraeducators. *Teaching and Teacher Education, 18,* 503-521.

Salmon, G. (2000). A model for CMC in education and training. *E-moderating. The key to teaching and learning online.* London: Kogan Page.

Schellens, T., & Valcke, M. (2005). Collaborative learning in asynchronous discussion groups: What about the impact on cognitive processing? *Computers in Human Behavior*, *21*, 957-975.

Seale, J. K., & Cann, A. J. (2000). Reflection online or off-line: The role of learning technologies in encouraging students to reflect. *Computers & Education, 34*, 309-320.

Silverman, D. (2001). *Interpreting qualitative data. Methods for analysing talk, text and interaction*. London: SAGE Publications.

Strong, M., & Baron, W. (2004). An analysis of mentoring conversations with beginning teachers: Suggestions and responses. *Teaching and Teacher Education, 20*, 47-57.

Tagg, A. C. (1994). Leadership from within: Student moderation of computer conferences. *The American Journal of Distance Education, 8*, 40-50.

Topping, K. J. (1996). The effectiveness of peer tutoring in further and higher education: A typology and review of the literature. *Higher Education*, *32*, 321-345.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Vincent, S., & Ley, J. (1999). The multigrade classroom: A resource handbook for small, rural schools. Book 5: Instructional delivery and grouping. Retrieved April 24, 2006 from http://www.nwrel.org/ruraled/publications/multig3.pdf

Webb, N. M. (1992). Testing a theoretical model of student interaction and learning in small groups, In R. Hertz-Lazarowitz and N. Miller (Eds.), *Interaction in cooperative groups*. Cambridge: Cambridge University Press.

Weinberger, A., & Fischer, F. (2006). A Framework to Analyze Argumentative Knowledge Construction in Computer-Supported Collaborative Learning. *Computers & Education, 46*, 71-95.

Chapter 4*

Cross-age peer tutors in asynchronous discussion groups: Studying the impact of labelling on tutoring behaviour and tutors' efficacy beliefs

Abstract

Cross-age tutors were randomly assigned to one of the three tutor training conditions distinguished for the current study: (a) the labelling experimental condition, characterised by requirements to label their tutor interventions, based on the e-moderating model of Salmon (2000); (b) the non-labelling experimental condition, focusing on tutor's acting upon the role of an e-moderator without preliminary requirements with regard to labelling the phase of e-moderating in their messages; and (c) a control condition, typified by all-round information on online facilitation. The results indicated that tutors are not really capable in labelling their interventions accurately. Nevertheless, labelling did foster higher e-moderating activities. Compared to tutors in a control condition, also tutors in the non-labelling experimental condition performed at a higher level, implying that they adopted more balanced tutor support. Labelling did not result in a differential impact on self-efficacy and perceived collective efficacy.

Introduction

In the present study, cross-age peer tutoring was introduced in asynchronous discussion groups to support freshmen when discussing cases and solving authentic problems. Fourth-year graduate students were involved as online tutors to provide structure and to scaffold collaborative learning in a computer-supported collaborative learning environment (CSCL). Prior research, examining the nature of the actual tutor support, revealed that peer tutors were mainly engaged in social support, and paid less attention to stimulating 'knowledge construction' and 'personal development' (De Smet, Van Keer, & Valcke, 2008). According to Salmon (2000), tutor support should embrace a wider variety of facilitating activities, ranging from support for 'access and motivation' to 'socialisation', 'information-exchange', 'knowledge construction', and 'personal development'. Hence, both the design and content-focus of a peer tutor training were stated as critical variables to be considered in future research (De Smet et al., 2008).

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Taking the abovementioned results into account, the main aim of the present study was to improve and balance the nature of peer tutor interventions by fostering self-monitoring. As suggested by Zimmerman and Paulsen (1995, In: Ellis & Zimmerman, 2001, p. 210), during high-quality self-monitoring, people must track or control their understanding and performance. In the present study, self-monitoring was invoked by inviting tutors to label their tutoring interventions a priori. In this respect, three different tutor training approaches - in which one particular group of tutors was invited to label their tutor interventions based on the e-moderating model of Salmon (2000) - were distinguished. Considering the expected impact of labelling on the nature of tutoring activities, we initially studied the nature and the accuracy of the labelling. The different types of tutor training and labelling are considered as the independent variables in this study. As dependent variables we studied the impact on the nature and structure in tutoring behaviour in terms of e-moderating (Salmon, 2000) and the impact on self-efficacy (Bandura, 1993; Ellis & Zimmerman, 2001) and group or collective efficacy beliefs (Carroll & Reese, 2002; Sosik, Avolio, Kahai, & Jung, 1998). This specific focus on efficacy beliefs is in line with the work of Brown and Morrissey (2004) building on the idea that specific training approaches can have a differential impact on tutor characteristics that are related to one's motivation to perform in accordance with the training guidelines (Nijman, 2004).

Theoretical framework

Facilitating and scripting

Computer-supported collaborative learning (CSCL) has become more and more prevalent in higher education. A key issue in the CSCL-literature is how to facilitate learner activities in CSCL-settings. It has repeatedly been argued that collaboration as such does not systematically produce learning (Dillenbourg, 2002). The current CSCL-debate, therefore, focuses on the conditions that foster productive interactions (McLoughlin & Luca, 2000). Dewiyanti, Brand-Gruwel, and Jochems (2005) stress that successful implementation of a CSCL-environment is determined by instructional methods within the learning environment. These instructional approaches are expected to answer the need for guidance of learners in meaningful online discourse (Bonk, Wisher, & Lee, 2004; De Smet et al., 2008; Laurillard, 1998). Two dominant instructional approaches can be observed. A growing body of empirical studies focuses on the supportive task and role of *facilitators* in a CSCL-context (Bonk et al., 2004; Garrison, Anderson, & Archer, 2000; Rickard, 2004; Salmon, 2000). Other researchers (De Wever, Van Keer, Schellens, & Valcke, in press; Dillenbourg, 2002; Weinberger, Reiserer, Ertl, Fisher, & Mandl, 2005) focus on *scripting*. Typical scripts assign task-based or communication-oriented roles to learners in order to aim for critical thinking and knowledge construction through deliberate role-playing (De Wever et al., in press). Other scripts present detailed guidelines or work plans to the collaborating learners (Weinberger et al., 2005).

Peer tutors as *online facilitators*

In the present study, we involved peer tutors to take up the role of an 'online facilitator' (Backroad Connections Pty Ltd, 2002; Rickard, 2004; Salmon, 2000). More in particular, cross-age peer tutoring was introduced into asynchronous online discussion groups. Peer tutoring can be defined as 'people from similar social groupings who are not professional teachers, helping each other to learn, and learning themselves by teaching' (Topping, 1996, p. 322). In the CSCL-environment undergraduate tutors facilitate the online peer communication to foster communication and collaboration, and to structure, moderate, and improve the thought processes of the tutees.

Labelling as a scripting approach

In view of improving tutors' online facilitation acts, part of the peer tutors involved in the present study was required to identify the type of each contribution they add to the discussion. This *labelling* activity - also called *tagging* - is a particular type of scripting. Our interest in using scripts to improve and balance one's supportive efforts is inspired by the work of De Bono (1991). He described the positive effects of labelling one's point of view underlying decision-making processes in collaborative learning.

In our study, a number of tutors are invited to base their labelling on the e-moderating model of Salmon (2000), discussed below. In addition to linking their tutoring intentions to a shared framework, the participants are required to decide themselves what type of support is most relevant to bring in in view of approaching tutees' needs. This might invoke higher-order thinking as labelling involves a relatively complex judgment task. According to Halpern (1998), higher-order thinking is thinking that is reflective, sensitive to context, and self-monitored. Ellis and Zimmerman (2001) state that this self-monitoring process results in a stronger focus and enhanced (meta)cognitive awareness. This can also be linked to the work of Bandura (1993) when he discusses the concept of 'cognitive motivation' that helps translating forethought and goal-setting into anticipatory action through self-regulatory mechanisms.

Labelling requirements and *efficacy beliefs*

In line with the finding that self-efficacy positively contributes to self-regulatory cognitive functioning (Bandura, 1993), it is likewise assumed that labelling might increase the self-efficacy beliefs of peer tutors with regard to their role as e-moderator. In addition, since learning in a peer tutoring setting is to be considered as a specific type of collaborative learning (Griffin & Griffin, 1998; Topping, 1996), next to personal beliefs, tutors' perceived collective efficacy might also be influenced by training-related labelling requirements. Scripts or structuring tools can specify, sequence, and assign collaborative learning activities in online learning environments (Kollar, Fisher, & Hesse, 2003). In this respect, we assume that also the labelling component might have its influence on tutor's beliefs on the group's collective power to produce desired results, further described as perceived collective efficacy. Collective efficacy is a fairly new concept, finding its origins in the theory of self-efficacy. As Bandura (1997) suggests, collective efficacy refers to the self-efficacy of a group, team, or

larger social system or entity. In recent research, Bandura (2000) reported that perceived collective efficacy is an important contributor to human agency.

In this study, we did not focus on the effects of efficacy beliefs on specific behaviour (Bandura, 1993; Michalski & Cousins, 2000; Pajares, 2004). We also did not investigate the effects of peer tutoring on academic self-efficacy (Griffin & Griffin, 1998). The present study rather controlled for the impact of different training conditions on peer tutors' self-efficacy and perceived collective efficacy. Therefore, the central question was not whether or not training will increase one's efficacy beliefs, but whether different training approaches make a difference. This idea builds on the dissertation of Nijman (2004) regarding the interaction between specific training approaches and resulting trainee characteristics in professional organisations. It also follows the work of Brown and Morrissey (2004) exploring the effects of different training conditions on undergraduate students' self-efficacy. The three different tutor training conditions as developed and implemented in the present study (e.g., labelling, non-labelling, control) are described below.

Research objective and research questions

The central research objective of this study focuses on the differential impact of tutor training approaches and the impact of labelling during tutoring activities on (1) actual tutoring behaviour in terms of e-moderating, (2) tutors' self-efficacy beliefs, and (3) tutors' perceived collective efficacy. Three specific research questions are put forward:

- Do the tutors in the labelling training condition label their interventions in an accurate way?
- Do the labelling requirements result in different patterns in e-moderating compared to a non-labelling tutor training and a control condition?
- Does labelling have a differential impact on tutors' self-efficacy beliefs and perceived collective efficacy?

Method

Participants and setting

The study was set up in a naturalistic university setting involving 74 online peer tutors supporting each about 10 freshmen in asynchronous online discussion groups. The discussion groups were a formal part of the 6 credit course 'Instructional Sciences' for first-year bachelor students taking the 'Educational Sciences' curriculum. Tutors were fourth-year 'Educational Sciences' students, taking up the tutor role as a formal part of their 6-credit educational internship. Both tutors and tutees represented the entire population of respectively fourth- and first-year students.

Procedure

Group assignments. During 8 weeks, the tutors supported the collaborative work in relation to four educational themes. Each theme presented an authentic group assignment, related to a

chapter of the course: behaviourism, cognitivism, constructivism, and higher-order thinking. The online discussion to work on the assignment lasted for two weeks. Group assignments were identical for all discussion groups. The assignments consisted of a complex problem without a clear univocal solution, to be solved by the group. For analysis purposes, the four discussion themes were clustered in two tutoring phases to study tutoring activities and self-efficacy at the start (theme 1 and 2) and at the end (theme 3 and 4) of the peer tutoring activities.

Tutor training conditions. All tutors received a three-hour tutor training. Training consisted of face-to-face sessions two weeks before the onset of the discussion groups. In the experimental conditions, 35 tutors were introduced to the multidimensional nature of tutoring (Rickard, 2004). These tutors received a theoretical introduction to the five-step model for e-moderating of Salmon (2000). Additionally, the 35 tutors were randomly assigned to a labelling and a non-labelling experimental condition. Tutors in the labelling condition (N=18) were trained in labelling their tutoring interventions as one of the five e-moderating steps: (1) access and motivation, (2) socialisation, (3) information-exchange, (4) knowledge construction, and (5) personal development. This aims to stimulate reflection upon the ongoing discussion and on how to intervene in order to improve collaboration. Moreover, labelling visualises the predominance or absence of one or more e-moderating steps. In this respect, tutors are stimulated to self-monitor and reflect on their own interventions.

In the non-labelling condition (N=17), cross-age peer tutors were introduced in identical online group discussions without preliminary requirements with regard to labelling the phase of e-moderating in their messages. In a next phase, all peer tutors in the experimental conditions were invited to study the output of CSCL-activities of an earlier student cohort, also supported by tutors. This helped to discuss content mistakes, conflicts, unclear arguments, and tutees' non-participation in the discussion group and how they could react as tutors. The training ended by a hands-on introduction to the technical CSCL-environment and a detailed introduction with regard to the planning and set-up of the course (e.g., internship rules, group composition, planning, etc.). This extra information was also made available - for future consultation - on a tutor website. Tutors could also consult a printed manual with all background information.

Next to the two experimental training conditions (e.g., labelling and non-labelling), a control condition was part of the research design. Tutors in the control condition (N=39), were involved in a comparable internship but did only receive all-round tutoring instructions about online facilitation (Backroad Connections Pty Ltd, 2002; Rickard, 2004). These tutors were informed about functional skills such as community building, asking questions, triggering reflection, and providing descriptive feedback (De Smet et al., 2008). In addition an information website and a manual were made available. Compared to the training of tutors in the experimental conditions, the training in the control condition was theoretical in nature and not skills-oriented. For example, tutors did not exercise their tutoring interventions and no trial discussions with peer tutors were organised.

Focus groups. During the tutoring period, all tutors participated in focus groups on a two-weekly base. Nine tutors enrolled in the same training condition participated in the focus groups. In addition, all tutors were asked to develop a personal internship logbook with critical reflections about tutee performance and their personal progress in tutoring. Both focus groups and the reflective journal, build theoretically on literature about professional teacher development (Rueda & Monzo, 2002).

Content analysis

In view of determining the impact of three different training approaches on the nature and structure of tutoring behaviour, content analysis was applied to analyse the complete dataset of tutor transcripts generated during the asynchronous discussions. In addition, the number of tutor posts was counted to measure participation per tutor per tutor training condition and per tutoring phase.

The 'unit of meaning' in a tutor message was chosen as the unit of analysis. Following Chi (1997) a unit of meaning is defined as a unit that represents a consistent idea, argument chain, or discussion topic. Each unit of meaning was coded on the base of Salmon's (2000) taxonomical five-step model for e-moderating. As reported in a previous study (De Smet et al., 2008), seventeen categories - representing the five stages - were distinguished as concrete and operational indicators of online tutoring support. We more specifically focused on the occurrence of five e-moderating activities during tutoring, going from fostering access and motivation, over encouraging socialisation, information-exchange, and knowledge construction, to stimulating personal development (Salmon, 2000).

Segmentation into units of meaning and coding was performed by independent trained coders. During a three-hour face-to-face training session the coders received (a) an explanation of the segmentation and coding process; (b) written guidelines elucidating the segmentation and coding procedure; (c) authentic examples illustrating each code; and a (d) practice session based on sample data. As suggested by Strijbos, Martens, Prins, and Jochems (2006), a procedural distinction was made between the segmentation process into units of analysis and the content analysis and coding process.

To determine inter-rater reliability, a sample consisting of 371 units of meaning (7%) was coded by both coders. The percentage agreement is acceptable (.74) and a moderate Cohen's Kappa (.66) was calculated indicating an acceptable level of agreement between coders beyond chance. When Cohen's Kappa is used, values between .40 and .75 represent fair to good agreement beyond chance (Neuendorf, 2002).

Research instruments

Tutors in both the labelling and non-labelling condition, were invited to complete two scales to measure self-efficacy beliefs and perceived collective efficacy. The self-efficacy instrument was administered at the start and during the closing phase of the discussion activities. The collective efficacy instrument was administered right after closing down each discussion theme.

Building on a literature review, two existing instruments were selected to develop a questionnaire to determine self-efficacy beliefs related to tutoring activities: the Teachers' Sense of Efficacy Scale (short 12-item form) of Tschannen-Moran and Woolfolk Hoy (2001) that builds on several versions of the Ohio State Teacher Efficacy Scale (OSTES) and the Teacher Self-Efficacy Scale of Bandura (2001). Ten items were selected from both instruments on theoretical and context-specific grounds. This implies that we selected only those items appropriate for assessing self-efficacy beliefs of peer tutors toward being a facilitator within a computer-supported collaborative learning environment. More specifically, items regarding peer tutor's self-efficacy in asking questions, enhancing text-based collaboration, and giving feedback were included. For example, 'To what extent can you craft good questions for your students?' (Tschannen-Moran & Woolfolk Hoy, 2001), and 'How much can you do to get students to work together?' (Bandura, 2001). Respondents were asked to rate the extent to which they expected and perceived to be a capable tutor on a 5-point Likert scale (0 = to no extent, 1 = to a limited extent, 2 = to some extent, 3 = to a considerable extent, 4 = to a great extent). Then, mean scores in both the starting and closing tutoring phase were calculated.

A Principal Axis Factoring (PAF) with oblique rotation was performed based on the pre-test questionnaire results of 92 peer tutors and resulting in a two-factor solution as presented in Table 1. Oblique rotation derives factor loadings based on the assumption that the factors are correlated (Tabachnick & Fidell, 2001). The first factor contains seven items and represents tutors' self-efficacy beliefs with regard to fostering a sense of community. The second factor is composed of three items and refers to tutors' self-efficacy beliefs with regard to stimulating knowledge construction in CSCL. Reliability of the self-efficacy instrument is 'acceptable' to 'good' with Cronbach's alpha coefficients varying between .65 and .82 when administered at the start and closing of the study.

Table 1. Results of the PAF with oblique rotation with regard to tutors' self-efficacy beliefs (*N*=92)

		Factor 1	Factor 2
Item 1	I believe I can provide an alternative explanation or example when my tutees are confused.	-.12	**.70**
Item 2	I believe I can craft good questions for my tutees.	.08	**.66**
Item 3	I believe I can make activities running agreeably in my discussion group.	**.62**	.05
Item 4	I believe I can respond to the questions of my tutees.	-.02	**.52**
Item 5	I believe I can motivate tutees who show low interest in the learning materials.	**.52**	-.13
Item 6	I believe I can reduce non-participation in my discussion group.	**.49**	-.09
Item 7	I believe I can get my tutees believe that they can do well in the discussion group.	**.47**	.22
Item 8	I believe I can get my tutees to work together.	**.40**	.11
Item 9	I believe I can help my tutees to meet the expectations about their participation in the discussion group.	**.36**	-.04
Item 10	I believe I can control disruptive behaviour in my discussion group.	**.34**	-.06

In order to measure tutors' perceived collective efficacy over time, the group potency scale of Guzzo, Yost, Campbell, and Shea (1993) was administered. The original version was developed for use in professional face-to-face settings, containing items such as 'My group has confidence in itself' and 'No task is too tough for my group'. Tutors were asked to rate items on a 5-point Likert response format (0 = to no extent, 1 = to a limited extent, 2 = to some extent, 3 = to a considerable extent, 4 = to a great extent). In view of the peer tutoring context, one item was removed from the original scale. A high internal consistency (Cronbach alpha = .74) was found. Opposed to the assessment method of Guzzo et al. (1993) capturing a group-level construct, perceived collective efficacy in this study represented an individual belief in the efficacy of the group. Ratings on the seven items were averaged for each peer tutor separately, and then their scores were not averaged across the single discussion group involving one tutor and about ten tutees but across the tutor population. This individual-level method of measuring collective efficacy was already employed by Earley (1993).

Results

Tutor participation

The work of the 35 experimental tutors resulted in 2591 messages, consisting of 5381 units of meaning. Tutors in the labelling condition (N=18) submitted 1442 messages which are 80.11 messages per tutor. Tutors in the non-labelling condition (N=17) posted only 1149 messages which are 67.59 messages per tutor. Less postings were counted in the closing phase (theme 3 and 4) with an average of 31.26 messages per tutor, as compared to the starting tutoring phase (theme 1 and 2) with an average of 42.77 messages per tutor. According to the statistical analyses, there is a significant decrease in tutor messages over time (t = 5.906, df = 34, p = .000, effect size .67). A differential impact of the tutor training condition was found as well. During the starting phase, a significantly higher amount of messages were posted in the labelling condition (mean = 49.06 messages per tutor) than in the non-labelling condition (mean = 36.12 messages per tutor); t = 2.160, df = 33, p = .038, two-tailed, effect size .65.

Do the tutors in the labelling condition label their interventions in an accurate way?

89.7% of the messages of peer tutors in the labelling condition were labelled related to Salmon's five-step model. For the remaining messages, tutors did not perform the labelling. Figure 1 presents an overview of the actual labelling performance along the five steps of e-moderating for tutors assigned to the labelling condition. In 57.9% of the contributions, the label tagged to the message was associated with at least one of the codes assigned to the unit(s) of meaning in that message. More specifically, it appeared that the tutor message label generally corresponded to the code assigned to the unit of meaning consisting of the highest amount of words. When exploring the fit between the message label and the objective coding for each distinct unit, it appeared that in only 34.6% of the 2754 involved units of meaning full correspondence was found. Full correspondence means that the labels per unit are identical to the code per unit. To deal with the methodological difficulty that tutors assigned one of the five labels to complete messages whereas independent coders assigned one of the

five codes to units of meaning within messages, all units of meaning were labelled in accordance with the tutor's label per message. In view of exploring the occurrence of full correspondence between the tutors' labels and the independent coder's code, for instance, in the case that a tutor tagged his complete message as 'information-exchange' we labelled the unit(s) in that message similarly.

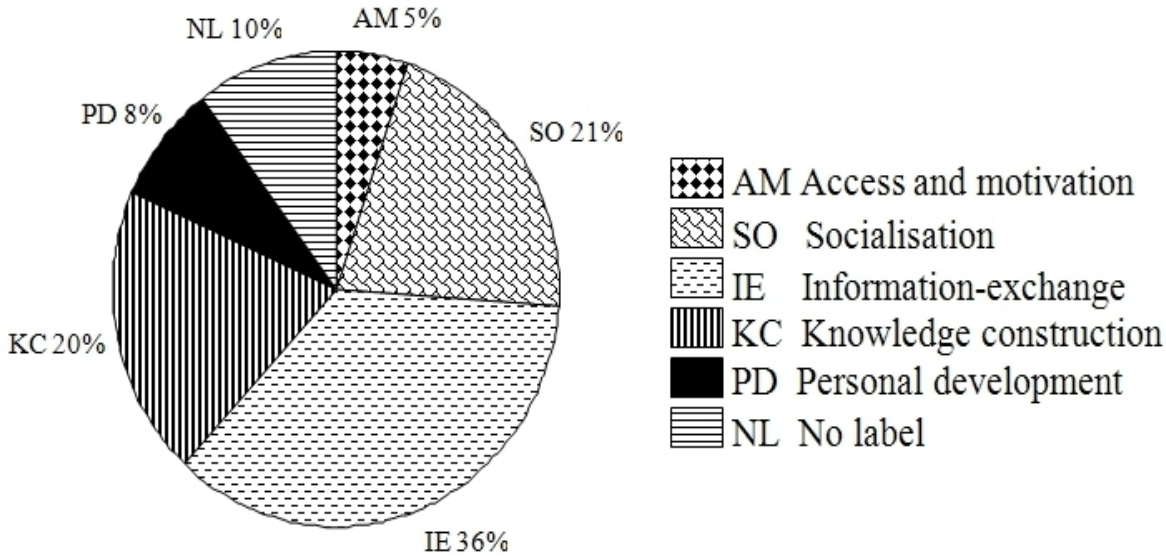

Figure 1. An overview of the actual labelling performance of tutors assigned to the labelling condition (*N*=18)

To analyse the labelling approach of the tutors, a more detailed comparison was carried out by comparing the labelling and the coding by independent coders, resulting in an indicator for accurate labelling (label = code) with regard to each step of e-moderating. 'Access and motivation' and 'information-exchange' appeared to be the least problematic to be labelled. In respectively 56.6% and 40.0% of the units of meaning assigned to these phases of e-moderating the tutor labelling per message (i.e. per unit) was identical to the objective coding of the unit(s) per tutor message. Considering 'socialisation', 'knowledge construction', and 'personal development', the percentages reflecting labelling accuracy were respectively 37.9%, 25.2%, and only 12.2%.

Do the labelling requirements result in different patterns in e-moderating compared to a non-labelling tutor training and control condition?

In view of answering this research question, the data of tutors in the two experimental and the control condition are taken into account. The following results refer to the patterns in e-moderating of 74 tutors assigned to either the labelling (*N*=18), non-labelling (*N*=17), or control training condition (*N*=39). The objective coding of the tutor interventions according to the model of Salmon is the basis for this analysis. The percentages in Figure 2 indicate the proportions of particular tutoring behaviour of tutors in the three different conditions. The descriptive results indicated that tutors in the labelling condition reflect a higher proportion of e-moderating interventions stimulating 'personal development'. Nevertheless, the overall

pattern in e-moderating does not seem to be very different between the tutors in the different conditions. All tutors dominantly give tutor support that invokes 'information-exchange'.

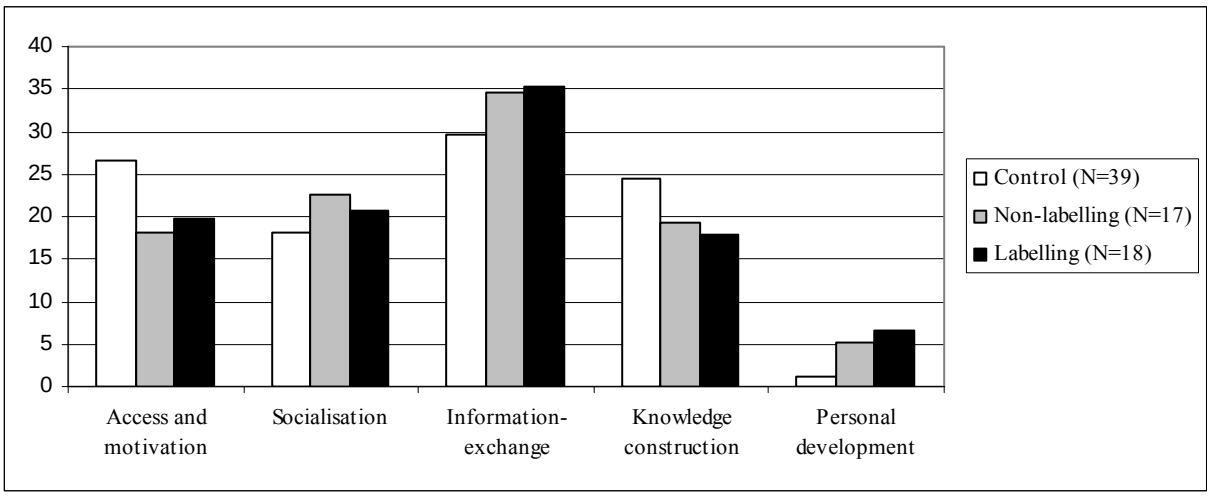

Figure 2. Percentages of Salmon's five-step model for e-moderation per tutor training condition

In order to explore the impact of labelling on tutoring patterns in more detail, a multinomial logistic regression analysis was performed with the five categories of the five-step model for e-moderating as polytomous dependent variable, and the three training conditions as independent variable. Multinomial logistic regression is used when the dependent variable in question is nominal and consists of more than two categories (Hosmer & Lemeshow, 2000). As can be derived from Table 2, the tutoring category 'access and motivation' was chosen as reference category for the multinomial logistic regression analysis. The control condition was selected as reference category to study the impact of the training conditions. A total of 10.853 units of meaning were analysed and the full model significantly fitted with the data (χ^2 (8) = 355.215, p < .000*)*. Table 2 summarises the regression coefficients, Wald statistics, associated degrees of freedom, and probability values for the independent variable. The results indicate that the training condition reliably affected tutoring behaviour in terms of e-moderating (Salmon, 2000). A number of significant differences are related to tutors in the labelling condition. When comparing e-moderating in the labelling condition versus the control condition, we come to the following conclusions:

- the odds of focusing on 'socialisation' versus 'access and motivation' are 1.54 times higher;
- the odds of facilitating 'information-exchange' versus 'access and motivation' increase by a factor of 1.61 (95% CI 1.422 – 1.817) for students in the labelling condition;
- the odds of 'personal development' versus 'access and motivation' are about 7.39 times higher.

When comparing e-moderating in the non-labelling condition with the control condition, the following results emerge:

- the odds of focusing on 'socialisation' versus 'access and motivation' are 1.83 times higher;
- the odds of 'information-exchange' versus 'access and motivation' are 1.72 times higher;
- the odds of 'personal development' versus 'access and motivation' are 6.26 times higher.

Table 2. Multinomial logistic regression estimates indicating the differences between the training conditions with regard to performing a particular tutoring behaviour following the model of e-moderating

Phase e-moderating	Training condition	Est.	Std. error	Wald	df	Sig.	OR	LB95 %CI	UB95 %CI
Socialisation[a]	Intercept	-.388	.041	88.770	1	.000			
	Labelling	.432	.070	37.690	1	.000	1.540	1.342	1.768
	Non-labelling	.604	.077	61.183	1	.000	1.829	1.572	2.128
	Control	ref.cat							
Information-exchange[a]	Intercept	.106	.036	8.621	1	.003			
	Labelling	.475	.062	57.782	1	.000	1.607	1.422	1.817
	Non-labelling	.541	.070	59.853	1	.000	1.718	1.498	1.971
	Control	ref.cat							
Knowledge construction[a]	Intercept	-.087	.038	5.235	1	.022			
	Labelling	-.017	.070	.056	1	.812	.983	.857	1.129
	Non-labelling	.146	.078	3.551	1	.059	1.157	.994	1.347
	Control	ref.cat							
Personal de-velopment[a]	Intercept	-3.080	.125	607.715	1	.000			
	Labelling	2.000	.149	180.304	1	.000	7.386	5.517	9.890
	Non-labelling	1.834	.162	128.603	1	.000	6.261	4.560	8.597
	Control	ref.cat							

[a] The reference category is 'Access and motivation'.

Does labelling have a differential impact on self-efficacy beliefs and perceived collective efficacy?

With regard to the third research question, statistical analyses are based on the comparison of mean test scores of tutors in the labelling (*N*=18) and non-labelling condition (*N*=17). The control condition was not taken into account since the instruments were not administered to these tutors.

It is first to be noted that tutors' overall self-efficacy beliefs were fairly high (mean = 2.43). Secondly, no significant differences at the 5% level were found between self-efficacy beliefs of tutors in both experimental training conditions. However, significant differences in perceived collective efficacy could be observed (t = -2.101, df = 33, p = .043, two-tailed). This represented a higher perceived collective efficacy in the non-labelling condition (mean = 2.45) as compared to the labelling condition (mean = 2.08). Thirdly, in both training conditions tutors' perceived collective efficacy did increase over time. A paired t-test showed a significant increase in tutors' perceived collective efficacy over time (t = -7.251, df = 34, p = *.000*).

Discussion

Building on prior research (De Smet et al., 2008), the present study tried to enhance the work of cross-age tutors in online asynchronous discussions. Next to a more elaborated initial tutor training, part of the tutors was invited to label their tutoring interventions.

The results clearly show that tutors in the labelling condition intervened more frequently than other tutors. Other researchers have stressed that the quantity of participation in a text-based CSCL-environment, is an important predictor for future knowledge construction (Schellens, Van Keer, Valcke, & De Wever, 2007; Weinberger & Fischer, 2006). We can argue that working with the labels did offer tutors an efficient thinking tool that fostered a higher degree of active tutoring.

The first aim of this study was to control the actual labelling performance of cross-age peer tutors. A first observation is the high percentage of labelling that did take place. Secondly, it was found that about 58% of the labels were in agreement with at least one of the codes given by independent coders to the unit(s) of meaning in tutor messages. It therefore appeared that tutors included in a single message other information apart from the label reference as well. This observation implies that tutors adopted different types of e-moderating in a single message. Part of the message was therefore not correctly labelled. An example is that tutors blend ‘welcoming and motivating’ with ‘providing extra information’. A typical tutor would label this message as ‘information-exchange’. This exemplifies that labelling is not a straightforward cognitive task.

The results in relation to the first research question also point at a large number of inaccurate labels. Tutor labels linked to their messages were not always identical to the labelling by independent coders. At this moment, there is hardly comparable research evidence available to compare the results of the present study. Nevertheless, the results can be explained in a number of ways. First, the results are in line with Robinson and Udall’s report about self-assessment (2006, p. 98). They state that “students are often unable to make realistic judgments about their own learning”. However, and in accordance with De Bono’s (1991) view that labelling can help learners becoming better self-monitoring thinkers, it is likely that labelling could have a positive impact on tutors’ thought processes despite the weak agreement between tutor labels and the objective coding. Secondly, the findings can suggest that the fourth-year tutors lacked sufficient experience with the e-moderating framework. In addition, since they had to perform this task or script on top of the actual tutoring work, this might have invoked a level of undesirable extraneous cognitive load (Dillenbourg, 2002; Kirschner, 2002; Koedinger & Aleven, 2007). Salmon (2006) gives in this context advice to avoid e-moderating barriers during actual tutoring activities. Finally, the taxonomical structure of the e-moderating model might have suggested tutors to strive after tutoring behaviour that was actually beyond tutees’ needs and the required kind of tutoring at hand. In the literature this is referred to as the ‘demand effect’, a concept adopted by Grant (2003).

The findings in relation to the first research question suggest that future practice and research should aim at a longer and more detailed introduction about the nature of the e-moderating labels. Since labelling implies thinking, we agree with Halpern (1998) who states that thinking skills need to be explicitly and consciously taught and exercised.

The results indicate that, independent of the nature of the tutor training, tutors fulfilled all of the roles expected in e-moderating activities: motivational, social, informative, knowledge constructive, and challenging for personal development (Salmon, 2000). These results reiterate the findings from our previous study in a similar research context (De Smet et al., 2008). Exchanging information remains, however, a dominant type of tutoring behaviour and this in contrast to the limited occurrence of the fifth and highest step in e-moderating. This suggests that tutors still mainly centre on informing and modelling. Nevertheless, on the base of multinomial logistic regression analyses, the three different tutor training conditions seem to result in significant differences in the e-moderating patterns as well. Both the labelling and non-labelling conditions are associated with an increase in support for 'socialisation', information-exchange', and 'personal development'. Tutors in the labelling condition seem to foster 'personal development' to the highest extent. Tutors in the non-labelling condition surpassed the labelling tutors with regard to the occurrence of 'socialisation' and 'information-exchange'.

The small differences between the tutors in the labelling and non-labelling experimental condition are surprising. The findings suggest not to magnify the extent to which a specific tutor training affects online peer tutoring behaviour in the early stages of tutoring. It even seems that a strong focus on labelling and hence on deliberate self-monitoring as part of a tutor training and tutoring activity might be - initially - counterproductive. This is a phenomenon regularly observed in research on variables affecting 'transfer of training' (Nijman, 2004; Ottoson, 1997; Prawat, 1989). A positive impact of labelling might occur only at a later stage when the interference of the labelling is no longer obstructing the actual tutoring process. Further research is needed to study this assumption on cognitive load during labelling. Although the results suggest that tutors in the experimental conditions adopt a wider range of e-moderating activities, future research should also explore the underlying reasons for the increase in support generating 'socialisation', 'information-exchange', and 'personal development'. Qualitative studies building on stimulated-recall and focus groups could be helpful to gather this type of tutor information.

The third purpose of this study was to examine the impact of labelling on self-efficacy beliefs and perceived collective efficacy. In the context of this research, perceived self-efficacy was related to peer tutors' prospective action in the role of online facilitator whereas perceived collective efficacy was related to tutor's perceptions with regard to the interpersonal characteristics of tutees' online discussion behaviour in small groups.

The findings showed that tutors' self-efficacy beliefs were high but no differences were found between the labelling and the non-labelling tutor training condition. This suggests that labelling tutoring activities did not invoke self-regulatory activities to a higher extent, leading

to higher self-efficacy beliefs. This result does not substantiate the findings of Brown and Morrissey (2004) illuminating that verbal self-guidance training increases students' self-efficacy beliefs. The possible occurrence of extraneous cognitive load because of the labelling activity could explain the lack of difference between the labelling and non-labelling tutor training condition (Dillenbourg, 2002; Kirschner, 2002; Koedinger & Aleven, 2007).

Significant differences in perceived collective efficacy were observed between tutors in the two training conditions at the start of the tutoring activities. The results suggest that tutors in the labelling condition experienced a lower level of perceived collective efficacy. This particular finding fits on the one hand into the earlier observations about the lack of a strong differential impact of labelling on the nature of online tutoring in terms of e-moderating. On the other hand, this hypothesis fits in with the work of Bandura (2000) who states that the extent to which one puts effort in the group endeavour is affected by perceived collective efficacy, and the other way round. Because of the labelling, tutors might consider in more detail how well or how bad tutees work together; thus affecting their overall perceived collective efficacy. This confirms the assumption that labelling helps them becoming more critical thinkers as suggested by De Bono (1991). Moreover, this finding supports the idea that self-monitoring processes result in a stronger focus and enhanced (meta)cognitive awareness (Ellis & Zimmerman, 2001).

Limitations and further research

The present study reflects a number of shortcomings that should be considered when interpreting the findings. In addition, the limitations are to be addressed in future research.

Given the complex process of behaving as a 'peer' in conjunction with a 'tutor' (Chappell, 1995), the moderate internal consistency of the self-efficacy subscale items is an issue requiring further exploration. Future studies, set up in alternative educational settings, should aim at controlling for higher reliability levels and concurrent validity of the research instruments. In the discussion section, it was suggested that cognitive load might have played a role. This variable could be studied and/or controlled for in future research. Moreover, in further research tutees' perceived collective efficacy could be measured, aggregated, and/or contrasted with tutors' perceived collective efficacy of the discussion group.

The interpretation of the present research findings is also limited due to the lack of comparable studies about online peer tutoring. This type of empirical studies is scarce. Some exceptions are the computer-supported peer tutoring studies of De Smet et al. (2008) and McLuckie & Topping (2004), and studies illustrating a practical and comprehensive model for a peer tutoring skills training (Chappell, 1995; Nath & Ross, 2001).

In addition to the content analysis and logistic regression techniques used in this study, other techniques should be adopted to acquire a fuller understanding of cross-age tutoring activities. Data and method triangulation should be adopted. For example, stimulated-recall interviews (Calderhead, 1981; Lyle, 2003) could be a promising direction to explore the thoughts underlying tutors' contributions, and this related to the labelling activities and their efficacy beliefs.

To explain the lack of significant differences in tutor-related dependent variables, other issues should be considered. The present study was set up in a naturalistic setting. It was therefore not possible to rule out external factors influencing the tutor training effectiveness in terms of 'transfer' (Ottoson, 1997; Prawat, 1989). Future research could take a closer look at tutors' (labelling) performance, and relate this activity to their degree of flexibility to adopt a certain phase of e-moderating on a certain moment, learning outcomes in the long run, and supportive activities outside the research setting.

Conclusion

The present study about facilitation via peer tutoring and labelling of tutoring activities has resulted in a number of useful observations about the nature and structure in peer tutoring in a CSCL-setting. The study results indicate that tutors easily adopt labelling activities, but that their labelling is not always accurate. Nevertheless, the labelling activity combined with a more extensive tutor training, proved to result in a number of significant differences in the occurrence of particular types of tutoring activities and a more balanced pattern in the types of tutoring activities. However, the results are still too unclear to be able to observe differential patterns in e-moderating due to the labelling or self-monitoring activity. Finally, the research results indicate that the labelling activity has - yet - hardly a differential impact on self-efficacy. Differences in perceived collective efficacy can be observed, suggesting that the labelling activity imposes extra workload on tutors. The discussion of the research results points at the need for qualitative research that pays even more attention to the initial tutor training and the long-term impact on their tutoring activities.

References

Backroad Connections Pty Ltd. (2002). *Effective Online Facilitation* (Version 2.00), Australian Flexible Learning Framework Quick Guides series, Australian National Training Authority.

Bandura, A. (1993). Perceived Self-Efficacy in Cognitive Development and Functioning. *Educational Psychologist, 28,* 117-148.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York: Freeman.

Bandura, A. (2000). Exercise of Human Agency Through Collective Efficacy. *Current Directions in Psychological Science, 9*, 75-78.

Bandura, A. (2001). *Guide for constructing self-efficacy scales (Revised).* Available from Albert Bandura, Stanford University.

Bonk, C. J., Wisher, R. A., & Lee J-Y. (2004). Moderating Learner-Centred E-Learning: Problems and Solutions, Benefits and Implications. In Roberts T.S. (Ed.), *Online Collaborative Learning: Theory and Practice*, 54-85. Hershey: Information Science Publishing.

Brown, T., & Morrissey, L. (2004). The effectiveness of verbal self-guidance as a transfer of training intervention: its impact on presentation performance, self efficacy and anxiety. *Innovations in Education and Teaching International, 41,* 255-269.

Calderhead, J. (1981). Stimulated Recall: A Method for Research on Teaching. *British Journal of Educational Psychology, 51,* 211-217.

Carroll, J. M., & Reese, D. D. (2002). Community Collective Efficacy: Structure and Consequences of Perceived Capacities in the Blacksburg Electronic Village. *Proceedings on the 36th Hawaii International Conference on System Sciences.*

Chappell, V. A. (1995). Theorizing in Practice: Tutor Training "Live, from the VAX Lab". *Computers and Composition, 12,* 227-236.

Chi, M. T. H. (1997). Quantifying Qualitative Analyses of Verbal Data: A Practical Guide. *The Journal of the Learning Sciences, 6,* 271-315.

De Bono, E. (1991). Six Thinking Hats for schools. Resource book for Adult Educators. Logan (IA): USA Perfection Learning.

De Smet, M., Van Keer, H., & Valcke, M. (2008). Blending Asynchronous Discussion Groups and Peer Tutoring in Higher Education: An Exploratory Study of Online Peer Tutoring Behaviour. *Computers & Education, 50,* 207-223.

De Wever, B., Van Keer, H., Schellens, T., & Valcke, M. (in press). Applying multilevel modelling on content analysis data: Methodological issues in the study of the impact of role assignment in asynchronous discussion groups. *Learning and Instruction.*

Dewiyanti, S., Brand-Gruwel, S., & Jochems, W. (2005). Applying reflection and moderation in an asynchronous computer-supported collaborative learning environment in campus-based higher education. *British Journal of Educational Technology, 36*, 673-676.

Dillenbourg, P. (2002). Over-scripting CSCL: The risks of blending collaborative learning with instructional design. In P.A. Kirshner (Ed.), *Three worlds of CSCL: Can we support CSCL?* (pp. 61-91). Heerlen: Open Universiteit Nederland.

Earley, P. C. (1993). East meets West meets Mideast: Further explorations of collectivistic and individualistic work groups. *Academy of Management Journal, 36,* 319-348.

Ellis, D., & Zimmerman, B. J. (2001). Enhancing Self-Monitoring during Self-Regulated Learning of Speech. In H. J. Hartman, *Metacognition in Learning and Instruction. Theory, Research, and Practice.* (pp. 205-228). Dordrecht: Kluwer Academic Press.

Garrison, R. D., Anderson, T., & Archer, W. (2000). Critical Inquiry in a text-based environment: computer conferencing in higher education. *The Internet and Higher Education, 2*, 87-105.

Grant, A. M. (2003). The impact of life coaching on goal attainment, metacognition and mental health. *Social Behavior and Personality, 3*, 253-264.

Griffin, B. W., & Griffin, M. M. (1998). An Investigation of the Effects of Reciprocal Peer Tutoring on Achievement, Self-Efficacy, and Test Anxiety. *Contemporary Educational Psychology, 23*, 298-311.

Guzzo, R., Yost, P., Campbell, R, & Shea, G. (1993). Potency in groups: Articulating a construct. *British Journal of Social Psychology, 32*, 87-106.

Halpern, D. F. (1998). Teaching Critical Thinking for Transfer Across Domains. Dispositions, Skills, Structure Training, and Metacognitive Monitoring. *American Psychologist, 53,* 449-455.

Hosmer, D. W. Jr., & Lemeshow, S. (2000). *Applied Logistic Regression*. New York: Wiley.

Kirschner, P. A. (2002). Cognitive load theory: Implications of cognitive load theory on the design of learning. *Learning and Instruction, 12,* 1-10.

Koedinger, K., & Aleven, V. (2007). Exploring the Assistance Dilemma in Experiments with Cognitive Tutors, Educational Psychology Review, *19, 239-264*.

Kollar, I., Fischer, F., & Hesse, F. W. (2003). Cooperation scripts for computer-supported collaborative learning. In B. Wasson, R. Baggetun, U. Hoppe, & S. Ludvigsen (Eds.), *Proceedings of the International Conference on Computer Support for Collaborative Learning, CSCL 2003* – Community events, communication, and interaction (pp. 59-61). Bergen: Intermedia.

Laurillard, D. (1998). Multimedia and the learner's experience of narrative. *Computers & Education, 31,* 229-242.

Lyle, J. (2003). Stimulated Recall: a report on its use in naturalistic research. *British Educational Research Journal, 29,* 861-878.

McLoughlin, C., & Luca, J. (2000). Cognitive engagement and higher order thinking trough computer conferencing: We know why but do we know how? In A. Herrmann and M.M. Kulski (Eds), *Flexible Futures in Tertiary Teaching.* Proceedings of the 9th Annual Teaching Learning Forum, 2-4 February 2000. Perth: Curtin University of Technology. Retrieved September, 18, 2004, from: http://lsn.curtin.edu.au/tlf/tlf2000/mcloughlin2.html

McLuckie, J., & Topping, K. J. (2004). Transferable skills for online peer learning. *Assessment & Evaluation in Higher Education, 29*, 563-584.

Michalski, G. M., & Cousins, J. B. (2000). Differences in stakeholder perceptions about training evaluation: A concept mapping/pattern matching investigation. *Evaluation and Program Planning, 23,* 211-230.

Nath L. R., & Ross, S. M. (2001). The Influence of a Peer-Tutoring Training Model for Implementing Cooperative Groupings with Elementary Students. *Educational Technology Research & Development, 49,* 41-56.

Neuendorf, K. A. (2002). *The Content Analysis Guidebook*. Thousand Oaks, CA: Sage Publications.

Nijman, D-J. (2004). *Supporting Transfer of Training. Effects of the Supervisor. Doctoral Dissertation.* Enschede, The Netherlands: University of Twente.

Ottoson, J. M. (1997). Beyond Transfer of Training: Using Multiple Lenses to Assess Community Education Programs. *New Directions for Adult and Continuing Education, 75,* 87-96.

Pajares, F. (2004). Psychometric Analysis of Computer Science Help-Seeking Scales. *Educational and Psychological Measurement, 64*, 496-513.

Prawat, R. S. (1989). Promoting Access to Knowledge, Strategy, and Disposition in Students: A Research Synthesis. *Review of Educational Research, 59*, 1-41.

Rickard, K. (2004). E-mentoring and pedagogy: a useful nexus for evaluating online mentoring programs for small business? *Mentoring and Tutoring, 12*, 383-401.

Robinson, A., & Udall, M. (2006). Using formative assessment to improve student learning through critical reflection. In C. Bryan & K. Clegg (Eds.), *Innovative assessment in higher education* (pp. 92-99). London: Routledge.

Rueda, R., & Monzó, L. D. (2002). Apprenticeship for teaching: professional development issues surrounding the collaborative relationship between teachers and paraeducators. *Teaching and Teacher Education, 18,* 503-521.

Salmon, G. (2000). *A model for CMC in education and training. E-moderating. The key to teaching and learning online.* London: Kogan Page.

Salmon, G. (2006). 80:20 for E-moderators. In I. Mac Labhrainn, C. McDonald Legg, D. Schneckenberg, & J. Wildt (Eds.), *The Challenge of eCompetence in Academic Staff Development.* Galway: CELT.

Schellens, T., Van Keer, H., Valcke, M., & De Wever, B. (2007). Learning in asynchronous discussion groups: A multilevel approach to study the influence of student, group, and task characteristics. *Behaviour & Information Technology, 26,* 55-71.

Sosik, J. J., Avolio, B. J., Kahai, S. S., & Jung, D. I. (1998). Computer-Supported Work Group Potency and Effectiveness: The Role of Transformational Leadership, Anonymity and Task Interdependence. *Computers in Human Behaviour, 14*, 491-511.

Strijbos, J-W., Martens, R. L., Prins F. J., & Jochems, W. M. G. (2006). Content Analysis: What Are They Talking About? *Computers & Education, 46*, 29-48.

Tabachnick, B. G., & Fidell, L. S. (2001). *Using Multivariate Statistics, Fourth Edition*. Needham Heights, MA: Allyn & Bacon.

Tschannen-Moran, M., & Woolfolk Hoy, A. W. (2001). Teacher efficacy: capturing an elusive construct. *Teaching and Teacher Education, 17*, 783-805.

Topping, K. J. (1996). The effectiveness of peer tutoring in further and higher education: A typology and review of the literature. *Higher Education, 32,* 321-345.

Weinberger, A., & Fischer, F. (2006). A Framework to Analyze Argumentative Knowledge Construction in Computer-Supported Collaborative Learning. *Computers & Education, 46,* 71-95.

Weinberger, A., Reiserer, M., Ertl, B., Fischer, F., & Mandl, H. (2005). Facilitating collaborative knowledge construction in computer-mediated learning environments with cooperation scripts. In R. Bromme, F. W. Hesse, & H. Spada (Eds.), *Barriers and biases in computer-mediated knowledge communication* (pp. 15-38). Boston: Kluwer.

Chapter 5*

Cross-age peer tutors in asynchronous discussion groups: Exploring the impact of three types of tutor training on patterns in tutor support and on tutors' efficacy beliefs

Abstract

This study examined the impact of three tutor training approaches on peer tutors' support in discussion groups and on tutors' efficacy beliefs. To study tutoring behaviour, we focused on both the occurrence of five e-moderating activities and the evolution from modelling to coaching. Besides investigating the impact of tutor training on the actual tutoring, the effects of tutor characteristics (e.g., tutors' self-efficacy, perceived collective efficacy, and training evaluation) were explored as well. The results indicated that both the multidimensional support and the model/coach training positively influenced the occurrence of support stimulating personal development. With regard to the model-to-coach evolution, opposed to the control condition in both experimental training conditions tutors started as a model. It can be concluded that the tutor training focus can determine the adoption of certain types of online support. Concerning the tutor chracteristics, however, no significant differences linked to the experimental tutor training conditions were observed.

Introduction

Peer tutoring can be defined as "people from similar social groupings who are not professional teachers, helping each other to learn, and learning themselves by teaching" (Topping, 1996, p. 322). A more capable, knowledgeable, and experienced peer with a supportive role is called the 'tutor', while less experienced students receiving help from a tutor are called 'tutees' (Topping, 1998). The present study focuses on blending in cross-age peer tutoring and asynchronous discussion groups. Cross-age peer tutoring refers to older and more knowledgeable students tutoring younger students (Gautrey, 1990; Gumpel & Frank, 1999). Many other authors integrate the use of asynchronous technologies such as e-mail and discussion groups in their educational research as well (Benbunan-Fich, Hiltz, & Turoff, 2002; Dewiyanti, Brand-Gruwel, & Jochems, 2005; Kim, Wah, & Lee, 2007). The implementation of asynchronous discussion groups is based on the social constructivist notion that social dialogue is important to trigger knowledge construction (Brewer & Klein, 2006; Jonassen, Lee, Yang, & Laffey, 2005). Cross-age tutors were added to discussion groups in

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order to answer the need for guidance and structure in computer-supported collaborative learning (CSCL) environments as suggested by numerous researchers (Bonk, Wisher, & Lee, 2004; Falchikov, 2001; Garrison, Anderson, & Archer, 2000; Laurillard, 1998; Rickard, 2004; Salmon, 2000). In the current research, fourth-year students operated as online tutors to structure and scaffold tutees' collaboration and knowledge construction. According to Salmon (2000), promoting knowledge construction is intrinsic to e-moderating. She maintains that e-moderating involves a series of stages which include access and motivation, socialisation, information-exchange, knowledge construction, and personal development. Previous research into online tutoring behaviour in terms of e-moderating, however, indicated that peer tutors are predominantly engaged in social support, while less attention is paid to promoting tutees' 'personal development' (De Smet, Van Keer, & Valcke, 2008). The key ingredient at the stage of personal development is reflection and becoming responsible for one's own learning (Salmon, 2000). In this respect, e-moderators need to challenge learners' thoughts, for example by playing the devil's advocate and by encouraging reflection. Moreover, it appeared that tutors' contributions do not evolve from explicit tutor-centred modelling behaviour, characterised by supplying examples, to indirect prompts and tutee-centred coaching behaviour (De Smet, Van Keer, & Valcke, in press), as would be expected from the model of Moust and Schmidt (1994). Taking these results into account, the main aim of the present study was to improve peer tutors' supportive contributions through tutor training.

Building on the Social Cognitive Theory, it is apparent that next to external factors such as tutor training, internal factors can affect tutoring behaviour as well. Social Cognitive Theory defines human behaviour as a triadic, dynamic, and reciprocal interaction of personal factors, behaviour, and the environment (Bandura, 1993). In the context of the present research, it is assumed that a number of personal factors, i.e. tutor characteristics, affect tutors' support in discussion groups, next to and in interaction with the nature of the tutor training. Research, for example, predicts that self-efficacy beliefs of trainees serve as a major predictor of transfer of training (Orpen, 1999; Saks, 1995). A second tutor characteristic, based on research into group dynamics and originating in research about self-efficacy, is called 'collective efficacy'. As Bandura (2000) suggested, perceived collective efficacy is very likely affected by the quality of group interactions and has strong positive effects on group performance. However, little research is available investigating the impact of collective efficacy on the nature of tutoring behaviour in computer-supported collaborative learning (Carroll & Reese, 2002). Thirdly, inspired by studies in educational evaluation (Barnard, Veldhuis, & van Rooij, 2001; Huberty & Davis, 1998; Kirkpatrick, 1994) also one's personal training evaluation is expected to be a key tutor characteristic affecting tutoring behaviour.

In summary, this study attempts to explore the impact of tutor training on patterns in tutor support. Moreover, the study aims at controlling for the impact of a number of tutor characteristics: (1) tutors' self-efficacy beliefs, (2) tutors' perceived collective efficacy over time, and (3) tutors' personal training evaluation.

Theoretical framework

Different training approaches to improve tutors' supportive contributions

Since research revealed that peer tutoring is less effective without a preceding training program (Falchikov, 2001; Jenkins & Jenkins, 1987; Parr & Townsend, 2002), a tutor preparation with regard to tutor tasks and roles in a CSCL-environment is imperative. However, only a few studies illustrate a practical and comprehensive model for training peer tutoring skills (Chappell, 1995; Nath & Ross, 2001).

As training aims at a transfer of newly acquired tutoring behaviour to the actual tutoring setting (Barnard et al., 2001), it is assumed that tutor preparation should focus on helping tutors to deliver the type of support that is most relevant at a certain time. In the present study, tutor training centred on avoiding problems identified in earlier research involving peer tutors in a CSCL-setting (De Smet et al., 2008; De Smet et al., in press). A first study revealed that tutors are predominantly engage in social support at the expense of stimulating tutees' 'personal development' (De Smet et al., 2008). Subsequently, it was found that peer tutors' supportive contributions do not evolve automatically from supplying explicit to indirect prompts. This result is inconsistent with Moust and Schmidt's (1994) recommendation that tutors should evolve from a 'model', supplying learners with direct input, to a 'coach', soliciting for active input of tutees (De Smet et al., in press).

Building on these research findings, in the present study two tutor training approaches were introduced and contrasted with a control condition. The two experimental tutor training approaches were developed and implemented in order to affect and improve patterns in tutoring behaviour in terms of e-moderating. We more specifically focused on the occurrence of different e-moderating activities during tutoring, going from fostering access and motivation, over encouraging socialisation, information-exchange, and knowledge construction, to stimulating personal development (Salmon, 2000). In addition, the importance of evolving from modelling to coaching behaviour over time (Moust & Schmidt, 1994) was stressed as well. The view that different types of training could affect and improve tutoring behaviour builds on a large body of research endorsing and describing various training programs developed to improve particular skills of trainees (Huberty & Davis, 1998; McDermott, Beck, Buffington, Annas, Supratikto, Prenggono, Ekonomi, & Achadi, 2001).

Tutor characteristics affecting tutors' supportive contributions

Inspired by the dissertation of Nijman (2004) on determinants supporting transfer of training, and acknowledging that efficacy beliefs are standing at the very core of Social Cognitive Theory (Bandura, 1993, 1997), next to training we expect that also tutor characteristics related to tutors' motivation to act in the role of online facilitator influence peer tutoring behaviour. We first focus on tutors' self-efficacy beliefs since they positively contribute to self-regulatory cognitive functioning (Bandura, 1993) and transfer of trained skills (Nijman, 2004; Orpen, 1999; Saks, 1995). Self-efficacy refers to a belief in the ability to execute courses of action to achieved desired outcomes. In the present study, we presume that peer tutors' self-efficacy beliefs regarding their performance might influence the types of supportive

contributions they actually adopt in online discussions. This particular interest in whether there is a relationship between self-efficacy and its effect on behaviour builds on the work of Bandura (1993) and Pajares (2004). With regard to teachers' sense of self-efficacy, for instance, Bandura (1993, p. 140) revealed that "teachers who believe strongly in their instructional efficacy create mastery experiences for their students". In contrast, "teachers that have doubts about their efficacy, construct classroom environments that are more likely to undermine students' sense of efficacy and cognitive development".

Secondly, since learning in a peer tutoring setting is to be considered as a specific type of collaborative learning (Griffin & Griffin, 1998; Slavin, 1996; Topping, 1996), tutors' perceived collective efficacy of their discussion group as a whole is included in the present study as well. Bandura (2000) suggested that perceived collective efficacy has been affected by the group interaction, how the group is structured, and how well the group is led. As described by Bandura (1997), collective efficacy refers to the self-efficacy of a group, team, or larger social system or entity. In recent research, Bandura (2000) reported that one's appraisal of the groups' capability and functioning operates as an important contributor to human agency. More specifically, Bandura (2000, p. 78) found that "the higher the perceived collective efficacy, the higher the group's motivational investment in their undertakings, the stronger their strength in the face of impediments and setbacks, and the better their accomplishments". The expected impact of collective efficacy beliefs can also be compared to the findings of Fresko (1996). She observed that if university tutors and tutees were pleased with their participation, they were more inclined to continue in their respective roles and accrue to the benefits that peer tutoring has to offer.

Thirdly, inspired by studies in educational evaluation (Barnard et al., 2001; Huberty & Davis, 1998; Kirkpatrick, 1994) also one's personal training evaluation is expected to be a tutor characteristic affecting tutoring behaviour after training. According to Cousins and MacDonald (1998, p. 334), in such training evaluation the trainee is the primary unit of analysis since "most evaluations determine only if participants liked the materials, format, facilitators, and whether they learned the concepts and skills taught in the program".

It is important to note that in the present study, tutor characteristics are studied in two ways. It is first assumed that tutor characteristics affect tutoring behaviour and secondly we assume that these characteristics will be influenced by the tutor training. Two remarks have to be made in this context. A first remark concerns the expected impact of different training approaches on self-efficacy, perceived collective efficacy, and personal training evaluation. The central question is not whether or not training will increase tutors' self-efficacy beliefs as reported in many corporate training studies, but rather whether different training approaches make a difference. A second issue concerns the impact of the aforementioned variables on the tutor training outcomes. Although Michalski and Cousins (2000, p. 212) pointed at "the extreme difficulty of isolating the effects of training and linking such effects to effectiveness measures", the effects of training can largely be defined as a function of self-efficacy. The latter is especially true in organisational training literature (e.g., Frayne & Latham, 1987; Saks, 1995). The same applies to educational training research. In their study aimed at

improving students' presentation performance, Brown and Morrissey (2004), for example, argued that if self-efficacy increases, also performance seems to increase after the training.

Research objective and research questions

The present study aims to explore the impact of different tutor training conditions on online peer tutoring behaviour and on peer tutors' efficacy beliefs. In addition, predictors reflecting tutor characteristics (e.g., tutors' self-efficacy, perceived collective efficacy, and personal training evaluation) are controlled for. More specifically, we put forward the following four research questions:

- Do contributions of tutors assigned to one of the three training conditions differ over time with regard to patterns in e-moderating?
- Do contributions of tutors assigned to one of the three training conditions differ over time with regard to the adoption of modelling and coaching behaviour?
- Do tutors in the multidimensional support training condition differ from tutors in the model/coach training condition with regard to their self-efficacy beliefs, perceived collective efficacy, and personal training evaluation over time?
- What is the impact of different tutor training approaches on (1) tutors' patterns in e-moderating, and (2) tutors' modelling or coaching behaviour when controlling for tutor characteristics over time (e.g., self-efficacy beliefs, perceived collective efficacy, and personal training evaluation)?

Method

Participants and setting

The study was conducted in a naturalistic or ecologically valid university setting in which participation in asynchronous discussion groups were a formal component of the blended course 'Instructional Sciences', part of the first-year bachelor of Educational Sciences' curriculum. According to Macdonald (2006, p. 2), "blended learning is associated with the introduction of online media into a course, while at the same time recognising that there is merit in retaining face-to-face contact". Tutors (N=96) were fourth-year Educational Sciences' students, performing the tutoring activities as the core of their educational internship. Both tutors and tutees represented the entire population of respectively fourth- and first-year students. Within the scope of this research, cross-age tutors were randomly assigned to one of the three training conditions distinguished for the current study: (a) the multidimensional support condition (N=29), characterised by bringing in variation into one's contributions; (b) the model/coach condition (N=28), focusing on tutor's evolution from model to coach; and (c) a control condition (N=39), typified by all-round information on online facilitation.

Procedure

Group assignments. During the first semester, fourth-year tutors supported freshmen while they were working on successive group assignments. In all training conditions, these assignments were of equal complexity, as evaluated by content area experts of the department, and related to distinct themes in the course. Completing each assignment lasted two weeks. After two weeks, the discussion was accessible on a read-only base and a new assignment was presented. The thematic group assignments were identical for all discussion groups and can be characterised as open-ended tasks, implying no standard approach, nor resulting in single right answers. Furthermore, the assignments were quite complex and extensive in order to force group members to join efforts instead of solving tasks on their own. In view of studying the second research question, the discussion themes were clustered in two separate tutoring phases. In this respect, tutoring activities were studied at the start and at the end of the peer tutoring period.

Tutor training conditions. Two weeks before the onset of the CSCL-activities, a three-hour face-to-face tutor training session was set up. Notwithstanding the content-focused differences in the three training conditions as described underneath, all tutor training approaches ended with an in-depth demonstration of the technical CSCL-environment. Additionally, a tutor website was made available summarising logistic information next to a specific guidebook with background information about the respective tutor training approach.

In the first experimental condition, labelled as the multidimensional support condition, tutors were stimulated to consider and adopt a broad range of supportive contributions that build on the taxonomical e-moderating model of Salmon (2000). This implies that peer tutors were expected to consider a variation of support activities over time fostering: (1) access and motivation, (2) socialisation, (3) information-exchange, (4) knowledge construction, and (5) personal development. Accordingly, the peer tutors received training in how to stimulate the collaboration in view of reaching the fifth level of 'personal development'. Since mastering new skills requires exercise (Halpern, 1998), tutors were engaged in a one-hour practice session on how to facilitate tutees' personal development. Additionally, they received an introduction to theoretical conceptions about developing critical thinking skills (Halpern, 1998; Huberty & Davis, 1998) and reflection skills (Kelchtermans, 2000; McGrath & Higgins, 2006; Schön, 1983). In a next step, "examples of good practice", based on a large set of tutor contribution samples from previous research, were discussed aiming to promote transfer of the demonstrated skills (Halpern, 1998).

In the second experimental training condition, labelled as the model/coach condition, tutors were expected to evolve in their contributions: a decline in the number of contributions and an evolution from supplying information to inviting for input. Next to an introduction to the theoretical conceptions of modelling and coaching behaviour (Moust & Schmidt, 1994), fading out in the discussions was recommended (Mason, 2000) in order to reorient tutor assistance depending on the cognitive and social capacities of the group. In addition, many examples of adequate modelling and coaching behaviour were presented and the appropriateness of such tutor contributions was discussed depending on the phase in group

discussions. This pre-service exercise was enriched by discussions and deliveration in dyads of tutors.

The contents of the two experimental training approaches differed in two ways from the largely theoretical tutor training as introduced in the control condition (De Smet et al., 2008; De Smet et al., in press). First, in contrast with the more specific content-focused instructions in the experimental training conditions in the control condition tutors received all-round instructions about their future online tutoring task and role so that they could master a relevant mix of organisational, (meta)cognitive, and social tutoring skills (Backroad Connections Pty Ltd, 2002; Rickard, 2004). More particularly, peer tutors were informed about functional skills such as community building, asking questions, triggering reflection, and providing descriptive feedback (De Smet et al., 2008). Secondly, not in the control condition but only in both experimental training approaches tutors were asked to keep a tutor diary and tutors were involved in two stimulated-recall sessions (Lyle, 2003). Stimulated-recall was helpful to recall tutors' thoughts and decision-making while tutoring. Except for the focus groups, only in the experimental tutor training conditions in-service training was added to pre-service training.

Focus groups. Every two weeks, focus groups were organised to discuss tutors' performance and to improve their peer tutoring activities. These face-to-face meetings were set up in small groups of about ten tutors.

Content analysis

Content analysis was applied to analyse the complete dataset of transcripts generated during the asynchronous discussions.

Unit of analysis. The 'unit of meaning' in a tutor message was chosen as the unit of analysis. Following Chi (1997) a unit of meaning is defined as a unit that represents a consistent idea, argument chain, or discussion topic. Since online tutoring is to be considered as a multidimensional activity, it is clear that tutors' contributions can reflect a variety of units within a single message. Therefore, tutor messages were split up into units of meaning.

Coding schemes. Tutor contributions were analysed by means of a content analysis scheme based on Salmon's (2000) five-step model for e-moderating. As reported in a previous study (De Smet et al., 2008), seventeen categories - representing the five stages - were distinguished as operational indicators of online tutor support. In order to explore the impact of the different training conditions, an additional content analysis scheme was applied (De Smet et al., in press). This instrument focuses on four process dimensions, namely tutors' (1) social and organisational support in the learning community, (2) domain-specific support with regard to the learning contents and group assignments, (3) modelling or inviting (coaching) for knowledge construction, and (4) off-task behaviour. Following Moust and Schmidt (1994), explicit prompts, such as providing examples, were categorised as modelling behaviour while indirect prompts or invitations to contribute to the discussion were categorised as coaching behaviour.

Reliability. The segmentation and coding procedure was performed by independent trained coders. Two independent coders received a training to carry out the segmentation procedure.

As suggested by Strijbos, Martens, Prins, and Jochems (2006), a procedural distinction was made between the segmentation process into units of analysis and the content analysis and coding process. Next, the researchers compared and discussed the segmented units of meaning in order to reach consensus about the segmentation process. In addition to the segmentation training, the coders also received a training to apply the subcategories in the two coding schemes. The training was based on a sample of 178 tutor contributions that were segmented into 3507 units of meaning. After the training and in view of determining coding and segmentation reliability, a sample of 436 units of meaning or 12% of the full sample of units was coded by both coders. A moderate level of inter-rater reliability was observed. An overall percentage agreement of 80% was found for the categories reflecting the model of Salmon. A moderate Cohen's Kappa (.73) was calculated indicating a level of agreement between the two coders beyond chance. With regard to the second coding scheme, an acceptable percentage agreement (.81) and Cohen's Kappa (.72) were observed. When Cohen's Kappa is used, values between .40 and .75 represent fair to good agreement beyond chance (Neuendorf, 2002).

Research instruments

In both experimental training approaches, tutors' self-efficacy beliefs, perceived collective efficacy, and personal training evaluation were assessed by means of self-report questionnaires. To be able to study the evolution in tutor characteristics over time, tutors' self-efficacy beliefs were measured shortly before the onset of the tutoring period (starting phase) and at the start of theme 3 (closing phase). With regard to tutors' perceived collective efficacy, peer tutors filled out the questionnaire after finalising the work in each discussion theme. Tutors' personal tutor training evaluation was tested immediately after their training. More specifically, a questionnaire survey was conducted in order to collect evaluative information about seven selected aspects of training.

Tutors' efficacy beliefs. Building on a literature review, two existing instruments were selected to develop a new questionnaire to measure self-efficacy beliefs related to the tutor role: the Teachers' Sense of Efficacy Scale (short 12-item form) prescribed by Tschannen-Moran and Woolfolk Hoy (2001), that builds on several versions of the Ohio State Teacher Efficacy Scale (OSTES) and the Teacher Self-Efficacy Scale of Bandura (2001). In order to measure tutors' perceived collective efficacy over time, the group potency scale of Guzzo, Yost, Campbell, and Shea (1993) was used. Further detail on the development of the instruments for assessing tutors' self-efficacy beliefs and their perceived collective efficacy over time and also in relation to the tutor training is reported in the previous chapter.

Tutor training evaluation. Based on the literature on evaluating training in organisations (Cousins & MacDonald, 1998; Galanouli, Murphy, & Gardner, 2004; Kirkpatrick, 1994; Michalski & Cousins, 2000), a 7-item scale was developed to investigate tutors' personal evaluation of training contents ('Training contents were relevant to me') and training strategies ('Training was presented nicely'). Immediately after training, tutors were asked to

indicate to which extent they agreed with the statements on a five point scale (strongly disagree, disagree, neither agree/disagree, agree, strongly agree). Principal Axis Factoring (PAF) with oblique rotation of the data from 57 tutors, resulted in a two-factor model as illustrated in Table 1. The overall instrument reflected an internal consistency of .74. The first factor reflected a Cronbach's alpha of .71; the second factor reflected an internal consistency of .72.

Table 1. Results of the PAF with oblique rotation with regard to tutors' training evaluation (*N*=57)

		Factor 1	Factor 2
Item 1	Training contents have met my preparation needs.	-.10	**.89**
Item 2	Training contents were relevant to me.	**.83**	-.10
Item 3	Training contents have met my expectations.	.45	**.57**
Item 4	I think I will appeal to the training manual during tutoring.	**.54**	.01
Item 5	I found the training interesting.	**.51**	-.01
Item 6	Training was presented nicely.	**.49**	.19
Item 7	The training worked motivating to me.	**.47**	-.05

Results

Descriptive results

With regard to the experimental training conditions, during online group work fourth-year students acting in the role of tutor posted 1527 messages. Tutors in the model/coach condition (*N*=28) submitted 60.57 messages per tutor. Tutors in the multidimensional support condition (*N*=29) posted only 48.50 messages per tutor. Less postings were counted in the closing phase (theme 3 and 4) with an average of 22.43 messages per tutor, as compared to the starting tutoring phase (theme 1 and 2) with an average of 32.11 messages per tutor. Within the 1527 tutor messages, the coders identified 3507 units of meaning: 1891 units resulting from tutors receiving the model/coach training approach and 1616 units from tutors that received the multidimensional support training. With regard to the control condition, the data consisted of 1955 tutor messages and contained 5552 units of meaning.

Impact of training conditions on tutors' patterns of e-moderating

To answer the first research question, peer tutor contributions were classified according to the five levels of e-moderating of Salmon (2000). As can be observed in Figure 1, tutoring behaviour reflects the five levels in Salmons' model, but there are differences in the observed proportions. Tutors trained to present multidimensional support stimulate 'personal development' and 'information-exchange' to a somewhat higher extent. Tutors in the control condition reflect the highest proportion of 'socialisation' and 'knowledge construction' support behaviour.

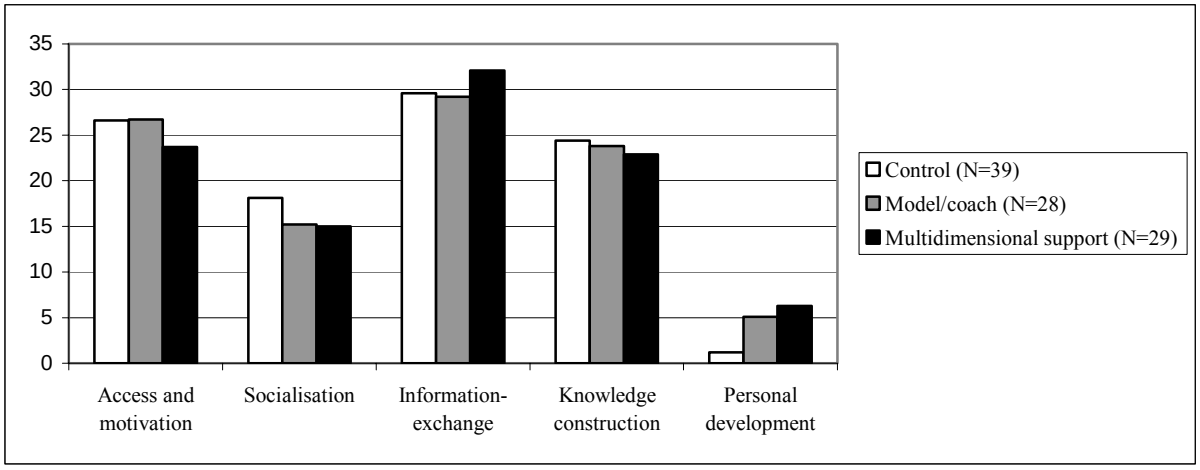

Figure 1. Percentages of the occurrence of the different steps in e-moderation per tutor training condition

In order to explore the impact of the three types of tutor training on patterns in e-moderating, a multinomial logistic regression analysis was performed with multidimensional tutor support as a polytomous dependent variable and the three training conditions as independent variable. Multinomial logistic regression is used when the dependent variable is treated as nominal and consists of more than two categories (Hosmer & Lemeshow, 2000). Table 2 presents the detailed results of the multinomial logistic regressions analysis incorporating the estimated parameters (estimate), the standard error (SE), the Wald statistic (Wald), the p-values (p) of the Wald test, the odds ratio (OR = exp (est)), the inverse odds ratio (OR^{-1} = exp (-est)) in case the odds ratio is smaller than 1, and the 95% confidence interval (CI) for the odds ratio, comprising a lower bound (LB95%CI) and an upper bound (UB95%CI). As to the results, a total of 9064 units of meaning were analysed. The likelihood ratio test confirms an overall significant effect of training type (χ^2 (8) = 162.784, $p < .000$). In other words, the results show that the distinct training conditions predict in a reliable way a different pattern in e-moderating. Since the taxonomical model of Salmon (2000) highlights the sound prevalence of this stage of e-moderating and to be consistent with the previous study, the first level in the dependent variable ('access and motivation') was chosen as reference category. The control condition was selected as reference category for the independent variable.

The findings indicate that the training condition considerably affects the odds of supporting 'access and motivation' compared to the other types of tutor support, except for facilitating 'knowledge construction'. More particularly, it appears that compared to the control condition, the odds of 'socialisation' versus 'access and motivation' are 1.19 times lower for tutors in the model/coach training condition. Moreover, being trained to provide multidimensional support in contrast with being prepared by means of an all-round training is associated with an increase in the odds for facilitating 'information-exchange' versus 'access and motivation' by a factor of 1.22. Additionally, in the control condition the odds of 'personal development' compared to support for 'access and motivation' are 4.18 times lower as compared to the model/coach condition. The same is true for the multidimensional support

condition since in the control condition the odds of supporting 'personal development' versus 'access and motivation' are 5.80 times lower compared to the training condition focusing on multidimensional support.

Table 2. Multinomial logistic regression estimates indicating the differences between the training conditions with regard to the occurrence of the five steps of e-moderating

Phase e-moderating	Training condition	Est.	Std. error	Wald	df	Sig.	OR	OR^{-1}	LB95 %CI	UB95 %CI
Socialisation[a]	Intercept	-.388	.041	88.770	1	.000				
	Model coach	-.177	.085	4.372	1	.037	.838	1.19	.710	.989
	Multi dimension	-.071	.092	.597	1	.440	.931	1.07	.778	1.115
	Control	ref.cat								
Information-exchange[a]	Intercept	.106	.036	8.621	1	.003				
	Model coach	-.017	.071	.057	1	.812	.983	1.02	.855	1.131
	Multi dimension	.198	.076	6.705	1	.010	1.219		1.049	1.416
	Control	ref.cat								
Knowledge construction[a]	Intercept	-.087	.038	5.235	1	.022				
	Model coach	-.029	.075	.146	1	.703	.972	1.03	.839	1.126
	Multi dimension	.052	.082	.402	1	.526	1.053		.897	1.238
	Control	ref.cat								
Personal development[a]	Intercept	-3.080	.125	607.715	1	.000				
	Model coach	1.430	.167	73.321	1	.000	4.180		3.013	5.799
	Multi dimension	1.757	.167	110.157	1	.000	5.795		4.174	8.046
	Control	ref.cat								

[a] The reference category is 'Access and motivation'.

When excluding the control condition from the analyses, and consequently mutually comparing both experimental tutor training approaches, likewise significant differences are found by means of the multinomial logistic regression analysis. Compared to the multidimensional support training condition, the odds of 'information-exchange' and 'access and motivation' are 1.23 times lower for tutors in the model/coach condition. Moreover, being trained to evolve from 'model' to 'coach' in contrast with being prepared for multidimensional support is associated with a decrease in the odds of facilitating 'personal development' versus 'access and motivation' by a factor of 1.46.

Impact of training conditions on tutors' adoption of modelling and coaching behaviour

The second research question focused on the impact of receiving a specific tutor training on tutors' modelling and/or coaching behaviour over time. Studying the descriptive results, tutors receiving the model/coach training perform as much 'modelling' behaviour as coaching behaviour (50.5% versus 49.5%). Conversely, in both the control condition and the

multidimensional support training condition, more coaching behaviour is observed than modelling behaviour. Whereas the model/coach ratio in the control condition appears to be 39.1% versus 60.9%, the differences are less pronounced in the multidimensional support condition (45.4% versus 54.6%).

Binomial logistic regression analysis was further applied in which a subsample of 2500 units of meaning related to the third process dimension in the coding scheme (see De Smet et al., in press) were coded as either modelling or coaching in view of facilitating 'knowledge construction'. The modelling or coaching type of tutor support served as binary dependent variable and the three tutor training conditions as the independent variable in which the control condition was again selected as reference category. The likelihood ratio test confirms an overall significant effect of training condition (χ^2 (2) = 24.294, $p < .000$). In the control tutor training condition, the odds of modelling compared to coaching behaviour are 1.59 times lower than in the model/coach training condition. We found similar results when studying the impact of the multidimensional support training condition. The odds of modelling compared to coaching behaviour are 1.30 times lower in the control condition than in the multidimensional support tutor training condition.

With regard to the evolution over time when looking at the adoption of a 'model' and 'coach' role, next to the three training conditions also the two tutoring phases were further taken into account. A starting and closing tutoring phase was distinguished including respectively 1548 and 952 units of meaning across the three tutor training conditions. When looking at the results of the binomial logistic regression analysis in the starting tutoring phase the likelihood ratio test confirms an overall significant effect of tutor training condition (χ^2 (2) = 22.096, $p < .000$). The odds of adopting modelling behaviour compared to coaching behaviour are 1.78 times higher in the model/coach condition than in the control condition. Additionally, the odds of adopting modelling behaviour versus coaching behaviour are 1.40 times higher in the multidimensional support training condition than in the control condition. In contrast to the starting phase, in the closing tutoring phase the training condition no longer makes a difference with regard to the adoption of modelling or coaching behaviour (χ^2 (2) = 1.608, $p = .448$).

Impact of training conditions on tutor characteristics

With regard to the third research question, statistical analyses were based on the comparison of mean questionnaire scores of tutors in both experimental tutor training conditions. The control condition was not taken into account since the tutor characteristics were not studied in this condition. The tutor characteristics controlled for in this study referred to seven distinct variables involving mean scores per tutor. The first cluster consisting of four variables reflected tutors' self-efficacy beliefs with regard to either fostering a sense of community or knowledge construction in either the starting or closing tutoring phase. A second cluster consisting of two variables reflected tutors' perceived group efficacy during both the starting and closing tutoring phase. One single variable referred to tutors' personal training evaluation.

As explained earlier, self-efficacy beliefs of tutors were tested twice to be able to study evolution over time. Though tutors' overall self-efficacy beliefs are fairly high, tutors reflect a

lower mean score in the concluding tutoring phase (SE_{end} = 1.83). A paired *t*-test reveals that the decrease over time is significant ($p < .001$) on both subscales. Further comparison of tutors' self-efficacy beliefs shortly after training shows that tutors in the multidimensional training reported results significantly higher on the 'knowledge construction' self-efficacy subscale as compared to students in the model/coach training condition. As to the results, an independent *t*-test shows a significant difference between the conditions at the starting tutoring phase ($t = -2.237$, $df = 54$, $p = .029$, two-tailed), effect size = .60.

Secondly, the evolution in tutors' perceived collective efficacy was studied considering the two different training conditions. Perceived collective efficacy is high in both training conditions (between 2.58 and 2.89). An independent *t*-test did therefore not result in significant differences. However, regardless of the tutor training condition tutors' collective efficacy is significantly higher in the closing tutoring phase as compared to the starting phase. A paired *t*-test shows a significant increase over time that was significant at the 5% level ($t = -2.148$, $df = 56$, $p = .036$).

A third tutor characteristic taken into account in this study is the personal training evaluation of individual peer tutors. An independent *t*-test ($t = 2.809$, $df = 49$, $p = .007$) shows an overall significant difference in mean test scores in favour of tutors in the model/coach condition. Looking in further detail at the mean differences for the seven distinct item scores between the training conditions, three items reflect significant differences. Being trained to evolve from 'model' to 'coach' appears to be conditional for reporting a higher mean score on the following items: (1) training contents have met my expectations ($p = .010$), (2) training contents have met my preparation needs ($p = .016$), and (3) training was presented nicely ($p = .018$).

Tutor characteristics controlled for when studying the impact of different tutor training approaches on tutors' patterns in e-moderating and on tutors' modelling or coaching behaviour

The fourth research question can be answered briefly. Multinomial logistic regressions analysing the impact of different tutor training conditions on online peer tutoring behaviour, and controlling for tutor characteristics, did reveal specific results.

Considering patterns in e-moderating behaviour as the dependent variable, a test of the full model with all eight predictors was statistically significant (χ^2 (32) = 54.964, $p < .01$), indicating that the predictors, as a set, reliably distinguished between the types of e-moderating. However, considering the likelihood ratio test (χ^2 (4) = 26.745, $p < .000$) tutors' self-efficacy beliefs associated with fostering a sense of community during the starting tutoring phase seemed to be the only statistically significant predictor among the four self-efficacy covariates. This finding can be explained by the higher mean scores of fourth-year students in the 'model' to 'coach' tutor training condition as compared to the multidimensional support training condition on the self-efficacy subscale that is linked to fostering a sense of community (SE_{start} = 2.73; SE_{end} = 1.90). In addition, when running the full model neither the tutor training condition nor the following tutor characteristics did

predict patterns in e-moderating: perceived collective efficacy during both the starting and closing tutoring phase and personal training evaluation.

Similar binomial logistic regression analyses were performed to predict the binary dependent variable 'adoption of modelling and coaching behaviour'. Again, tutor characteristics are considered to be covariates and tutor training the main independent variable. A test of the full model with all eight predictors was statistically significant (χ^2 (8) = 34.636, p < .000*)*, indicating that the predictors, as a set, reliably distinguished between modelling and coaching. However, when running the full model only the likelihood ratio tests for one single tutor characteristics and the main independent variable demonstrate an overall significant effect on tutors' decision to act as a 'model' or 'coach': perceived collective efficacy during the starting phase (χ^2 (1) = 18.047, p < .000) and tutor training approach (χ^2 (1) = 4.513, p < .05*)*. It is found that the odds of modelling versus coaching are higher in the model/coach training condition as compared to the multidimensional support training condition due to the lower perceived collective efficacy of tutors in the former training condition (CE_{start} = 2.58).

Discussion

Building on the results of earlier research (De Smet et al., 2008; De Smet et al., in press), the main aim of the current study was to study the differential impact of different tutor training approaches on the actual behaviour of cross-age tutors when supporting freshmen in asynchronous discussion groups. Based on the literature (e.g., Brown & Morrissey, 2004; Michalski & Cousins, 2000; Nijman, 2004; Saks, 1995), it was also assumed that the impact of tutor training on behaviour can be predicted by specific tutor characteristics, namely self-efficacy beliefs, perceived collective efficacy, and personal training evaluation. Three distinctive tutor training conditions were developed: a training condition focusing on the adoption of multidimensional support, a training condition focusing on the progression from being a model to serving as a coach, and a control condition typified by all-round information on online facilitation. Two content analysis schemes were developed to determine the nature of tutoring behaviour of peer tutors after receiving a specific training. Logistic regression was applied to study and compare the impact of the different tutor training conditions on the adoption of tutoring behaviour as described in the e-moderating model of Salmon (2000) and on the adoption of modelling and coaching behaviour. Regarding the evolution over time, we distinguished between a starting and closing tutoring phase. Further, self-efficacy beliefs, perceived collective efficacy, and training evaluation were added to the tutor training in order to evaluate this model predicting actual tutoring behaviour.

Considering the first research question, the descriptive results confirm that - independent of the tutor training condition - tutors adopt a varied pattern in the types of tutoring behaviour. This finding is in line with the results from previous studies (De Smet et al., 2008; Salmon, 2000). The peer tutors fulfilled all of the required e-moderators roles: motivator, social supporter, information deliverer, knowledge constructor, and challenger for personal

development. However, exchanging information remains a predominant tutoring behaviour and this in contrast to the limited occurrence of the fifth step in e-moderating, namely eliciting personal development. Nevertheless, on the base of multinomial logistic regression analyses, the different tutor training approaches seem to result in some significant differences in the patterns of e-moderating behaviour. In contrast to participating in an all-round training (control condition), both experimental tutor training conditions are associated with more support for personal development. This implies that the specific tutor training resulted in transfer of training to the actual tutoring setting (Barnard et al., 2001; Kirkpatrick, 1994; Nijman, 2004). The results suggest that both experimental training conditions initiate the adoption of tutoring behaviour that stimulates tutees' personal development. However, further research might reveal more information about this finding. Future studies could, for instance, gain insight in the impact of the separate components (content-focus, pre-service exercises, tutor diary, and stimulated-recall) intrinsic to the experimental training conditions. Additionally, since each discussion theme was based on a body of knowledge which for freshmen was entirely new, further research is needed to explore the interrelationship between the research setting and the outcomes of the condition-specific training guidelines.

The results further show that with regard to tutors' patterns in e-moderating being trained to evolve from model to coach differs from being trained to provide multidimensional tutor support. More specifically, the former training condition is associated with less facilitating 'personal development' and 'information-exchange'. It therefore seems that the latter tutor training condition has the strongest impact on tutors' actual adoption of invitations to critical argumentation.

With respect to the second research question, the results reveal that only during the starting tutoring phase the specific tutor training condition does result in differences in the adoption of modelling or coaching behaviour. Tutors receiving an experimental tutor training reflect a higher proportion of modelling versus coaching behaviour. This increase in modelling support might be linked to a stronger content-focus in these training approaches that explicitly alert tutors to start as a 'model' or to provide multidimensional support. Especially for tutors in the model/coach training condition, the result is consistent with our expectations to find different patterns in modelling and coaching behaviour. These expectations build on the concept of 'transfer of training' as rooted in organisational psychology (Ottoson, 1997). According to Nijman (2004), positive transfer of training is defined as the application in the task environment of the knowledge, skills, and attitudes gained in a training context. Since the differences between the three training conditions with regard to the occurrence of modelling versus coaching behaviour could not be replicated during the closing tutoring phase, further research is needed to explore tutors' underlying motives guiding or inhibiting transfer of training over a longer period of time.

The third research question focused on the impact of the tutor training approaches on tutor characteristics. The descriptive results revealed that at the start of the tutoring activities, online peer tutors already report a high level of self-efficacy beliefs and perceived collective

efficacy. This implies that the tutors reported positive personal beliefs about having the means to learn or perform in an effective way (Ellis & Zimmerman, 2001). Nevertheless, we could not observe significant differences during the starting and the closing tutoring phase that might be linked to the experimental tutor training conditions. Since no data were available about tutor characteristics of tutors in the control condition, it is not clear whether the high self-efficacy test-scores were be due to the differential impact of a specific training condition.

Considering the evolution over time, it was found that tutors' self-efficacy beliefs decreased whereas perceived collective efficacy increased over time. Because efficacy beliefs are presumed to be relatively stable (Tschannen-Moran & Woolfolk Hoy, 2001), more research is needed regarding the factors that might have contributed to the changes in efficacy judgments over time. At first, related to the decrease in tutors' self-efficacy beliefs further research is necessary to find out why peer tutors incline to overrate their future tutoring capacities. Moos and Azevedo (in press) refer in this respect to complex (meta)cognitive processes related to self-regulated learning (SRL). Particularly, the tutoring task which seems to be perceived as relative manageable but not the complex SRL processes needed to meet this task may explain the result that peer tutors' self-efficacy beliefs on average fluctuated, and that they reported the highest level of self-efficacy immediately before participating in the online learning environment. Moreover, inspired by the concept of tutor satisfaction (Fresko, 1996), growing in-depth group processing might account for a positive evolution in tutors' perceived collective efficacy. In this respect, it may be credible that next to the initial tutor training, the perceived collective efficacy is the driving force behind the nature of tutors' contributions. Furthermore, referring to an academic peer tutoring context, Fresko (1996) reported that the most crucial factor directly influencing tutor satisfaction is the extent to which tutors felt they had achieved project goals with their tutees. Moreover, the tutors' subjective assessment of the group interaction and the tutees' academic progress appeared to be a major factor influencing tutor satisfaction.

Building on the broad scope of training literature (Brown & Morrissey, 2004; Frayne & Latham, 1987; Michalski & Cousins, 2000; Saks, 1995), the fourth research question controlled for the impact of tutor characteristics in addition to the two experimental tutor training approaches on online peer tutoring behaviour. As to the results, both tutors' self-efficacy beliefs and perceived collective efficacy seemed important variables predicting the training outcomes in terms of e-moderating and evolution in tutor support. More specifically, in the case of being trained to evolve from model to coach it seems that high self-efficacy beliefs linked to fostering a sense of community predicted a low occurrence of support related to the three highest steps of e-moderating whereas low perceived collective efficacy means predicted a high occurrence of modelling tutoring behaviour. Although further research is needed to validate the extent to which tutors with high self-efficacy outperform tutors with lower self-efficacy regarding their patterns in tutoring behaviour, it appears that our findings in an educational context support those of Brown and Morrissey (2004), acknowledging the mediating impact of self-efficacy beliefs on student's presentation performance shortly after training.

Limitations and further research

This study reflects a number of methodological limitations to be considered in future research.

Given the complex process of behaving as a 'peer' in conjunction with a 'tutor' (Chappell, 1995), the rather moderate internal consistency of the self-efficacy subscale items is an issue requiring further exploration. Future studies, set up in alternative educational settings or knowledge domains, should aim at controlling for the reliability and concurrent validity of the research instruments.

Educational Science students were involved in this study. This was a convenience population since the researchers used participants who were available. Future research should try to replicate the findings involving other and larger online peer tutor populations.

Another suggestion for follow-up research can be made. Quantitative content analysis, logistic regressions, and self-report questionnaires have been used in order to gain insight into tutoring behaviour. However, this approach is limited in acquiring a full understanding of cross-age tutors' supportive activities in view of tutees' knowledge acquisition. Triangulation of data collection should be adopted. In concrete, stimulated-recall interviews (Calderhead, 1981; Lyle, 2003) could be promising to explore the perspectives underlying tutors' contributions, and this in relation to their tutor training and their personal self- and collective efficacy beliefs.

The present research is also limited due to the quasi-experimental design. The tutor training was implemented in a comprehensive way, but tutors' supportive interventions were not scripted. This allowed for a certain degree of freedom of the tutors in how and when to apply specific tutoring guidelines. A more scripted and pre-structured training format might create opportunities for both verifying and improving 'the study of the transfer of training'.

A final issue that needs consideration is related to the nature of the tutor training conditions. In addition to the two experimental training approaches discussed in the present study, a supplementary experimental tutor training could present a blend of both training approaches. Although Michalski and Cousins (2000) pointed at the difficulty of isolating the effects of training in association with specific effectiveness indicators, further research could attempt to control the variation in the training design components as suggested by McDermott et al. (2001): e.g., objectives, intensity, complexity, and in-service versus pre-service training.

Conclusion

The overall results of this study imply that providing peer tutors guidelines by means of a specific training approach is fruitful. The newly developed tutor training conditions seemed helpful to stimulate novice tutors to adopt certain types of online support. The results demonstrated that tutors who were explicitly trained in the need for balanced support, facilitation for 'personal development', and the adoption of modelling prior to coaching behaviour, act up to these instructions in the actual tutoring setting. In addition, tutors in the experimental training conditions generally showed high mean scores on both self-efficacy beliefs and perceived collective efficacy. A practical implication of this study is that a

comprehensive tutor training might be considered as recommendable to improve the quality of tutors' and as a result also tutees' online contributions. Moreover, it can be concluded that the focus and subject matter of a tutor training can determine and stimulate the adoption of certain types of online support. For instance, the preliminary content-focused instructions for peer tutors force them to adopt more balanced support and can be further introduced when blending in peer tutoring with asynchronous discussion groups to support learners' needs in CSCL-environments.

References

Backroad Connections Pty Ltd. (2002). *Effective Online Facilitation* (Version 2.00), Australian Flexible Learning Framework Quick Guides series, Australian National Training Authority.

Bandura, A. (1993). Perceived Self-Efficacy in Cognitive Development and Functioning. *Educational Psychologist, 28,* 117-148.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York: Freeman.

Bandura, A. (2000). Exercise of Human Agency Through Collective Efficacy. *Current Directions in Psychological Science, 9*, 75-78.

Bandura, A. (2001). *Guide for constructing self-efficacy scales (Revised).* Available from Albert Bandura, Stanford University.

Barnard, Y. F., Veldhuis, G. J., & van Rooij, J. (2001). Evaluation in Practice: Identifying factors for improving transfer of training in technical domains. *Studies in Educational Evaluation, 27,* 269-290.

Benbunan-Fich, R., Hiltz, S. R., & Turoff, M. (2002). A comparative content analysis of face-to-face versus asynchronous group decision making. *Decision Support Systems, 34,* 457-469.

Bonk, C. J., Wisher, R. A., & Lee J-Y. (2004). Moderating Learner-Centred E-Learning: Problems and Solutions, Benefits and Implications. In Roberts T.S. (Ed.), *Online Collaborative Learning: Theory and Practice*, 54-85. Hershey: Information Science Publishing.

Brown, T., & Morrissey, L. (2004). The effectiveness of verbal self-guidance as a transfer of training intervention: its impact on presentation performance, self efficacy and anxiety. *Innovations in Education and Teaching International, 41,* 255-269.

Calderhead, J. (1981). Stimulated Recall: A Method for Research on Teaching. *British Journal of Educational Psychology, 51,* 211-217.

Carroll, J. M., & Reese, D. D. (2002). Community Collective Efficacy: Structure and Consequences of Perceived Capacities in the Blacksburg Electronic Village. *Proceedings on the 36th Hawaii International Conference on System Sciences.*

Chappell, V. A. (1995). Theorizing in Practice: Tutor Training "Live, from the VAX Lab". *Computers and Composition, 12,* 227-236.

Chi, M. T. H. (1997). Quantifying Qualitative Analyses of Verbal Data: A Practical Guide. *The Journal of the Learning Sciences, 6,* 271-315.

Cousins, J. B. & MacDonald C. J. (1998). Conceptualizing the successful product development project as a basis for evaluating management training in technology-based companies: a participatory concept mapping application. *Evaluation and Programming Planning, 21*, 333-344.

De Smet, M., Van Keer, H., & Valcke, M. (2008). Blending Asynchronous Discussion Groups and Peer Tutoring in Higher Education: An Exploratory Study of Online Peer Tutoring Behavior. *Computers & Education, 50,* 207-223.

De Smet, M., Van Keer, H., & Valcke, M. (in press). Cross-age peer tutors in asynchronous discussion groups: A study of the evolution in tutor support. *Instructional Science.*

Dewiyanti, S., Brand-Gruwel, S., & Jochems, W. (2005). Applying reflection and moderation in an asynchronous computer-supported collaborative learning environment in campus-based higher education. *British Journal of Educational Technology, 36*, 673-676.

Ellis, D., & Zimmerman, B. J. (2001). Enhancing Self-Monitoring during Self-Regulated Learning of Speech. In H. J. Hartman, *Metacognition in Learning and Instruction. Theory, Research, and Practice.* (pp. 205-228). Dordrecht: Kluwer Academic Press.

Falchikov, N. (2001). *Learning together. Peer tutoring in higher education*. London: Routledge/Falmer.

Frayne, C. A., & Latham, G. F. (1987). The application of social learning theory to employee self-management of attendance. *Journal of Applied Psychology, 72*, 387-392.

Fresko, B. (1996). Effects of Tutor-Tutee Intimacy, Tutoring Conditions, and Tutor Background on College Student Tutor Satisfaction. *Educational Studies, 22,* 147-164.

Galanouli, D., Murphy, C., and Gardner, J. (2004). Teachers' perceptions of the effectiveness of ICT-competence training. *Computers & Education, 43*, 63-79.

Garrison, R. D., Anderson, T., & Archer, W. (2000). Critical Inquiry in a text-based environment: computer conferencing in higher education. *The Internet and Higher Education, 2*, 87-105.

Gautrey, F. (1990). Cross-Age Tutoring in Frankley. *Reading, 24*, 21-27.

Griffin, B. W., & Griffin, M. M. (1998). An Investigation of the Effects of Reciprocal Peer Tutoring on Achievement, Self-Efficacy, and Test Anxiety. *Contemporary Educational Psychology, 23*, 298-311.

Gumpel, T. P., & Frank, R. (1999). An expansion of the peer-tutoring paradigm: Cross-age peer tutoring of social skills among socially rejected boys. *Journal of Applied Behavior Analysis, 32*, 115-118.

Guzzo, R., Yost, P., Campbell, R, & Shea, G. (1993). Potency in groups: Articulating a construct. *British Journal of Social Psychology, 32*, 87-106.

Halpern, D. F. (1998). Teaching Critical Thinking for Transfer Across Domains. Dispositions, Skills, Structure Training, and Metacognitive Monitoring. *American Psychologist, 53,* 449-455.

Hosmer, D. W. Jr., & Lemeshow, S. (2000). *Applied Logistic Regression*. New York: Wiley.

Huberty, C. J. & Davis, E. J. (1998). Evaluation of a state critical thinking skills training program. *Studies in Educational Evaluation, 24*, 45-69.

Jenkins, J. R. & Jenkins, L. M. (1987). Making peer tutoring work. *Educational Leadership, 44*, 64-68.

Jonassen, D. H., Lee, C. B., Yang, C.C., & Laffey, J. M. (2005). The collaboration principle in multimedia learning. In R. E. Mayer (Ed.), *Cambridge Handbook of Multimedia Learning,* pp. 247-270. Cambridge University Press.

Kelchtermans, G. (2000). Telling dreams, a commentary to Newman from a European Context. *International Journal of Educational Research, 33*, 209-211.

Kim, T., Wah, W., & Lee, T. (2007). Asynchronous Electronic Discussion Group: Analysis of Postings and Perception of In-Service Teachers, *Turkish Online Journal of Distance Education, 8,* 33-42.

Kirkpatrick, D. L. (1994). *Evaluating training programs: The four levels.* San Francisco: Berrett-Koehler.

Laurillard, D. (1998). Multimedia and the learner's experience of narrative. *Computers & Education, 31,* 229-242.

Lyle, J. (2003). Stimulated Recall: a report on its use in naturalistic research. *British Educational Research Journal, 29,* 861-878.

Mason, J. (2000). Asking mathematical questions mathematically. *International Journal of Mathematical Education in Science and Technology, 31,* 97-111.

McDermott, J., Beck, D., Buffington, S. T., Annas, J., Supratikto, G., Prenggono, D., Ekonomi, Dra. M. F. Sri, & Achadi, E. (2001). Two models of in-service training to improve midwifery skills: how well do they work? *Journal of Midwifery & Women's Health, 46*, 217-225.

McGrath, D. & Higgins, A. (2006). Implementing and evaluating reflective practice group sessions. *Nurse Education in practice, 6,* 175-181.

McLuckie, J., & Topping, K. J. (2004). Transferable skills for online peer learning. *Assessment & Evaluation in Higher Education, 29*, 563-584.

Michalski, G. M., & Cousins, J. B. (2000). Differences in stakeholder perceptions about training evaluation: A concept mapping/pattern matching investigation. *Evaluation and Program Planning, 23,* 211-230.

Moos, D. C., & Azevedo, R. (in press). Monitoring, planning, and self-efficacy during learning with hypermedia: The impact of conceptual scaffolds. *Computers in Human Behavior.*

Moust, J. H. C., & Schmidt, H. G. (1994). De effectieve tutor: meer dan alleen een vakinhoudelijke deskundige? *Tijdschrift voor Hoger Onderwijs, 2*, 95-114.

Nath L. R., & Ross, S. M. (2001). The Influence of a Peer-Tutoring Training Model for Implementing Cooperative Groupings with Elementary Students. *Educational Technology Research & Development, 49,* 41-56.

Neuendorf, K. A. (2002). *The Content Analysis Guidebook*. Thousand Oaks, CA: Sage Publications.

Nijman, D-J. (2004). *Supporting Transfer of Training. Effects of the Supervisor. Doctoral Dissertation.* Enschede, The Netherlands: University of Twente.

Orpen, C. (1999). The impact of self-efficacy on the effectiveness of employee training. *Journal of Workplace Learning, 11*, 119-122.

Ottoson, J. M. (1997). Beyond Transfer of Training: Using Multiple Lenses to Assess Community Education Programs. *New Directions for Adult and Continuing Education, 75,* 87-96.

Pajares, F. (2004). Psychometric Analysis of Computer Science Help-Seeking Scales. *Educational and Psychological Measurement, 64*, 496-513.

Parr, J. M. & Townsend, M. A. R. (2002). Environments, processes, and mechanisms in peer learning. *International Journal of Educational Research, 37,* 403-423.

Rickard, K. (2004). E-mentoring and pedagogy: a useful nexus for evaluating online mentoring programs for small business? *Mentoring and Tutoring, 12*, 383-401.

Saks, A.M. (1995). Longitudinal field investigation of the moderating and mediating effects of self-efficacy on the relationship between training and newcomer adjustment. *Journal of Applied Psychology, 80,* 211-225.

Salmon, G. (2000). *A model for CMC in education and training. E-moderating. The key to teaching and learning online.* London: Kogan Page.

Schön, D. (1983). *The Reflective Practitioner. How professionals think in action*, London: Temple Smith.

Slavin, R.E. (1996). Research on cooperative learning and achievement: What we know, what we need to know. *Contemporary Educational Psychology*, 21(1), 43-69.

Strijbos, J-W., Martens, R. L., Prins F. J., & Jochems, W. M. G. (2006). Content Analysis: What Are They Talking About? *Computers & Education, 46*, 29-48.

Topping, K. J. (1996). The effectiveness of peer tutoring in further and higher education: A typology and review of the literature. *Higher Education, 32,* 321-345.

Topping, K. J. (1998). The effectiveness of peer tutoring in further and higher education: a typology and review of the literature. In S. Goodlad (ed.), *Mentoring and tutoring by students*. London: Kogan Page.

Tschannen-Moran, M., & Woolfolk Hoy, A. W. (2001). Teacher efficacy: capturing an elusive construct. *Teaching and Teacher Education, 17*, 783-805.

Weinberger, A., Reiserer, M., Ertl, B., Fischer, F., & Mandl, H. (2005). Facilitating collaborative knowledge construction in computer-mediated learning environments with cooperation scripts. In R. Bromme, F. W. Hesse, & H. Spada (Eds.), *Barriers and biases in computer-mediated knowledge communication* (pp. 15-38). Boston: Kluwer.

Chapter 6*

Studying thought processes of online peer tutors through stimulated-recall interviews

Abstract

The present study aims to explore peer tutors' cognitive processes during their support of freshmen engaged in asynchronous discussion groups. Stimulated-recall was applied to study the underlying motives for specific tutoring behaviour in the online discussions and to make tutors' concerns explicit. A grounded theory approach was used to analyse the interview transcripts. A constant comparative analysis of the data resulted in six issues associated with peer tutors' cognitive processing in relation to actual tutoring behaviour: strategy use, timing of intervention, experience with online discussions, evaluation of faculty support, satisfaction with tutor-tutee interaction, and evolution over time. Furthermore, the results point at tutor worries. A major dilemma concerns the persistent problem of deciding when, how exactly, and how frequently to intervene. A second tutor dilemma is associated with the multidimensional tutor role. Thirdly, peer tutors struggle with the fact they are no professionals so not expert in the learning materials.

Introduction

An extensive body of peer tutoring studies documents the impact of introducing peer tutoring programs within a face-to-face context (see e.g., Carroll, 1996; Duran & Monereo, 2005; Topping, 1996; Webb, 1992). However, apart from the recent work of McLuckie and Topping (2004) and De Smet, Van Keer, and Valcke (2008), research into online peer tutoring is relatively scarce. Moreover, in the limited number of studies available, the thought processes underlying the tutor's online facilitation approaches in the actual management of younger peers' learning processes is rarely addressed. The present study aims to fill this research gap by focusing on the thoughts and reflections underlying peer tutors' online facilitation acts. This purpose may assist in controlling the commitment and responsibility on the older peers in the tutoring experience. As it is not common to analyse thought processes by means of a survey or building on questionnaires, qualitative interpretative research is chosen. In line with the work of Bennett and Marsh (2002) on training programs for online tutors, fourth-year university students, who participated in the present study as cross-age tutors, are engaged in stimulated-recall to reflect on their online tutor role. Additionally, this technique is most useful for generating research-based understanding of peer tutors' thoughts on their field

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experiences. Moreover, the information obtained from the interviews can identify elements valuable for the design of future tutor training programs.

Theoretical background

Online facilitation can be described as "the act of managing the learners and the learning through an online medium" (Backroad Connections Pty Ltd, 2002, p. 2). It is frequently referred to as 'online moderation' or 'e-moderating' (Bonk, Wisher, & Lee, 2004; Paulsen, 1995; Salmon, 2000). In online learning this management is usually taken care of by a teacher or a staff tutor. However, e-moderating can be an older peer task as well. In the study of McLuckie and Topping (2004), for example, peer tutors were introduced in an interactive online learning environment to give their peers ongoing content and/or process-related support. This type of collaborative learning, in which "people from similar social groupings who are not professional teachers help each other to learn, and learn themselves by teaching" (Topping, 1996, p. 322), is called peer tutoring. Peer tutoring is further characterised by "specific role taking as at any point someone has the job of tutor while the other(s) are in the role of tutee(s)" (Topping, 1996, p. 322). Within the scope of the present study, the facilitating role performance of cross-age online tutors is of special interest.

A number of researchers acknowledge that online facilitation behaviour is generated by a cognitive activity at the same time that it generates this activity (Darvin, 2006). This point of view stresses the impact of both cognitive activity and context variables on online facilitation behaviour, and therefore, the situated nature of online facilitation (Darvin, 2006; Lave & Wenger, 1991). Within the broad area of research on peer tutoring little empirical evidence is found in view of gaining insight into tutors' cognitive activity when facilitating younger peers' collaborative learning. Although it has been shown that during the actual task of supporting, facilitators learn as they reason (Zohar, Degani, & Vaaknin, 2001), generate instructional explanations, and monitor their own understanding (Chi, Siler, & Jeong, 2004; Topping, 1996; Topping, 2005), the actual thought process of peer tutors' during this practice is rarely studied. In their exploratory study, Solomon and Crowe (2001) aimed at presenting an overview of the perceptions and concerns of peer tutors in a carefully organised face-to-face and problem-based learning program. The results of this study indicated that peer tutors convey a sense of worry and a feeling of responsibility for ensuring that their colleagues addressed the tutorial objectives adequately.

Bennett and Marsh (2002) also made a valuable suggestion after surveying the research literature on being an effective online tutor. During the in-service training that they implemented, the staff tutors were given the opportunity to 'observe' their own online tutor role through online teaching observation and a mentor-facilitated discussion. Involving tutors in self-observation, stimulated-recall interviews, or discussions about the nature and complexity of online facilitation processes fits in with the approaches adopted in 'teacher thinking' and 'teaching practice' research (Udvari-Solner, 1996) as well as research exploring beliefs underlying teachers' actions (Samuelowicz & Bain, 2001; Zohar et al., 2001). In general, a reflective, developmental, and inquiry-oriented view on the teaching practice and

teaching career underlies the broad research field on teacher thinking. In particular, from the mid-1980s, educational researchers began to focus on non-behavioural components of the teaching process, such as (1) teachers' beliefs about classroom, students, school, and learning; (2) teachers' decisions for designing and presenting a teaching activity; (3) teachers' perceptions on classroom teaching affairs; and (4) teachers' roles and their self-images (Kagan, 1995). In their expectancy-value model on motivation, Wigfield and Eccles (2000) stressed that, besides contextual circumstances, cognitive processes, and beliefs affect teaching performance. According to Valcke, Sang, Rots, and Hermans (in press), the feedback loop in the expectancy-value model is of critical importance. The feedback loop illustrates how teachers' teaching performance is part of a persistent interplay with context variables, cognitive processes, and personal beliefs.

In line with the work of Hargreaves and Fullan (1998) and Wigfield and Eccles (2000) on teacher thinking, we assume that it is what tutors think and what tutors do at the level of the online environment that ultimately shapes their kind of tutoring and learning. Within the context of the present study on online peer tutoring behaviour, cognitive processing in relation to actual behaviour takes a central position. In this respect, capturing a portrait of the tutor's thoughts during practice in online discussions may contribute to previous behaviour-oriented studies about online peer tutoring (De Smet et al., 2008; McLuckie & Topping, 2004). The importance of this broader orientation towards tutoring behaviour is stressed in view of the conclusions that might be derived for the improvement of future online peer tutoring practices. Furthermore, a cognitive processing orientation towards tutoring behaviour may allow future tutor trainers to identify and develop solutions to the challenges and paradoxes of authority embodied in peer tutoring (Chappell, 1995; Solomon & Crowe, 2001). From the tutor's learning perspective, requirements for recalling their thoughts may encourage tutors to reflect on their current practice and advance exploration of new perspectives and tutoring strategies (Bennett & Marsh, 2002; Udvari-Solner, 1996). Accordingly, these reflections may offer research-based evidence of the learning of the tutor as suggested in earlier research on peer tutoring (Chi et al., 2004; Topping, 1996; Topping, 2005).

Research objective

In this study we intend to draw a more complete picture of peer tutoring activities. Building on the wide scope of teacher thinking studies (Hargreaves & Fullan, 1998; Kagan, 1995; Samuelowicz & Bain, 2001; Udvari-Solner, 1996; Wigfield & Eccles, 2000; Zohar et al., 2001), this means that context variables and non-behavioural components such as beliefs, decisions, perceptions, and self-concepts tend to be associated with the actual tutoring behaviour. Our study responds to the need to understand the specific gains and reflections accruing from the tutoring process. Uncovering the specific thoughts underlying actual online peer tutoring behaviour is of interest. In particular, a better understanding of peer tutors' thoughts in relation to a specific tutoring context is aimed for. The following objectives directed our research. First, this study aims to identify themes or issues raised by peer tutors

facilitating online discussions. Secondly, we intend to study the concerns of online peer tutors as this might be helpful to direct future tutor training practices.

Method

Participants and setting

The present study was set up during the first semester of the academic year 2006-2007. Fifty-seven fourth-year Educational Science students participated, of which 53 were female and 4 were male, aged between 22 and 25 years. These students were enrolled in a 6-credit educational internship. During this internship they take up the role of peer tutor facilitating asynchronous discussion groups. In view of their online facilitation role, tutors received a specific training which is discussed below. The asynchronous discussion groups were a formal component of the 'Instructional Sciences' 7-credit course, which is part of the first-year bachelor of Educational Sciences' curriculum. In the present study, the general task for the cross-age tutors was supplying support during freshmen's online task-based interaction. More specifically, during 8 weeks the freshmen worked on four successive authentic tasks related to four course themes: behaviourism, cognitivism, constructivism, and higher-order thinking in educational settings. Each assignment lasted two weeks. The tutors worked in 28 tutor pairs (except for one 3-person team), facilitating the same group of 12 to 14 freshmen students throughout all assignments. The co-tutorship format implied tutors took turns. The non-active tutor worked in the background, monitored the interaction, and shared ideas in view of the online facilitation acts.

Procedure

To structure the online facilitation, and to meet basic tutor quality requirements, the following components were built in to the support of all peer tutors: (1) tutor training, (2) stimulated-recall interviews, (3) focus groups, (4) keeping a tutor diary, and (5) writing a personal internship report.

Tutor Training. For the purpose of the present peer tutoring study, combined with a computer-supported collaborative learning (CSCL) environment, peer tutors needed an introduction to the dynamics, skills, and techniques of online facilitating. Hence, a compulsory tutor training was organised during a three hour face-to-face session prior to the actual tutoring. The tutor training format included pre-service practice. At the end of the training, tutors received an in-depth introduction to the CSCL-environment and a website was set up supporting the administrative and logistical issues related to the online facilitation during the next 8 weeks. The tutor training was supplemented by a tutor manual with background information as well.

Stimulated-recall interviews. The individual 57 tutors were involved in two stimulated-recall interviews, which focused on recalling tutors' thought processes prior to and during their tutoring activities. Further information about stimulated-recall is presented below.

Focus groups. In order to supervise tutors' performance and to improve peer tutoring activities through feedback, every two weeks focus groups were organised. These face-to-face

meetings were set up in small groups of approximately ten tutors bringing together tutors from the same tutor training condition.

Keeping a tutor diary. By means of keeping a diary, tutors were required to write down reflections about their activities on a daily basis. More specifically, they were asked to reflect on their position, role, and concrete interventions. An example of what could be expected from the tutors in terms of this diary was made available on the tutor website.

Writing a personal internship report. At the end, tutors were required to write a concise personal internship report consisting mainly of critical reflections about their tutoring activities and the identification of indicators of personal progress (Seale & Cann, 2000).

Data collection and sampling

Lyle (2003) argued that coaching presumes cognitive skills in which thinking and decision-making is paramount. Therefore, studying the nature of online facilitation and especially the cognitive processes underlying the tutoring activities may allow the adoption of qualitative methodological approaches. Lyle (2003) studied sports coaches' cognitive activity and tried "to design an investigation which (a) adopted a holistic approach; (b) used data gathered from a naturalistic setting; (c) engaged with the cognitive system and its interaction with the environment; and (d) addressed the challenge of inferring cognitive organisation from individual and retrospective techniques" (ibid, p. 868). To achieve this goal in the present study, we adopted stimulated-recall. This research method makes it possible to elicit peer tutors' decision-making, beliefs, dilemmas, and goals which are vital to understand what they do in the online discussion group, and why they do so. This approach is also in line with the work of Calderhead (1981) who stated that the identification of teachers' thoughts and decision-making by stimulated-recall, and the reasons they have for acting as they do, could provide essential information in the description of teaching processes in naturalistic research. On top of the methodological perspectives, in the present study tutors were also required to engage in stimulated-recall as an opportunity to reflect on and learn from their online tutor role. Although the stimulated-recall method has been used extensively in classroom-based research about teaching (Dunkin, Welch, Merritt, Phillips, & Craven, 1998; McBride & Bonnette, 1995; Schepens, Aelterman, & Van Keer, 2007; Stoffels, 2005), the use of non-video based approaches that build on both written, asynchronous, and peer communication has yet not been reported in the literature.

The procedure adopted by the researcher in managing the stimulated-recall interviews builds on a series of open-ended questions presented to the tutor immediately after reviewing his tutor contributions in the discussion group. For instance, the interviewer pointed to single online contributions and asked the tutor to remember and report what he/she actually thought just before and during writing this tutoring comment. Another open-ended question asked for the extent to which the tutor intervened deliberately. On average, the stimulated-recall interviews lasted twenty minutes per tutor. To gather information about the validity of the interview procedure, a number of additional questions were asked about the difficulty in reliving the thought processes (i.e., 'were you able to relive what you thought and felt just before and during intervening?'). Since the stimulated-recall technique was also introduced as

a type of 'clinical supervision' (Wallace, 1991, In: Bennett & Marsh, 2002), the interviewer finished the session by inquiring as to whether or not the tutor needed specific faculty help in future tutoring sessions. Furthermore, the researcher added personal comments or memos as an initial written form of reflecting on the data being gathered (Strauss & Corbin, 1990). In general, field notes permit us to make the qualitative research process more explicit.

In order to analyse the interview data, each stimulated-recall interview was audio-taped and a 'purposeful sample' of the recordings was transcribed. Coyne (1997) defines purposeful sampling as "selecting information-rich cases for study in depth" (p. 624). As for Cutcliffe (2000), "purposeful sampling involves the calculated decision to sample a specific locale according to a preconceived but reasonable initial set of dimensions" (p. 1477). In this respect, 45 interviews were chosen for data analyses from a set of 112 interviews (i.e., 28 tutor pairs over four discussion themes). In order to generate rich information on the type of phenomena which needed to be studied (Miles & Huberman, 1994), purposeful sampling was based on gender and discussion theme variables. Transcriptions of the interviews were linked to the four consecutive discussion themes: theme 1=12, theme 2=11, theme 3=10, and theme 4=12.

Data analyses

An in-depth qualitative analysis was carried out in order to map the large variation in topics being raised by online peer tutors in the data. Therefore a grounded theoretical approach was adopted (Glaser & Strauss, 1967; Strauss & Corbin, 1990). Cutcliffe (2000) gives the following description of this analysis approach: "Grounded theory is a theory that will *fit* the situation being researched and *work* when put into use. By *fit* Glaser and Strauss mean that the categories must be readily (not forcibly) applicable to and indicated by the data under study. By *work* they mean that the categories must be meaningfully relevant and be able to explain the behaviour under study" (p. 1477, italics his own).

To support the qualitative analysis, the Atlas.ti 5.2 software tool was used to organise the interviews, compare data, and construct knowledge relating to the topics arising during peer tutors' retrospective talk (Marsh, 2001). The actual coding of the topics implied the adoption of an interpretative and cyclical approach to review the coding categories and the sections studied earlier until a rich final and saturated picture has been developed (Zafeiriou, 2003). This process of attempting to saturate coding categories with case examples in order to support their relevance is often called the 'constant comparative method' (Strauss & Corbin, 1990). To give an example of this method later known as Grounded Theory, our results apply to distinctive issues and dilemmas negotiated by online peer tutors during stimulated-recall. The initial coding resulted in 24 categories identifying a blend of events, strategies, decisions, beliefs, perceptions, attitudes, self-images, feelings, and concerns related to the students' experiences as online peer tutors. Thanks to a closer computer-supported and iterative examination procedure, the 24 categories developed beforehand were once again examined and clustered to form themes. Finally, the open-coding technique (Strauss & Corbin, 1990) illuminated six tutor issues and five tutor challenges, and resulted in a general analytical framework that had theoretical and practical relevance in relation to our research setting.

Results

A qualitative analysis of the tutor interview sample drawing on Grounded Theory revealed specific thoughts of peer tutors during a series of online tutoring activities. In what follows, these reflections are divided into main issues and specific tutor concerns. To illustrate their frequency, the total number of statements referring to and/or exemplifying one specific issue is reported, together with translated fragments of the tutor's disclosure.

Issues raised by tutors

A constant comparative analysis of the data resulted in the identification of six main issues associated with peer tutors' thoughts on their actual online facilitation acts: (1) strategy use, (2) timing of intervention, (3) experience with online discussions, (4) evaluation of faculty support, (5) satisfaction with tutor-tutee interaction, and (6) evolution over time. These distinct thematic issues are outlined in more detail below.

Strategy use

Almost all tutors mentioned that they applied particular tutoring strategies (189 statements). A typical example of a tutoring strategy concerns: giving a compliment to the student prior to making a comment or posing a question. Other strategies frequently mentioned and adopted by the tutors were: modelling how to induce (counter)arguments, how to elicit summaries, and how to promote discussion on a topic; keeping an eye on the structure of the discourse; encouraging students to participate; controlling for understanding; and providing or inviting for examples.

> "Even if they feel uncertain about the accuracy of their contribution, I encourage them to participate."
> "I tend to set deadlines. Therefore, they finish by summarising."
> "I get them to consult and elaborate on other students' contributions to see if their thoughts had been confirmed by other students."

Moreover, when talking about their strategy use, tutors applied a large variety of tutoring metaphors (72 statements) to illustrate personal skills, beliefs, or thoughts associated with their online facilitation role. For instance, a student compared her computer-supported facilitation role with "being on call". One tutor associated his overall peer tutor role with three main tasks of a skipper:

> "Creating enough swell at sea, passing on the helm, and taking over the helm when the ship is threatened to sink."

Timing of intervention

Tutor reactions to the interview questions revealed that they have rigorous reasons that direct a decision to intervene in a discussion at a certain moment. They mention: 'keeping dialogue on track, elaboration on a topic, time or conflict management, indicating content mistakes or

misunderstandings, seizing the chance to build on the input of freshmen, answering questions, and introducing individual experiences or beliefs'.

> "I was thinking that when the discussion seems unclear for me as a tutor, there is a huge chance that this would be the same for the other participants."
> "As there came no answer on that, in my opinion, important question, I decided to elicit the solution myself."
> "Not everyone is intrinsically motivated to participate, so I started with an opening question."
> "I felt some controversy between two levels of theory and practice, so I clarified this issue with an example."

In contrast to decisions to intervene (92 statements), tutors also decided regularly not to jump in (37 statements).

> "I had no reason to complain, thus I thought to wait."
> "They are doing very well, so I decided not to intervene."
> "They took a slow start, but I preferred to let them work things out independently."

Experience with online discussions

Most peer tutors did build on their personal experiences with online discussions (51 statements). They referred explicitly to the weaknesses observed in their earlier experiences: unstructured discussions, low participation levels, limited understanding of individual students, and non-content-related contributions. This resulted in conscious decisions to pay attention to social and organisational support, such as giving compliments, sticking to the planning, and promoting a group decision that is clearly related to the actual completion of the group assignment.

> "I remember it is useful to make and agree to a planning in online discussions."
> "In comparison with my first-year discussion group, it seems that the tutees stick more to the assignment."
> "Coming to the computer class at university to post a message in the discussion group is a barrier for first-year students."

Evaluation of faculty support

The tutors stressed that they were satisfied with their participation in the focus groups that were set up for tutors (21 statements). The majority of the tutors found the peer feedback and the advice they received during the focus group sessions inspiring to solve problems encountered in subsequent tutoring activities and to put new ideas into practice. In addition, many tutors indicated that they could build on faculty support.

> "During the focus groups for tutors, I was initially advised to apply the first three steps of e-moderating. Hence, I geared my tutoring activities to this suggestion."

Satisfaction with tutor-tutee interaction

Many tutors expressed strong feelings of satisfaction when their tutees were participating and negotiating well (47 statements). Especially when they observed that first-year students took into account their contributions, tutors explicitly expressed appreciation. The following example is related to tutees showing meaningful thinking:

> "I do appreciate that this first-year student clearly defends his opinion by means of an elaborated argumentation. I reinforced his behaviour and asked the group whether they agreed or not."

Unfortunately, a minority of tutors reported opposite feelings as well. They found it frustrating and irresponsible of tutees when they ignored the tutor's posted message (18 statements). Those tutors reported this disillusionment especially in relation to the final discussion theme.

Evolution over time

Finally, in the stimulated-recall sessions, the tutors also mentioned issues related to changes in their thoughts over time. Since both tutors and tutees got more experienced in dealing with the online learning environment, some tutors felt somewhat superfluous during the later stages of the tutoring period. Other tutors were better able to deal with this evolution in the online discussions. They effaced themselves partly, invested more time in observing the ongoing discourse, and intervened only occasionally during the final discussions.

> "I neither made the threaded structure nor the planning myself. At this time, I am sure they can do it themselves."

At that moment, they especially tried to stimulate critical thinking about the learning content and the group assignments. Many tutors stated that they found it difficult to enter catching and appropriate thinking questions. At the end of the tutoring period, many tutors reported a better understanding of group dynamics, expressed a satisfactory feeling of belonging to a 'community', and reported a development in their reflective abilities.

> "In this final discussion theme, there is a reduced distance between me and the tutees. The interactions are less formal as well".
> "Both the level of self-motivation and discussion ability are higher".

As a result, many tutors engaged in self-assessment and asked tutees for feedback about their personal tutoring approach. With respect to tutees' perceived evolution over time (12 statements), tutors noted that the majority of the first-year students demonstrated sufficient technical skills to participate in the learning environments. Furthermore, the growth in unprompted tutee interaction with the tutor was appreciated. Finally, a gradual decline in the amount of meaningful tutee postings over time led some tutors to consider issues related to becoming tired, bored, and stressed, possibly connected to the demanding agenda of tutees.

"Compared to the beginning, they made less of an effort to get down to the bottom of a case."

Tutor concerns

In what follows, we present findings concerning the worries and dilemmas that emerged in 45 interviews with peer tutors recalling the thought process underlying their tutoring approach in asynchronous discussion groups. Since 158 excerpts were coded as 'tutor dilemma', tensions and feelings of uncertainty seem to be inherent to the induction period into online peer tutoring. Moreover, we focused on tutors' concerns as a way of better understanding relevant interventions and topics that may be useful for future training of online cross-age tutors. Five worries presented during the stimulated-recall interviews which should be further understood and better managed: (1) nature of intervention, (2) text-based interaction, (3) timing of intervention, (4) amount of intervention, and (5) novice versus expert tutor role.

Nature of intervention

One of the key concerns refers to the idea that the tutor role is often limited to encouraging interaction between students. Even though the tutors knew they were expected to stimulate 'personal development' while e-moderating (Salmon, 2000), the tutors in our study expressed concern about both the complexity and lack of time preventing them from inviting tutees' critical thinking on the learning materials. More specifically, many tutors reported that the four two-weekly discussion assignments were rather extensive which made it difficult for them to ask the freshmen extra critical thinking questions as suggested in the preliminary training. This tutor concern led to thoughts of avoiding overloading the tutees when doing their best to complete the assignment on time. Hence, the necessary time for negotiating and completing the new body of knowledge in each group assignment must be considered in more detail.

"I asked a critical question and assured them that I did not intend to overburden someone."

Text-based interaction

Another worry that demands consideration is related to how peer tutors approach their role in an online environment. In particular, this tutor dilemma involves the implications of written communication in CSCL, without face-to-face contact. Since this apprehension may be connected to the search for language adequacy and articulation within an electronic format, many tutors have doubts about how and when to intervene in order to facilitate purposively, concisely, and clearly. Being misinterpreted appears to be a major tutor concern as tutors are scared to discourage their tutees' enthusiasm to participate in the discussion, even when they contribute in a vague or far-fetched manner.

"It is my ambition to write in an as 'operant' way as possible, I mean, so that they can value my contribution. I prefer to intervene in a formal and concrete way to let them build on my input."

Timing of intervention

The third challenge concerns the tutors' worries associated with the multidimensional facilitating role in asynchronous discussion forums. Dependent on the task execution of the group, their knowledge construction, and their collaborative effectiveness, tutors can be situated in a context-specific role. For instance, the peer tutors in the present study preferred not to jump in, make a comment, ask another question, or redirect the discourse when observing the discussion as progressing well. Conversely, in cases of misunderstanding or content mistakes, some tutors expressed a similar concern associated with the decision to intervene or not. More specifically, one tutor refers to the implications of making the decision to wait before redirecting the discourse as follows:

> "In my opinion, giving my tutees the time to make and uncover content mistakes entails the diminishment of their time to discuss the right things."

Amount of tutor intervention

A fourth dilemma, partially related to the previous one, indicates the amount and frequency of postings necessary to call tutees' task-based interaction a 'good' discussion. A few tutors argued, regarding the input of both themselves and tutees', that:

> "Quantity is not intrinsic to quality, quite the contrary!"

However, the overriding concern for the fourth-year students as they embarked upon the online tutoring process was whether they posted enough, not enough, or too much to bring or keep a meaningful discussion on track. Accordingly, in the early stages of their online facilitation practice, a few tutors expressed 'feeling of guilt' when considering to keep some time in the background. On the contrary, it appears that some tutors started by putting their own role in the learning environment into question:

> "I did not want to be regarded as pedantic."
> "From the beginning, I did not want to be regarded as teacher-like."

Novice versus expert tutor role

The final tutor concern is related to peer tutors being a facilitator but not an expert in the learning materials they are expected to deal with. Tutors' focus of concern also includes a strong feeling of responsibility for tutees' learning and understanding in view of their exam. The following example provides evidence of the content-related uncertainty in peer tutors' reports.

> "What if I add something wrong? I am not sure that my answer is right as I find the assignments quite difficult."

Discussion

The present study intended to explore the thoughts underlying the online facilitation acts of cross-age tutors in discussion groups. All tutors in this study were challenged by the demands of an online facilitation internship in higher education. From a set of 112 interviews, 45 interviews were chosen for data analyses. During a series of online tutoring activities, certain issues and concerns emerged that were of particular interest. The results indicate that there is more to learn when investigating tutors' online tutoring processes in relation to their underlying thoughts. Previous quantitative research in a similar academic context (De Smet et al., 2008) already showed that peer tutors predominantly instantiated organisational and social support such as monitoring participation, providing technical help, and reinforcing good discussion behaviour. In the present study, non-video stimulated-recall interviews generated tutor thoughts suggesting that the aforementioned result was not coincidental. The main points that arose from these interviews are summarised and discussed below.

Qualitative analysis of the tutor interviews revealed thoughtful and reflective attitudes. Regarding the validity of the stimulated-recall technique, the results of the present study are in line with previous research on teachers' interactive cognitions during teaching practice (Schepens, Aelterman, & Van Keer, 2007). More specifically, the present study suggests that a transcript-based stimulated-recall technique can call on tutors' working memory when facilitating online, as was the case for teachers in a face-to-face context.

With regard to the first research question, the results of the interview analyses indicated six main issues. Initially, tutor reactions to the interview questions showed that online peer tutors have tutee-oriented reasons directing their decision to intervene in the discussion at a certain moment. The tutors' reasoning behind their decision not to intervene highlighted two arguments that are frequently found in the research literature. These arguments are based on social-constructivist principles: 'not doing what they can do themselves' (Vygotsky, 1978) and 'leaving the discussion largely alone when there is good progress' (Mazzolini & Maddison, 2007). Many tutors further mentioned that they apply particular tutoring strategies when building an individual and deliberate relationship with their tutees. In line with the work of Sobral (2006), this finding suggests that there is a great variation among peer tutors regarding personal goal-setting, frequency, and breadth of online tutoring activity. Notwithstanding these differences, it appeared that fourth-year tutors have at least two things in common. First, many tutors felt that both their good and bad experiences with online discussions are inspirational for acting in the role of an understanding and responsible cross-age tutor. Secondly, the in-service focus groups for tutors were perceived as a useful procedure to share experiences and to offer numerous ideas for improvements on one's tutoring performance.

With respect to the second research question, a prominent dilemma component in the online tutoring processes was revealed. This confirms the general conclusions of Chappell (1995) acknowledging that being a peer tutor is a complex process, especially with regard to acting in the role of 'peer' in conjunction with 'tutor'. In the current study, many tutor concerns are related to the continuous problem of deciding when and how to intervene due to

a complex tutorial context that is simultaneously computer-supported, asynchronous, collaborative, cross-age, and task-based. Although there is clearly more research to be carried out, early indications suggested the following tutor concerns. At first it seemed that peer tutors agree with Bennett and Marsh's (2002) idea that new information and communication technologies (ICT) have a considerable impact on the way in which people teach and learn. More specifically, connected to the online learning environment, being misinterpreted through written communication appears to be a main tutor concern as tutors are scared of discouraging tutees' enthusiasm to participate in the discussion when they contribute in a vague or far-fetched manner. A second tutor dilemma is associated with the multidimensional, and therefore context-specific, facilitating role in asynchronous discussion forums (Mazzolini & Maddison, 2007; Salmon, 2000). Even though they knew that they were trained to stimulate 'personal development' next to providing organisational and social support, a number of tutors in our study expressed two context-related problems inhibiting transfer of training (Ottoson, 1997; Saks, 1995). According to Ottoson (1997), transferability or perceived similarity between training and work environments assumes that "the context to which a skill transfers is one that supports or can accommodate the skill" (p. 89). In the present study, it appeared that both a lack of time and the complexity involved prevented our tutors from actually encouraging tutees' 'personal development' on the subject matter in the tutoring environment. These specific concerns about when and how to facilitate thinking skills are also consistent with the difficulties mentioned in previous research on teachers fostering critical thinking with a group of at-risk students in a face-to-face classroom setting (McBride & Bonnette, 1995). The result is further in line with one of the concerns of trade union tutors involved in text-based online teaching (Bennett & Marsh, 2002). A third and final major tutor concern is connected to the fact that peer tutoring involves tutors as facilitators, but not as experts in the learning materials they are expected to deal with. This result supports previous findings of Rourke and Anderson (2002) stating that a common anxiety about asking peers to assume the instructor role is their lack of content knowledge. Nevertheless, as pointed out by Topping (1996), peer tutoring typically has high focus on curriculum content. Paying extra attention to tutors' content knowledge in the preliminary tutor training might therefore assist them in their novice facilitator role. Other practical improvements can be made to the tutor training; for example, more information could be made available on the learning materials to be managed in the discussion group. In addition, examples of both 'good' collaboration and 'good' tutoring or facilitation practice within a CSCL-environment should be distributed for consideration by online peer tutors.

Notwithstanding the experienced dilemmas, time pressure, and the heavy workload, almost all peer tutors involved in this study remained task-focused and motivated, persisting in their role even when some of their tutees seemed relatively discouraged at the end of the project. This responsible attitude of peer tutors corroborates the findings of Solomon and Crowe (2001) indicating that peer tutors convey a sense of worry and a feeling of responsibility for ensuring that their tutees addressed the tutorial objectives adequately. In general, during recalling their thoughts, the tutors demonstrated evidence of being active and

self-regulated facilitators intending to bear in mind the internship as a meaningful learning experience for both themselves as tutors and for the freshman tutees.

Limitations and further research

The findings of this study, namely the thoughts and dilemmas associated with online facilitation, can be considered and adopted with their implications in the design of future online peer tutoring contexts. Moreover, tutors' input can be inspirational to the design and development of an adapted preliminary tutor training by higher institution educators. However, more empirical research is needed to confirm our findings. Future researchers might wish to understand the distinct as well as cumulative effects of task, training approach, group, and/or individual student variables on tutors' thoughts prior to and during performance. A number of factors which are not within the researcher's control could have influenced our resulting data. For example, it is feasible that the peer tutors enrolled for this study vary on tutor-specific characteristics such as writing maturity, experience with group assignments, and/or perceptions on academic internship affairs.

Another critical issue is related to the non-video stimulated-recall method as an element of a tutor training. Although the peer tutors reported that they were able to retrieve thoughts and decisions through stimulated recall on their text-based interventions in discussion groups, validating the degree of accuracy is very difficult as it seemed likely that they have brought a sense of semantic order to their verbal responses (Lyle, 2003). This methodological constraint was also recognised by Calderhead (1981) who argued that the stimulated-recall procedure and its explicit instructions prior to the task may encourage participants to place a greater degree of post-hoc rationality upon their behaviour. Hence, we agree with researchers pointing to the small distinction between the 'recall of an event' and the 'reflection on an event' (Gass, 2001, In: Lyle, 2003). The support for tutors, as adopted in the current study, can however be criticized in view of this consideration. More specifically, whereas the focus groups for tutors, tutors' diary, and tutors' personal internship report aim at reflection on being an online peer tutor, the stimulated-recall interviews aim at recalling the event of being an online peer tutor. In future research, it would be recommended to distinguish between reflective and recalling internship goals in order to avoid interference. At the same time, it would be recommended to glance through the many different reasons for introducing stimulated-recall in education and educational research.

Since the present study is subject of a larger comparative study, it is further advisable to pursue methodological and data triangulation (Tashakkori & Teddlie, 1998) using both qualitative and quantitative data and techniques. The stimulated-recall interview data reveal in-depth information about the thoughts and doubts of peer tutors prior to and during intervening in the online discussions, while quantitative research based on survey findings and/or content analysis could provide a knowledge base about the nature of tutor support. This idea follows the burgeoning interest in educational research utilizing mixed methods (Tashakkori & Teddlie, 2003).

A final limitation of the present study is once again related to the reliability and validity issue in qualitative interpretative research. In our opinion, it would be interesting to give the results back to the peer tutors in order to enhance the validity of our findings. By allowing them to read the researchers' interpretations related to the topics that arose during their retrospective talk, as a next step the participants could be given the opportunity to express more thoughts in order to refine the results.

References

Backroad Connections Pty Ltd. (2002). *Effective Online Facilitation* (Version 2.00), Australian Flexible Learning Framework Quick Guides series, Australian National Training Authority.

Bennett, S., & Marsh, D. (2002). Are we expecting online tutors to run before they can walk? *Innovations in Education and Teaching International, 39*, 14-20.

Bonk, C. J., Wisher, R. A., & Lee, J. Y. (2004). Moderating Learner-Centred E-Learning: Problems and Solutions, Benefits and Implications. In T. S. Roberts (Ed.), *Online Collaborative Learning: Theory and Practice*, 54-85. Hershey: Information Science Publishing.

Calderhead, J. (1981). Stimulated Recall: A Method for Research on Teaching. *British Journal of Educational Psychology, 51,* 211-217.

Carroll, M. (1996). Peer Tutoring: Can Medical Students Teach Biochemistry? *Biochemical Education, 24*, 13-15.

Chappell, V. A. (1995). Theorizing in Practice: Tutor Training "Live, from the VAX Lab". *Computers and Composition, 12,* 227-236.

Chi, M. T. H., Siler, S. A., & Jeong, H. (2004). Can tutors monitor their students' understanding accurately? *Cognition and Instruction, 22*, 363-387.

Coyne, I. T. (1997). Sampling in qualitative research. Purposeful and theoretical sampling: merging or clear boundaries? *Journal of Advanced Nursing, 26,* 623-630.

Cutcliffe, J. R. (2000). Methodological issues in grounded theory. *Journal of Advanced Nursing, 31,* 1476-1484.

Darvin, J. (2006). "Real-world cognition doesn't end when the bell rings": Literacy instruction strategies derived from situated cognition research. *Journal of Adolescent & Adult Literacy, 50*, 10-18.

De Smet, M., Van Keer, H., & Valcke, M. (2008). Blending Asynchronous Discussion Groups and Peer Tutoring in Higher Education: An Exploratory Study of Online Peer Tutoring Behaviour. *Computers & Education, 50,* 207-223.

Dunkin, M. J., Welch, A., Merritt, R., Phillips, R., & Craven, R. (1998). Teachers' Explanations of classroom events: Knowledge and beliefs about teaching civics and citizenship. *Teaching and Teacher Education, 14*, 141-151.

Duran, D., & Monereo, C. (2005). Styles and sequences of cooperative interaction in fixed and reciprocal peer tutoring. *Learning and Instruction, 15*, 179-199.

Glaser, B. J., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research.* New York: Aldine de Gruyter.

Hargreaves, A., & Fullan, M. (1998). *What's Worth Fighting for Out There.* New York: Teachers' College Press.

Kagan, D. M. (1995). Research on teacher cognition. In A. C. Ornstein (Ed.), *Teaching: Theory into Practice.* Boston: Ally and Bacon.

Lave, J., & Wenger, E. (1991). *Situated Learning: Legitimate peripheral participation.* Cambridge: Cambridge University Press.

Lyle, J. (2003). Stimulated Recall: A report on its use in naturalistic research. *British Educational Research Journal, 29,* 861-878.

Marsh, E. (2001). Atlas.ti, The Knowledge Workbench. *Library & Information Science Research, 23*, 93-102.

Mazzolini, M., & Maddison, S. (2007). When to jump in: The role of the instructor in online discussions forums. *Computers & Education, 49*, 193-213.

McBride, R., & Bonnette, R. (1995). Teacher and at-risk students' cognitions during open-ended activities: Structuring the learning environment for critical thinking. *Teaching and Teacher Education, 11*, 373-388.

McLuckie, J., & Topping, K. J. (2004). Transferable skills for online peer learning. *Assessment & Evaluation in Higher Education, 29*, 563-584.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis. An expanded sourcebook.* Thousand Oaks: Sage Publications.

Ottoson, J. M. (1997). Beyond Transfer of Training: Using Multiple Lenses to Assess Community Education Programs. *New Directions for Adult and Continuing Education, 75,* 87-96.

Paulsen, M. F. (1995). Moderating Educational Computer Conferences, In Z. L. Berge and M. P. Collins (Eds.), *Computer-mediated Communication and the On-line Classroom in Distance Education.* Cresskill, NJ: Hampton Press.

Rourke, L., & Anderson, T. (2002). Using Peer Teams to Lead Online Discussions. *Journal of Interactive Media in Education, 1,* 1-21.

Saks, A. M. (1995). Longitudinal field investigation of the moderating and mediating effects of self-efficacy on the relationship between training and newcomer adjustment. *Journal of Applied Psychology, 80,* 211-225.

Salmon, G. (2000). *A model for CMC in education and training. E-moderating. The key to teaching and learning online.* London: Kogan Page.

Samuelowicz, K. & Bain, J. D. (2001). Revisiting academics' beliefs about teaching and learning. *Higher Education, 41*, 299-235.

Schepens, A., Aelterman, A., & Van Keer, H. (2007). Studying learning processes of student teachers with stimulated recall interviews through changes in interactive cognitions. *Teaching and Teacher Education, 23,* 457-472.

Seale, J. K., & Cann, A. J. (2000). Reflection on-line or off-line: The role of learning technologies in encouraging students to reflect. *Computers & Education, 34*, 309-320.

Sobral, D. (2006). Influences on choice of surgery as a career: A study of consecutive cohorts in a medical school. *Medical Education, 40*, 522-529.

Solomon, P., & Crowe, J. (2001). Perceptions of student peer tutors in a problem-based learning programme. *Medical Education, 23, 2,* 181-186.

Stoffels, N. T. (2005). 'Sir, on what page is the answer?' Exploring teacher decision-making during complex curriculum change, with specific reference to the use of learner support material. *International Journal of Educational Development, 25,* 531-546.

Strauss, A., & Corbin, J. (1990). *Basics of Qualitative Research. Grounded Theory, Procedures, and Techniques.* Sage Publications.

Tashakkori, A., & Teddlie, C. (1998). *Mixed methodology: Combining qualitative and quantitative approaches.* Thousand Oaks: Sage Publications.

Tashakorri, A., & Teddlie, C. (2003). *Handbook of mixed methods in social & behavioral research*. Thousand Oaks: Sage Publications.

Topping, K. J. (1996). The effectiveness of peer tutoring in further and higher education: A typology and review of the literature. *Higher Education, 32*, 321-345.

Topping, K. J. (2005). Trends in Peer Learning. *Educational Psychology, 25*, 631-645.

Udvari-Solner, A. (1996). Examining Teacher Thinking. *Remedial & Special Education, 17*, 245-255.

Valcke, M., Sang, G., Rots, I., & Hermans, R. (in press). Taking prospective teachers' beliefs into account in teacher education. In E. Baker, B. McGaw, and P. Peterson (Eds.), *International Encyclopedia of Education*, 3rd edition, pp. xxx-yyy. Oxford: Elsevier.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Webb, N. M. (1992). Testing a theoretical model of student interaction and learning in small groups. In R. Hertz-Lazarowitz and N. Miller (Eds.), *Interaction in cooperative groups*. Cambridge: Cambridge University Press.

Wigfield, A., & Eccles, J. S. (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology, 25*, 68-81.

Zafeiriou, G. (2003). Managing conflict and reaching consensus in text-based computer conferencing: The students' perspective. *Education for Information, 21*, 97-111.

Zohar, A., Degani, A., & Vaaknin, E. (2001). Teachers' beliefs about low-achieving students and higher order thinking. *Teaching and Teacher Education, 17*, 469-485.

Chapter 7
General Discussion

In this general discussion, we reflect at a more general level on the theoretical base, the research design and methodology, and the results of the studies presented in this dissertation. We start this chapter by reiterating the central focus and the research objectives pursued with this dissertation. Next, we summarise the most important results, structured along the seven research questions outlined in the introductory chapter. This is the base for an in-depth discussion of these findings and introduces additional reflections about the limitations of the studies, directions for future research, and the implications of the research findings.

Research focus of this dissertation

The focus of the present dissertation is on the nature of peer tutor support in task-based online discussion groups in higher education. This focal point is in line with the outcomes of earlier research about the need for support in computer-supported collaborative learning since it has clearly been stated that grouping students for CSCL does not necessarily lead to effective interaction and the co-construction of knowledge (Dillenbourg, 2002; Kreijns, Kirschner, & Jochems, 2003; Teasley, 1995). Within the scope of this research, online peer tutoring was introduced in order to enhance student collaboration and promote meaningful discussion patterns. Especially in university education, learning conversations will often concern abstract knowledge which cannot be experienced directly but only through the descriptions of others, making learning essentially a mediated phenomenon (Laurillard, 1993). As stated by Verba (1998), peer tutoring is one way of making an active and social constructivist contribution to knowledge acquisition. Many pedagogical advantages have been attributed to the concept of peer tutoring in the research literature. According to McLuckie and Topping (2004), the immediate feedback given by a student tutor has a real motivating effect and whereas the tutee-tutor ratio is much reduced the time on task increases (Topping, 1996). When staff tutors should be involved instead of peer tutors, students may feel less free to speculate about the problem-at-hand and to explain subject matters to each other (Moust & Schmidt, 1994). Furthermore, the student who acts as a peer tutor has the opportunity of integrating the experience of a learner on the course with the experience of a teacher in the instructional system (Sobral, 2002). In this respect, learning by tutoring, which is related to the development of student tutors' cognitive and transferable skills, tends to be the primary objective of peer tutoring (Topping, 1996; McLuckie & Topping, 2004).

On the basis of the research literature on challenges and limitations in the area of peer tutoring, the present dissertation documented the cross-age tutor role in online peer tutoring (Dolmans, Gijselaers, Moust, De Grave, Wolfhagen, & Van Der Vleuten, 2002; Falchikov, 2001; Kassab, Abu-Hijleh, Al-Shboul, & Hamdy, 2005; Solomon & Crowe, 2001; Stromso, Grottum, & Lycke, 2004). Although there is ample descriptive literature about the different roles, tasks, and responsibilities of peer tutors (McLuckie & Topping, 2004; Neville, 1999),

there are hardly studies that examine the nature of peer tutoring behaviour. Taking into account this research gap, we focused in the different studies presented in this dissertation not only on the actual analysis of text-based peer tutoring behaviour by e.g., identifying tutor styles, but also on a variety of underlying processes and variables within the tutor and in the tutoring context that help to explain and predict this particular tutoring behaviour. Building on Riva (2001, p. 217), we agree that "the most effective way of clarifying the meaning of messages is to relate them to a shared context".

To structure this variety in processes and variables influencing the nature and amount of tutoring behaviour, the expectancy-value model on motivation was rephrased in terms of peer tutor instead of teacher-related determinants (Wigfield & Eccles, 2000). This particular framework allowed us to represent and structure the variables and processes influencing the types and amount of tutoring behaviour taken into account throughout this dissertation: tutor training, time, tutor thought processes, self-efficacy beliefs, perceived collective efficacy, and personal training evaluation. The rephrased model was depicted in Figure 2 in Chapter 1.

Based on the idea that tutor training can affect and improve particular skills of trainees (Jenkins & Jenkins, 1987; Huberty & Davis, 1998), the notion of scaffolding (Bruner, 1986), and Vygotsky's theoretical concept of the zone of proximal development (Samaras & Gismondi, 1998), two factors were identified in the external context that are expected to influence internal processes and subsequent online tutoring behaviour: the nature of the tutor training and the specific point in time (cfr. discussion theme or tutoring phase) when we consider and analyse tutoring behaviour. The model also points at a number of internal – cognitive and motivational – variables and processes that are considered to affect tutoring behaviour. We studied thoughts of tutors during and prior to contributing to the discussions (Chappell, 1995; Kassab et al., 2005; Solomon & Crowe, 2001). Secondly, we studied a variety of motivational variables at an individual level, such as self-efficacy beliefs, perceived collective efficacy, and personal training evaluation (Bandura, 1993; Michalski & Cousins, 2000; Pajares, 2004; Pata, Sarapuu, & Lehtinen, 2005).

The tutoring behaviour that is expected to be influenced by the external context and the cognitive and motivational processes was also studied in a specific way. The nature of tutoring behaviour is studied on the base of the e-moderating model of Salmon (2000). This is helpful to define types of tutoring behaviour and the extent to which they are being adopted by tutors. Second, the extent to which the tutors intervene in the online discussions is measured. In line with the empirical research of Hakkarainen and Lipponen (1998), we also studied the occurrence of certain tutor styles which refer to the tutor-dependent way tutors adopt tutoring behaviour. The notion of a "style" introduces a discussion about the consistency of particular patterns in tutoring behaviour.

Overview of the research objectives, research questions and the related results

In Chapter 1, we presented four objectives arising from a review of relevant earlier research in the field of peer tutoring and CSCL: (1) exploring the amount and types of tutoring behaviour that characterise online peer tutoring activities in higher education; (2) investigating the

relationship between online peer tutoring behaviour and contextual elements; (3) investigating the relationship between online peer tutoring behaviour, contextual circumstances and internal tutor characteristics; and (4) identifying a broad spectrum of peer tutor thoughts underlying the actual adoption of online peer tutoring behaviour. These objectives are studied through seven research questions:

> (OBJ1, RQ1) Which types of support do cross-age peer tutors actually adopt in asynchronous discussion groups, and therefore, to what degree can online peer tutoring behaviour be regarded as multidimensional?
> (OBJ1, RQ2) To what degree can online peer tutoring behaviour be regarded as tutor-dependent; thus reflecting a tutor style?
> (OBJ2, RQ3) To what degree can the types and amount of online peer tutoring behaviour be regarded as differing and evolving over time?
> (OBJ2, RQ4) What is the impact of different tutor training approaches on the types and amount of online peer tutoring behaviour?
> (OBJ3, RQ5) To what degree do tutors assigned to a specific tutor training differ with regard to their self-efficacy beliefs, perceived collective efficacy, and personal training evaluation over time?
> (OBJ3, RQ6) To what degree do tutor characteristics (e.g., self-efficacy beliefs, perceived collective efficacy, and personal training evaluation) predict the impact of different tutor training approaches on online peer tutoring behaviour?
> (OBJ4, RQ7) What is the nature of tutor thoughts during their tutoring activities?

In the five preceding chapters, the aforementioned objectives and related research questions have been tackled, reported, and discussed. Figure 1 gives a schematic representation of the variables and the hypothetical relations between them as they appear in the research questions included in this dissertation. First, we integrate the results from the different studies and relate the findings to the seven research questions. In a subsequent section, these results are discussed against the theoretical background of the studies as elaborated in Chapter 1. The results throughout this dissertation support online peer tutoring behaviour being mutually dependent on contextual circumstances and motivational components (Dolmans et al., 2002; Kassab et al., 2005; Wigfield & Eccles, 2000).

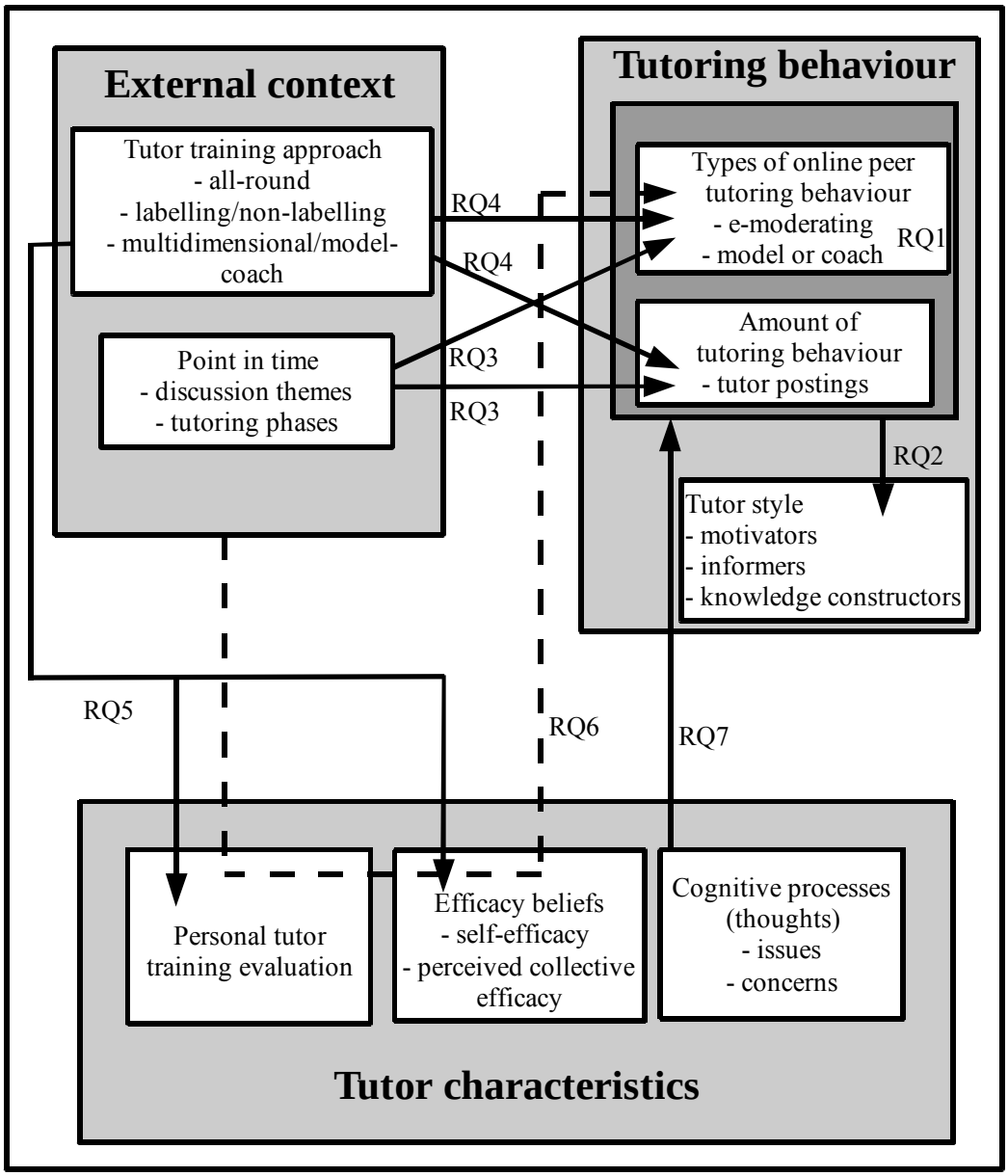

Figure 1. Variables and research questions studied throughout this dissertation

(RQ1) *Which types of support do cross-age peer tutors actually adopt in asynchronous discussion groups, and therefore, to what degree can online peer tutoring behaviour be regarded as multidimensional?*

This research question is primarily related to how peer tutoring behaviour can be measured and analysed in asynchronous discussion groups. The Chapters 2, 3, 4, and 5 each deal with quantitative content analysis, a research technique to analyse communication acts in discussion transcripts.

In the Chapters 2, 4, and 5, we applied a more elaborated version of the five-step model for e-moderating of Salmon (2000) to measure and analyse the nature of online peer tutoring behaviour. This taxonomical model distinguishes five different levels that coincide with recommended e-moderator functions (Salmon, 2000): (1) access and motivation, (2) socialisation, (3) information-exchange, (4) knowledge construction, and (5) personal

development. In the Chapters 3 and 5, a second coding scheme was developed, inspired by the interaction analysis models of Garrison, Anderson, and Archer (2000) and Weinberger and Fischer (2006). These models are related to learning and teaching in a computer-supported learning environment and build on a social constructivist theoretical background. Hence, our newly developed instrument focuses on four process dimensions, namely tutors' (1) social and organisational support in the learning community, (2) domain-specific support with regard to the learning contents and group assignments, (3) modelling or inviting (coaching) for knowledge construction, and (4) off-task behaviour. Following Moust and Schmidt (1994), explicit prompts, such as providing examples, were categorised as modelling behaviour while indirect prompts or invitations to contribute to the discussion were categorised as coaching behaviour.

Based on the results of the content analyses, some clear results could be presented. From the descriptive results it appears that cross-age peer tutors in this particular higher education setting perform a blend of tutoring activities, with a slight predominance of giving additional information, clarifying the learning task, and planning activities. In terms of Salmon (2000), these activities reflect the third step of e-moderating, namely 'information-exchange'. Peer tutors rarely stimulate for tutees' personal development, the fifth and highest step of e-moderating. In terms of the second content analysis scheme based on the model of Garrison et al. (2000) and Weinberger and Fisher (2006), we can conclude that tutors primarily focus on organisational and social support such as monitoring participation, providing technical help, and reinforcing good discussion behaviour.

The results on the different types of tutoring activities are also helpful to study whether online peer tutoring behaviour can be regarded as a multidimensional activity. The data show that very different e-moderating activities are being adopted during the tutoring activities and over time: from fostering access and motivation, over encouraging socialisation, information-exchange, and knowledge construction, to stimulating personal development. This illustrates the broad variety of tutoring dimensions that can be found in the e-moderating model of Salmon (2000). This is confirmed by the results reported in Chapter 3 that show how tutors vary between social and organisational support, domain-specific support, knowledge construction support, and off-task behaviour. Moreover, it has been shown that tutors alternate group support with individual support and modelling behaviour with coaching behaviour.

(RQ2) *To what degree can online peer tutoring behaviour be regarded as tutor-dependent; thus reflecting a tutor style?*

This research question asks whether tutors develop a personal tutor style when facilitating the interaction and learning processes of first-year students in asynchronous discussion groups. In Chapter 2, this particular question is answered by studying the number of the different tutoring activities - distinguished in the model of Salmon – being adopted by individual tutors. To identify tutor styles, hierarchical cluster analysis is carried out. In addition, we checked whether tutor styles are consistent over time and can therefore be considered as tutor-dependent instead of dependent on the nature of the specific tutoring activity and/or group of students to be tutored. The latter analysis is based on a k-means cluster analysis. The

clustering method resulted in the identification of three tutor styles: 'motivators', 'informers', and 'knowledge constructors'. The results of both cluster analysis methods point out that most tutors adopt the second tutor style, which is mainly characterised by information-exchange. In the three tutor styles we also hardly observe tutor contributions that stimulate personal development. With regard to the results of the analysis to study the adoption of tutor styles over time, we centred the analysis on a comparison of personal tutor styles at the start, in the middle and at the end of the tutoring period lasting 12 weeks. The results point out that only 5% of the tutors consistently adopt the same tutor style. Next, 65% of the tutors switch twice in tutor style and 30% switch three times in tutor style. These results suggest that tutor styles are adopted in a relatively consistent, but not completely consistent way.

(RQ3) *To what degree can the types and amount of online peer tutoring behaviour be regarded as differing and evolving over time?*
This third research question is strongly interrelated with the first one since we explore whether the timing in adopting a certain type of tutor support is of importance. Earlier research suggests that the evolution of tutoring behaviour over time is influenced by individual tutee characteristics and by contextual circumstances such as task and group characteristics (Dolmans et al., 2002; Johnson & Johnson, 1996; Kassab et al., 2005; Roscoe & Chi, in press; Schellens & Valcke, 2005).

In Chapter 2, it is hypothesised that peer tutor contributions evolve over time from introductory and social talk to contributions reflecting cognitive processing. The results of a univariate analysis of variance however force us to reject this hypothesis. It is rather revealed that each new discussion theme required a new mixture of all types of peer tutor support as distinguished in the e-moderating model of Salmon (2000). The results further reveal that the highest number of messages is posted during the second discussion theme. Afterwards, there is a gradual decrease in the average number of tutor contributions.

In Chapter 3, we examined again the evolution in types of support by looking at the evolution from modelling behaviour to coaching behaviour, and from addressing individual students versus addressing the group as a whole. Multinomial logistic regressions indicated that tutor interventions do not evolve from talk elucidating the learning environment through support for the learning contents to contributions stimulating tutees' knowledge construction. Furthermore, although the number of tutor postings considerably decreases over time an upward trend in modelling behaviour is found, resulting in more attention being paid to modelling compared to coaching during the final tutoring phase. In addition, the results also point out that tutors continuously prefer to address the group during their tutoring interventions.

(RQ4) *What is the impact of different tutor training approaches on the types and amount of online peer tutoring behaviour?*
Chapter 4 and 5 both concentrate on the impact of different tutor training approaches. The view that various types of training could affect and improve behaviour builds on research endorsing different pre-service training approaches to improve particular skills of trainees

(Huberty & Davis, 1998; McDermott, Beck, Buffington, Annas, Supratikto, Prenggono et al., 2001; Nath & Ross, 2001).

In Chapter 4, cross-age tutors are randomly assigned to one of the three tutor training conditions. The first tutor training is the labelling experimental condition, in which tutors are required - after going through an introduction about the variety of tutoring interventions they can adopt - to label their tutor interventions according to the e-moderating model of Salmon (2000). The second tutor training involves the non-labelling experimental condition, where tutors are not asked to label their contributions, but received an introduction to the variety of tutoring interventions they can adopt, building on the model of Salmon (2000). The third tutor training is the control condition, in which tutors only received some general information about tutoring.

During the starting tutoring phase a considerably higher amount of messages is posted in the labelling condition compared to the non-labelling condition. Multinomial logistic regressions are further applied to check whether the three different tutor training conditions resulted in significant differences in e-moderating activities of the tutors. The analysis results point out that tutors easily adopt labelling activities, but that their labelling is not always accurate. Nevertheless, the labelling activity, in combination with the extensive tutor training proved to result in a more balanced variety in the types of tutoring activities. The descriptive results also indicate that tutors in the labelling condition reflect a higher proportion of e-moderating interventions stimulating personal development. The results of this study are used to redesign the tutor training approach in the next research cycle.

Therefore, in Chapter 5, three new training conditions are distinguished: (1) the multidimensional support condition, characterised by stimulating tutors to adopt a wide variety of tutoring activities; (2) the model/coach condition, encouraging tutors to evolve from model to coach; and (3) a control condition in which tutors only received some general information about tutoring. Two consecutive content analyses are performed to analyse the tutoring behaviour: a first analysis is based on the model of Salmon (2000) and a second is based on the approach of Garrison et al. (2000) and Moust and Schmidt (1994) centring among other things on the extent to which modelling and/or coaching behaviour is observed over time. Multinomial logistic regressions are applied to study the differential impact of the three different tutor training conditions. The descriptive results confirm that - independent of the tutor training condition - tutors adopt a varied e-moderating pattern. The results also show that being trained to provide multidimensional tutor support results in a larger proportion of tutor interventions referring to information-exchange as compared to being rather all-round trained. Furthermore, compared to the control condition tutors in the model/coach condition pay less attention to online socialisation. Finally, all tutors receiving an experimental tutor training reflect a higher proportion of stimulating for personal development, and modelling versus coaching behaviour in comparison with the control condition.

(RQ5) *To what degree do tutors assigned to a specific tutor training differ with regard to their self-efficacy beliefs, perceived collective efficacy, and personal training evaluation over time?*

This research question focuses on a better understanding of individual tutor characteristics of peer tutors. First, tutor characteristics are expected to be related to the nature of the preliminary tutor training they received (Brown & Morrissey, 2004). Secondly (see also RQ7), tutor characteristics are expected to predict tutors' actual tutoring behaviour (Bandura, 1993; Frayne & Latham, 1987; Michalski & Cousins, 2000; Nijman, 2004; Pajares, 2004; Saks, 1995). A variety of individual tutor characteristics is measured: self-efficacy beliefs, perceived collective efficacy, and personal training evaluation. Only the experimental tutor training conditions are taken into account since the tutor characteristics were not yet studied in the control condition.

In Chapter 4, the findings show that tutors' self-efficacy beliefs are high but no differences are found between tutors receiving a labelling or a non-labelling tutor training condition. Furthermore, significant differences in perceived collective efficacy are observed between tutors in the two experimental training conditions at the start of the tutoring activities. Tutors in the labelling condition at that time experience a lower level of perceived collective efficacy. Personal training evaluation is not studied in Chapter 4.

In Chapter 5, comparison of tutors' self-efficacy beliefs shortly after the initial training shows that tutors in the multidimensional training report a significantly higher level of self-efficacy with regard to fostering knowledge construction as compared to students in the model/coach training condition. Perceived collective efficacy is high in both experimental tutor training conditions. Tutors trained to provide multidimensional support do not show a higher or lower average perceived collective efficacy compared to tutors trained to evolve from model to coach. A third tutor characteristic taken into account in this study is the personal training evaluation of individual peer tutors. Peer tutors trained to evolve from model to coach reported that training contents have positively met their expectations and preparation needs. Moreover, compared to being trained for providing multidimensional support they considered their model/coach training significantly more nicely presented.

(RQ6) *To what degree do tutor characteristics predict the impact of different tutor training approaches on online peer tutoring behaviour?*

In Chapter 5, we studied the impact of tutor characteristics (e.g., self-efficacy beliefs, perceived collective efficacy, and personal training evaluation) on the nature and amount of different tutoring activities. In addition, we took the nature of the initial tutor training into account.

The results reveal that both tutors self-efficacy beliefs and perceived collective efficacy seem important variables to predict tutor training outcomes in terms of e-moderating and evolution in tutor support. More specifically, in the case of being trained to evolve from 'model' to 'coach' it seems that high self-efficacy beliefs linked to fostering a sense of community predicted a low occurrence of support related to the three highest steps of e-

moderating. In contrast, a low perceived collective efficacy predicted a high occurrence of modelling tutoring behaviour.

(RQ7) *What is the nature of tutor thoughts during their tutoring activities?*
Our schematic representation of the variables included in this dissertation, structured by Wigfield and Eccles (2000), points at the importance of underlying cognitive processes influencing motivational processes and resulting in tutoring behaviour (see Figure 2 in Chapter 1). Considering the fact that these cognitive processes have hardly been researched in the literature, Chapter 6 centred on the exploration of tutor thoughts during tutoring activities. Stimulated-recall interviews were applied to study the underlying argumentations that are related to specific tutoring behaviour in the online discussions. Tutors could also make their concerns more explicit about the tutoring activities. A qualitative grounded theory approach was adopted to analyse the data in the interview transcripts. A comparative analysis of the data resulted in the identification of six main issues associated with online tutoring activities: (1) strategy use, (2) timing of intervention, (3) experience with online discussions, (4) evaluation of faculty support, (5) satisfaction with tutor-tutee interaction, and (6) evolution over time. In general, the results mirror the fact that tutors intervene in the discussions on the base of a motivated and reflective attitude. Tutor cognitive reflections also show that online peer tutors consider specific tutee-related reasons to direct decisions as to intervening in the discussions at a certain moment. In addition, the results point at a number of important tutor concerns. A major dilemma concerns the persistent problem of deciding when, how exactly, and how frequently to intervene. A second tutor dilemma is associated with the multidimensional tutor role in online discussion forums. Thirdly, peer tutors struggle with the fact they are not professionals; thus not a content expert.

General discussion

The research results, summarised above, resulted from different studies that were set up in a consecutive way. This implies that the successive studies did take into account the findings of the earlier study. This explains why a number of research questions reappear, and are studied again. For different tutor training approaches similar research questions were considered, such as studying the impact of specific tutor training on tutoring behaviour. This also explains why the number and type of variables/processes being studied in the initial studies was smaller as compared to the set of variables/processes taken into account in the final studies. In addition, this also explains why the research questions build on one another. For instance, the tutor training is modified and improved on the base of the two earlier studies on the types of online tutoring behaviour over time. Considering the former observation, we will therefore not discuss the results of the studies independent from one another, but in an integrated way and building on the related research questions.

Step 1: Exploring the nature of online peer tutoring behaviour over time

Although the research results point at the adoption of a wide variety of tutoring activities and the fact that the tutoring behaviour can be qualified as multidimensional, the results also clearly illustrate that some types of e-moderating activities are neglected or overemphasised and that the multidimensional nature of support is not present in a balanced way. The results throughout this dissertation study in a text-based online learning environment, namely asynchronous discussion groups, more specifically show that the main focus for online peer tutors was on work organisation related topics such as participation and planning, but an almost equal amount of attention was given to technical support in order to facilitate for knowledge construction in a later step. Less attention was directed to off-task interventions and very little on calling for reflection, elaboration, and playing devil's advocate.

More literature corroborating these findings indicates that both technical support to get online, social presence, and planning behaviour are of continuous importance to foster knowledge construction and reflective thinking in a CSCL-setting (Billett, 1996; Garrison et al., 2000; Hammond, 2000; Salmon, 2000; Schellens & Valcke, 2005). Apparently, tutors adopt a certain amount of organisational and social postings to initiate and ground the rest of the online discussion. The low occurrence of tutor contributions facilitating high-level collaboration that involves reflection could be explained by the complexity of the new subject matter that had to be processed by the tutees (Benammar, 2006; Seale & Cann, 2000). In addition, time pressure and tutors' actual or perceived lack of mastery of the subject content to be discussed and facilitated on a high level, could also have affected the results. Also Dolmans et al., (2002), Kim and Chae (2005), and Groves, Régio, and O'Rourke (2005) reported clear differences in tutoring behaviour when comparing expert versus non-expert tutors. It can be concluded that content expertise seems to result in a more directive role on the part of the tutors and in fewer student-student interactions (Dolmans et al., 2002; Neville, 1999). In Chapter 6, time pressure and the issue of content expertise were repeatedly found in the concerns expressed by tutors during the stimulated-recall interviews. Providing feedback to one's peer without possessing a high level of content expertise is known to be difficult and time demanding (Dochy et al., 1999; Topping, Smith, Swanson, & Elliott, 2000). From the tutors' viewpoint, it seems that both the rather high task complexity and the limited discussion time per group assignment (two weeks) did actually affect the types of tutoring. These two variables (time pressure and lack of tutor mastery of the subject matter) could be studied and/or controlled for in future research. In the directions for future research below, some recommendations are presented that centre on the nature of the group assignments by adding more structure to these tasks. In addition, we will link this to the types of tutoring behaviour.

The study of differences in actual tutoring behaviour, as elaborated in Chapter 2, showed that the nature of tutor contributions did not change dramatically over time as there was no significant evolution from introductory and social talk to contributions reflecting cognitive processing. The results in Chapter 3 pointed into the same direction as tutor interventions did not evolve from talk elucidating the learning environment through support for the learning contents to contributions stimulating tutees' knowledge construction. The fact that the group assignment in each consecutive discussion theme was completely new and not linked to a

former assignment could have provoked this result. Tutees and tutors had to start each new discussion theme and discussion period from scratch. This is comparable to what Schellens (2004) concluded in her study about the impact of CSCL on knowledge construction. She found that at the end of having discussed various group assignments, students did not communicate at a higher level of knowledge construction; she also related this finding to the nature of the consecutive new discussion assignments. An alternative approach could build on discussion themes that evolve from one discussion period to the other and to study how this affects the nature of peer tutoring.

Although it could be concluded that online peer tutors adopt a mixture of tutoring behaviour over time, social constructivist principles and concepts derived from problem-based learning (PBL) assume that the scaffolding and tutoring should be a process in which assistance is faded out (Brown, Collins, & Duguid, 1989; Bruner, 1986; Mason, 2000; Moust & Schmidt, 1994; Vygotsky, 1978). In Chapter 3, this expectation about fading out was rephrased in terms of tutoring related processes, such as peer tutors have to consider the zone of proximal development of their younger tutees. Bearing in mind the recommendations on the tutor role in PBL, namely evolving from model to coach (Moust & Schmidt, 1994), it was striking to state that in our research peer tutors did not evolve from modelling high-quality discussion behaviour to eliciting this type of behaviour in their tutees, also qualified as coaching. In fact, instead of a decrease, an increase in modelling behaviour was found over time, being even predominant during the third and final tutoring phase. We link this finding to time pressure and the problems of tutees to master the new learning content, related to each discussion. Consistent with the review of Neville (1999) on the PBL tutor, at this time, we interpret tutor directedness as a time-efficiency strategy. Moreover, it is likely that the content expertise of the tutors has grown over time and has therefore lead to more directive or modelling tutor activities, as recently proposed by Dolmans et al. (2002). Sobral (2002) found evidence that peer tutors expand their academic expertise with the growing tutoring experience. The study in Chapter 3 also indicated that the result of peer tutors preferring to start as a coach could point at an area of tension between the tutor's objectives in relation to the preliminary tutor training and the demands of the tutees to receive more explicit support and modelling at the start of each discussion period. In the preliminary tutor training it was clearly recommended that the ultimate goal of introducing peer tutors is that this assistance eventually can be faded out or taken away when the tutees are competent enough to discuss spontaneously, which is without the additional support of a peer tutor. This might have suggested tutors to strive after tutoring behaviour that was actually beyond tutees' needs and the required kind of tutoring at hand. In the coaching literature this is referred to as the 'demand effect' (Grant, 2003). Tagg and Dickinson (1994) found that it was difficult to identify a specific pattern in tutor activities, save that the tutor responded diligently to each contributor. On top of the tutor training and the running discussion theme, the needs of the learner seem to define the nature and amount of the tutoring. As stated by Pilkington (2004, p. 163), "it is important to meet students where they are at and not where we want or expect them to be if we are aiming to effectively facilitate online discussions". In future research, extra attention should therefore be paid to the interaction process between tutor and tutees and

to the evolution in the tutor-tutee relationship. This is in line with the empirical work of Roscoe and Chi (in press) who state that more research is needed to explore to what extent and how the tutees influence the tutoring process.

Both Chapter 2 and 3 support Dolmans' and colleagues (2002) position that tutoring behaviour is situation-specific. However, the individual differences in tutor participation and their differences in choices for specific tutoring activities do indicate that tutoring behaviour is not completely defined by contextual variables. The results suggest that the choices might also depend on an individual and a relatively consistent tutor style. This finding fits in with empirical research recognising learning and teaching styles as individual, consistent, and measurable (Hakkarainen & Lipponen, 1998; Fahy & Ally, 2005; Grasha, 2002; Kolb, 1993). On the other hand, our findings confirm the notion of a relatively consistent instead of completely consistent tutor style as 70% of the peer tutors holds on to their cluster in at least two tutoring phases. In this respect, it is yet not clear to what extent we might consider a tutor's style as an individual tutor characteristic. So far, a tutor style is not integrated as such in our research (see Figure 1). Future research should first accept or reject the assumption about the consistency of particular patterns in one's tutoring behaviour. In Chapter 2, the following tutor styles were distinguished: 'motivators', 'informers', and 'knowledge constructors'. Most tutors adopted the second tutor style, which is mainly characterised by giving additional information, clarifying the learning task, and planning activities. Rose, Moore, VanLehn, and Allbritton (2001) use in this context the concept "Didactic tutoring style", which reflects a strong emphasis on lecturing on the tutor's part, in contrast to a more "Socratic tutoring style". The results confirm that both the quantity and quality of tutoring behaviour might be influenced by a certain tutor style. This is in line with the empirical research of Pata et al. (2005) distinguishing a passive scaffolding cluster in which process and content scaffolding was performed less frequently than in the active scaffolding cluster. The results can also be framed in research arguing that tutoring is a complex umbrella process, influenced by behaviour, personality, and motivational aspects (Chappell, 1995; Lentell, 2003; Wood & Wood, 1996). In future research, we should study more in detail tutor styles in relation to personal beliefs about, for instance, the own peer tutor role. It could be interesting to distinguish between 'motivators', 'informers', and 'knowledge constructors' with regard to their constituent beliefs about teaching and learning in online discussion groups. The results of the qualitative research in Chapter 6 are also helpful to give directions for future research. For instance it could be interesting to compare tutor styles in relation to the adoption of specific combinations of tutoring activities such as intertwining invitations for critical reflection with positive social comments. Since the results make clear that tutors have difficulties in adopting the full scale of possible tutoring activities, an alternative approach can be adopted as well. Is it reasonable and possible to expect that the full range of tutoring activities can be provided by a single tutor? Charlier, Daele, Cheffert, Peeters, and Lusalusa (1999) and Macdonald, Weller, and Mason (2000) suggest to split up tutor roles between subject-related support and learner support.

Step 2: Developing online peer tutoring behaviour through specific tutor training

Within the context of this dissertation, peer tutors were trained to facilitate the interaction of less experienced peers in an online discussion environment. Chapter 4 and 5 elaborated on the impact of different tutor training approaches. These approaches were based on literature about pre-service teacher education and in-service tutor applications. Experimental tutor training approaches were introduced to improve the tutor activities and, in a subsequent step, tutees' activities. Content and pedagogy are closely intertwined; how and what instructors teach influences how and what students learn (Bereiter, 2002). The differential impact of the tutor training approaches is considered as contextual determinants of tutoring behaviour. The results of the studies reported in Chapter 2 and 3 indicate that peer tutors were predominantly engaged in social support, while less attention was paid to promoting co-construction of knowledge and personal development (Salmon, 2000). Moreover, tutor activities did not evolve from explicit tutor-centred modelling behaviour, to indirect prompts and a tutee-centred coaching behaviour (Mason, 2000; Moust & Schmidt, 1994). These results inspired consecutive research, including an alternative tutor training approach to enhance the adoption of more balanced tutoring activities.

Different tutor training approaches resulted in significant differences tutor activities (Salmon, 2000). To give an example, it was shown that stimulating tutees' collaboration in view of reaching personal development was successful for tutors in the labelling training condition (see Chapter 4) and for tutors prepared for giving multidimensional support (see Chapter 5). These findings suggest that a specific tutor training and pre-structuring the actual tutoring behaviour determine the adoption of specific types of specific support activities. In the context of this discussion it is important to clearly reiterate the nature of the experimental tutor training condition based on labelling. This tutor training did not only influence the tutors before their actual tutoring activity. The training also affected largely the nature of the tutoring activities due to the explicit invitation to label each tutoring intervention. The positive impact of this extra dimension can be compared to the beneficial impact of the scripting and structuring approaches that have been introduced to foster the quality of the online discussions of tutees. For instance, discussion groups where roles are assigned can work efficiently, smoothly, and productively (Cohen, 1994). Accordingly, De Wever, Van Winckel, and Valcke (in press) conclude that assigning roles is a promising structuring tool to enhance social knowledge construction in asynchronous discussion groups. Other scripts present detailed guidelines or work plans to the collaborating learners (Weinberger, Reiserer, Ertl, Fisher, & Mandl, 2005).

However, some remarks have to be repeated regarding the tutor training context. First, in both studies the tutors did not differ to a large extent with respect to their tutor activities. Second, our interest was not whether or not tutor training affected online peer tutoring behaviour, but whether different training approaches have a differential in affecting tutoring behaviour. All tutors were trained in one way or another, there was no control group without tutor training. Third, we agree with Michalski and Cousins (2000) that educational researchers must be aware of the difficulties in isolating effects of training interventions. It is important to repeat that not all variables playing a potential role in the tutoring and tutor training context

could be controlled for since the research was set up in an ecologically valid learning context. Furthermore, the research results do not allow to draw conclusions about the distinct as well as cumulative effects of the pre-service and in-service tutor training elements (Huberty & Davis, 1998). To give an example, the focus groups that were intertwined with the actual tutoring activities were not studied in detail nor contrasted with the preliminary tutor training. Also other variables could play a role, reflecting again the thematic differences in the group assignments tackled in each discussion group. Additional research methodologies should in this context be adopted. Tutors might be interviewed to analyse their experiences with training condition components. Fourth, even when a specific tutor training was found to have a differential impact on the types of and the multidimensional balance in tutoring activities, a number of related implications were not studied. It would be interesting to investigate the extent to which the specific tutoring activities resulted in differences in (1) the level of discussion activity, (2) the length of discussion threads, and (3) tutees' actual engagement in reflective dialogue. In the research, reported in Chapter 6, some tutors stated that most of the tutees appreciated in particular 'devil's advocate' postings. Also, both tutors and tutees perceived reflective thinking to be an indicator of mental effort. Similar observations are reported in the empirical research of Roscoe and Chi (in press) on the influence of the tutee in learning by peer tutoring. Nevertheless, it is to be repeated that the studies in the present dissertation did - explicitly - not focus on the impact of tutoring on tutee behaviour, their processing activities and/or their academic performance.

With regard to the peer tutors' acting as a model versus a coach, the results in Chapter 5 revealed that a specific tutor training condition did only result in differences in the adoption of modelling or coaching behaviour at the start of the tutoring period. Tutors receiving an experimental tutor training reflected a higher proportion of modelling versus coaching behaviour. The further differential impact of the tutor training conditions remained limited in the consecutive tutoring phases. We could not magnify the differential impact of various tutor training approaches. These results are less positive as compared to those reported by other authors studying learning and transfer effects of different training approaches (Berttram, 1980; Rodrigues, Bu, & Min, 2000). Apparently, of overriding importance is that online peer tutors are somehow prepared and supported to perform this tutor task (Falchikov, 2001; Jenkins & Jenkins, 1987; Parr & Townsend, 2002; Topping, 1996). As to our results, we can point at the short duration of the training on the one hand and the overall restricted period tutors had to tutor their tutees. Maybe this time line was too short to be able to observe significant changes in tutoring activities. Recently, also Wang (in press) pointed at the importance of the variable time in moderating online discussions. The available research evidence about online peer tutoring has thus far neglected the critical importance of the time variable. More attention should be paid to this in future studies.

Step 3: Investigating the impact of tutor characteristics

A third cluster of research questions was related to the study of tutor characteristics that were expected to affect tutoring behaviour. In this dissertation, tutor characteristics were especially related to cognitive and motivational processes. It can be questioned why we limited our

study to these specific characteristics. An alternative direction would have focused on e.g., demographical variables of tutors, such as gender. In this context, Clegg, Trayhum, and Johnson (2004) found significant differences in the nature of tutoring by male and female tutors. Female tutors tended to adopt more easily a coaching attitude and attracted a higher attendance rate of tutees.

The present research built on the theoretical assumption that next to contextual circumstances individual motivational factors are important variables to consider when studying behaviour (Bandura, 1993; Tschannen-Moran & Woolfolk Hoy, 2001; Wigfield & Eccles, 2000). The significant results of the two quantitative studies reported in Chapter 4 and 5 revealed that motivational variables such as self-efficacy and perceived collective efficacy were indeed relevant to consider in relation to the alternative tutor training approaches, the discussion theme, and the nature of the actual tutoring activities. The results were however less clear as those related to context-specific factors affecting tutoring behaviour. Consequently, they definitely need further consideration.

First, further reflection is needed about the finding that online peer tutors, assigned to the labelling training condition, experience a lower level of perceived collective efficacy as compared to tutors who were not required to label their interventions along the five-step model of Salmon (2000). Because of the labelling, tutors might consider in more detail how well or bad tutees work together; thus affecting their perceived collective efficacy. This result confirms the assumption that labelling helps students and/or facilitators becoming more critical thinkers (De Bono, 1991). Moreover, this finding supports the idea that self-monitoring processes result in a stronger focus and enhanced (meta)cognitive awareness (Ellis & Zimmerman, 2001). However, as we can imagine that the obligation to label the tutoring interventions invokes extraneous cognitive load in tutors (Dillenbourg, 2002; Kirschner, 2002; Tuovinen & Sweller, 1999), we argued in Chapter 4 that tutors may need more preparation and experience in labelling. Next to labelling, also self-assessment, peer assessment, and group assessment remain tools with a strong potential to enhance performance and stimulate reflection (Falchikov & Boud, 1989; Nicolay, 2002; Wenzel, 2007). As indicated by Dochy, Segers, and Sluijsmans (1999), such forms of assessment have much to offer to higher education.

Second, more research and/or a clear theoretical basis is needed regarding the factors contributing to the high levels of self-efficacy and perceived collective efficacy test, observed in both studies. In addition, since efficacy beliefs are presumed to be fairly stable (Tschannen-Moran & Woolfolk Hoy, 2001), further research is necessary to explain and find out the main variables influencing the decrease in online peer tutors' self-efficacy beliefs over time and the increase in their perceived collective efficacy. As proposed by Moos and Azevedo (in press), the relative manageable tutoring task and not the complex self-regulated learning processes needed to meet this task with hypermedia may explain the result that peer tutors' self-efficacy beliefs on average fluctuated, and that they reported the highest level of self-efficacy immediately before participating in the online learning environment. Furthermore, Crippen and Earl (2007) pointed out that the inclusion of worked examples and self-explanations helps to reduce cognitive load and to increase self-efficacy. O'Donnell, Dansereau, and Hall (2004),

reduced cognitive load and heightened self-efficacy by providing knowledge maps to learners. According to Brown and Morrissey (2004), verbal self-guidance enhances self-efficacy. Griffin and Griffin (1998) suggested that practice activities such as reciprocal peer tutoring could lead to higher feelings of self-efficacy. Bandura (2000) suggested that perceived collective efficacy should be very likely affected by the quality of communication in group interaction. Sosik, Avolio, Kahai, and Jung (1998) found that transformational leadership positively influences group potency. At last, Wang and Lin (2007) pointed at the potential impact of group composition on self-efficacy and collective efficacy.

Third, in the present study, the cognitive and motivational processes have been studied as independent variables and mediating the impact of alternative training procedures. This approach is acceptable when we look at the nature of the relationships between these variables in Figure 2 in Chapter 1. On the other hand, referring to Wigfield and Eccles (2000) and Valcke, Sang, Rots, and Hermans (in press) our schematic representation of the variables influencing tutoring behaviour also suggests a reciprocal relationship and a feedback loop. This suggests that the actual tutoring activities also influence the cognitive and motivational processes.

Further considerations on the aforementioned results might raise potentially important variables affecting online peer tutoring behaviour. In this dissertation, some variables to be corrected for in future were already suggested: extraneous cognitive load; task complexity and task structure; prior knowledge on the learning materials; tutor training design components (e.g., duration, objectives, complexity, intensity); discussion period; writing maturity; experience with and attitude towards group assignments, computer-supported collaborative learning, academic internship affairs, et cetera. Yet, we are aware of the fact that including all these variables in our tutoring behaviour model will make the theoretical as well as practical portrait of behaving as a peer in conjunction with a tutor even more complex. In addition we assume that further considerations might raise methodological questions, especially with respect to measuring tutor characteristics such as efficacy beliefs with self-report questionnaires. On establishing sufficient validity of the methodology followed, we acknowledge that methodological and data triangulation might increase generalisation of the research findings (Tashakkori & Teddlie, 1998). This brings us to the next discussion.

Step 4: Studying tutor thoughts and concerns during tutoring activities

As opposed to the previous chapters which involve quantitative research, Chapter 6 reported the findings of a qualitative interpretative study. More specifically, stimulated-recall interviews were organised to examine the thoughts of cross-age peer tutors. According to Sherry, Tavalin, and Billig (2000), we agree that articulation of reasoning helps participants to become aware of their own thinking and to inquire their thinking and reasoning. In this respect, we assume that tutoring increases the pedagogical reflective attitude of tutors by expanding their understanding of learning via online tutoring. From a theoretical point of view, our research is in line with the widespread idea that student tutors gain from tutoring (Goodlad & Hirst, 1989; Falchikov, 2001; Topping, 1996). Gains for tutors mainly result from reworking what they know in order to make it understandable to their tutees. In our

research inquiry, it is shown that fourth-year tutors experienced a tutoring enhancement effect with regard to: (1) understanding how well or how bad tutees negotiate the learning contents, (2) demonstrating online tutoring skills, (3) written communication, (4) feedback skills, questioning, clarifying, and elaborating on the discussion materials, and (5) communicating subject matter facts and principles. We found some evidence for enhanced cognitive abilities and computer literacy for peer tutors who tutored younger tutees in asynchronous discussion groups. Introducing online peer tutoring therefore not only changes traditional styles of pedagogy and instructional techniques, but also gives students opportunities to require and apply varying skills they will need in their later career as educator (Sobral, 2006; Stromso et al., 2004). Finally, our research on tutor thoughts has helped to identify the nature and complexity of the peer tutor's support in text-based discussions, and helped to provide ways of thinking about the processes of change that are related to the act of online peer tutoring on a carefully organised educational basis. We elaborate on these two issues in the next paragraphs by integrating the data and findings of different chapters.

The research results described in Chapter 6 revealed that peer tutors make deliberate choices as to the nature of tutoring activities. An example is giving a compliment to the tutee prior to making a comment or posing a question. In this respect, the importance of providing a safe and non-threatening learning environment for participation in online communication and activities is stressed. According to Henninger and Viswanathan (2004), the continuous social presence of a tutor seems to be critical in online tutoring in order to establish an interpersonal relationship and trust between the online communication partners. In addition, his or her social presence is critical to create a sense of community (Rovai, 2002; Swan, 2002). Tutors' thinking during performance also confirmed the earlier assumptions made about the partly situated nature of online peer tutoring behaviour. The results support other investigators indicating that cognitive processes are like perceptions of the social context and interpretations of attributions related to earlier experiences and incidents (Valcke et al., in press). Within the context of this dissertation, external context factors interacting with tutors' thoughts among other things refer to a time aspect and to the nature of the tutor training.

Concerning the former context variable time, the stimulated-recall interviews with the tutors were organised at the beginning and at the end of the tutoring period and were therefore helpful to analyse evolution and/or changes in tutor thoughts. Tutors intend to fade out their contributions and succeed in observing the ongoing discourse and in intervening only occasionally at the end of the tutoring period. But they keep worrying about asking catching and reflective thinking questions. Similar concerns and a feeling of responsibility for ensuring that their peers addressed the tutorial objectives adequately were found in the empirical research of Solomon and Crowe (2001) on perceptions of student peer tutors in a PBL program. The results are also partly in line with the results based on the quantitative analyses: there is a decrease in the amount of tutor involvement over time, but tutors keep adopting a wide scope of tutoring activities (e.g., Chapter 3). Apart from these results it has been a critical observation to find out how peer tutors keep in the background by the end of the tutoring period. On the one hand, the quantitative research (see Chapter 3) highlighted an evolution from coach to model. On the other hand (see Chapter 6), the qualitative research

identified peer tutors deciding not to elicit the solution themselves during the later stages of the tutoring period.

Regarding the presence of tutor training, peer tutors expressed in the interviews their satisfaction and gratitude about the pre- and in-service training support and guidance. Also Huberty and Davis (1998) and Hampel and Stickler (2005) stress the necessity to provide both pre-service and in-service support to online tutors. Tutor appreciation was especially related to the focus groups during which tutors got the opportunity to question and share experiences with peer tutors. This is in line with the findings of studies that report the positive impact of in-service training on this type of skills development (McDermott et al., 2001). The positive appreciation of the focus groups can also be seen as a just-in-time way of providing tutors with training opportunities. This just-in-time nature has been repeatedly stated as beneficial in the context of training of complex skills (Kesters, Kirschner, van Merrienboer, & Baumer, 2001). In line with the empirical studies of Seale and Cann (2000) and Chappell (1995), our results also support the idea that tutors are not only an audience, but are co-learners as well. This tutor learning dimension is also confirmed by Nath and Ross' (2001) who conclude that in-service tutor training efforts are important to ensure that peer tutors understand, integrate, and improve their tutoring skills during practice. It appeared that the in-service tutor training gave the tutors more self-confidence in tutoring. But also the training that was set up prior to the actual tutoring was considered to be important. The results point at the critical presence of sufficient time to discuss examples and time to practice and reflect on these experiences together with other novice tutors. Inspired by the work of Benammar (2006) on integrating reflection tools in education, we agree that increasing the time for practice and exercises during the pre-service tutor training could reduce tutor worries related to when and how actually interfering and contributing in the discussion. Taking into account peer tutors' concerns (see Chapter 6) will likely contribute to modifying the tutor training in view of improving tutors' support in asynchronous discussion groups. Studying the concerns of tutors in the early stages of new practice is largely consistent with recent research in the areas of innovation adoption in education (Donovan, Hartley, & Strudler, 2007). Lastly, further development of tutor training based on the findings of a more comprehensive triangulation process is needed when setting up future research in the field of online peer tutoring.

Limitations of the studies and directions for future research

The results of the present dissertation must be considered in the light of a number of limitations to be addressed in future research.

A first limitation can be related to the theoretical framework that has been put forward in this dissertation. A variety of conceptual frames of references, theoretical perspectives, and evidence-based models have been introduced that reflect e.g., social constructivism, social learning theory, expectancy-value conceptions about motivation, problem-based learning, teacher education, teacher thinking theory, etc. This implies that not one single theoretical framework has been developed and presented to study online peer tutoring.

Second, a broader perspective on online peer tutoring behaviour could have been adopted. Within the scope of this dissertation, the cross-age peer tutor is considered as a protagonist to facilitate tutees' learning processes. While previous peer tutoring studies mainly focused upon the efficacy of introducing peer tutoring, the studies in this dissertation rather focused on the nature of tutoring behaviour and the impact of external and internal processes/variables on the types and frequency of tutoring activities. Our research clearly was limited to the study of the online tutor. This particular focus on the tutor neglects the complex interplay between tutors and tutees. This can result in the critique that tutor activities are too much studied in isolation and independent from tutee activities. Moreover, we did not take into account the reciprocal relationship between tutoring and the tutee academic performance. We agree that there is an important interaction process between tutor and tutees. Research evidence from a study of Roscoe and Chi (in press) clearly demonstrates that tutees do contribute to the tutors' supportive and learning activities in a meaningful way. As emphasised by Bereiter (2002), the individual process of meaning-making is intrinsically connected to a particular context and cannot be seen in isolation. In Chapter 3 it was already stressed that online peer tutoring behaviour should not be seen as a one-sided decision on the part of the tutor, or the simple result of following a predefined tutoring protocol as presented in the tutor training. Therefore, our research results provide only a starting point to study the influencing factors on online tutoring behaviour. In future studies about online peer tutoring, also tutee characteristics in combination with tutee activities should be considered. It would be interesting to explore whether it is true that instructors' expectations, beliefs, and practices often differ from those of the students, as proposed by Poole and DeSanctis (2003). These studies could at the same time focus on the quality of the collaboration, the quality of the knowledge constructed during the discussions, and the tutee academic performance.

A major assumption underlying this dissertation is related to tutoring as a multidimensional activity. The multidimensional nature of tutoring introduces two methodological issues. A first issue is related to the unit of meaning used to analyse tutoring activities in the discussion transcripts. A unit of meaning is defined as the constellation of words or statements that relate to the same central meaning through their content and context (Chi, 1997; Graneheim & Lundman, 2003). First of all, it is not always easy to delineate a unit of meaning. In addition, it was sometimes hard to decide the coding category to be chosen, resulting in particular observations being neglected in the analysis. Secondly, the tutoring activity in each unit of meaning was coded along two different coding schemes. Though optimal interrater reliability indices were found when coding the tutoring behaviour, a particular issue is yet unresolved that was also mentioned by De Wever, Schellens, Valcke, and Van Keer (2006) who ask to reinforce the empirical base of content analysis instruments, and to study the concurrent validity of the applied instruments.

A fourth remark is related to our selection of the e-moderating model of Salmon (2000). This model provided a useful framework to analyse progressive stages in tutoring behaviour. The model is based on a clear rationale that is also present in other models. Basic tutoring activities are related to technical features of the discussion social dimension. Only in a next phase, tutoring is expected to centre on cognitive issues (Macdonald, 2006). Although the

Salmon model is popular among CSCL researchers, the model also reflects some shortcomings. First, there are concerns that the five-step model has not reflected the potential available to use e-learning as part of an integrated approach that includes face-to-face delivery (Moule, 2007). Within the context of this dissertation, the opportunities for e-moderating to a blended course were considered. Our learning environment made it possible that tutees had face-to-face contact during the weekly lessons and also tutors could meet their tutees face-to-face on an informal base. As some authors state that stage two 'online socialisation' may be omitted if initial socialisation in stage one has been effective (Moule, 2007), future research could unravel the extent to which our results reinforce the existing e-moderating template. Second, "care should be taken in implementing the model, as a piecemeal approach may result in unnecessary repetition of the early steps of the model" (Quek & Bopry, 2006, p. 88). But, since the discussion themes were always based on a new body of knowledge, a repetition of the early steps of the model had to appear at each stage. This might have affected the learning progress of the discussion groups and explain the somewhat restricted nature of the tutoring activities in which elaboration and reflection related activities were predominant.

A fifth limitation is related to the way the data regarding tutor characteristics have been gathered. Efficacy beliefs and personal tutor training evaluation were measured on the base of self-reporting. Self-report questionnaires present limitations in the way beliefs can be measured. In this respect, it is conceivable that discrepancies can be found between tutors' reported self-efficacy beliefs and their actual tutoring practices. Other questions also remain unanswered. For instance, what particular skills have 'peer tutor efficacy', 'teacher efficacy' (Tschannen-Moran & Woolfolk Hoy, 2001) and 'coaching efficacy' (Myers, Wolfe, & Feltz, 2005) in common? A separate study, focusing on the nature and quality of the instruments is appropriate too. This study should combine self-report questionnaires with interviews and think-aloud protocols. Future research could build on these ideas and, accordingly, more qualitative data could be collected to provide additional insight into the reasons why certain online tutoring attempts did or did not work as expected. This is in line with the ideas of Dolmans et al., (2002) to set up qualitative studies to gain better insights in the conceptions about the tutor role.

The next limitation is related to the limited attention paid to task complexity and task structure in the discussion themes. Earlier research (Schellens, 2004) already illustrated the differential impact of the nature of the task. As mentioned before, it should be noted however, that studying online discussions in a learning environment that was ecologically valid challenges the ability of the researcher to control all variables in the context. In this respect, it might be useful to conduct quantitative research in more controlled conditions, in order to isolate the effect of different variables. In addition, the theoretical framework adopted for the series of studies did focus on a limited set of external (time and training) and internal (cognitive and motivational) variables. The nature and amount of these variables can be criticised. Reid and Newhouse (2004) present an alternative list which results in a far more complex research agenda for future tutor-related research. Their questions are among others as: "How the learning community (or lack thereof) created by the design of the group, the actions of the tutors and the actions of the students operates? How the educational material

was presented, accessed, interacted with, and used in the group? How time management, marking, preparation time, and other non-instructional teaching processes affected the group? How learning to use technology, potential access problems, how to use technology in a proper pedagogic manner, and other facets of technology usage affected the group?"

Seventh, the subsequent studies have been set up in a particular naturalistic setting with medium-sized discussion groups of freshman, studying an introductory course at bachelor level. The fact that the tutors supported freshman students could have interfered with the range of tutoring activities that tutors were able to apply. In earlier paragraphs, we already mentioned that the knowledge base to be applied in the discussion groups was complex for both the tutees and the tutors. As suggested, this could have invoked cognitive load in tutees and tutors. Future tutor-oriented research should centre on tutoring in different knowledge domains and involving students in other academic programs.

Two further limitations of the present studies are also associated with the specific research design and the generalisation of the results. First, we allowed for a certain degree of freedom of the peer tutors in how and when to apply specific tutoring guidelines. An advantage of introducing peer tutors to facilitate students' interaction is that they do not directly steer or constrain students' actions too explicitly or strongly. As expressed by Innes (2004), using criteria to direct students' collaboration too explicitly is not desirable, as "they sometimes shape the students' behaviour without expanding their understanding" (p. 247). On the one hand, it has been stated that over-scripting can have disruptive effects (Dillenbourg, 2002). On the other hand, a more scripted and pre-structured training format might create opportunities for both verifying and improving the study of the 'transfer of training' (Brown & Morrissey, 2004; Nijman, 2004; Saks, 1995). Second, in our research both tutors and tutees 'begin cold' as they are not familiar with online peer tutoring. The question then becomes whether, for instance, the tutor styles as distinguished in Chapter 2 or peer tutors' deliberate thoughts (see Chapter 6), are the result of learning processes and gains accruing from the inexperienced tutoring. Hence, the findings of this dissertation cannot simply be generalised to other educational contexts. Further refinement and evaluation of the results might be needed outside our particular university setting in which online peer tutoring was just recently part of the curriculum and thus rather innovative.

Tenth, though the peer tutors in the different studies all were fourth-year students Educational Sciences they did not represent a homogeneous group. Their online peer tutoring behaviour was observed and monitored during the first semester of three consecutive academic years, from 2004-2005 (e.g., Chapter 2-3, control group in Chapter 4-5) over 2005-2006 (e.g., Chapter 4) to 2006-2007 (e.g., Chapter 5-6). Major differences in learning environment characteristics along the three consecutive academic years were related to pre-service and in-service tutor training components, the constellation of co-tutorship, and the discussion period which was either 12 weeks (e.g., Chapter 2-3) or 8 weeks (e.g., Chapter 4-6). Future research should try to replicate the findings involving other and larger tutor populations, and set up in alternative educational settings or knowledge domains. Follow-up research could also focus on the question whether online peer tutoring activities differ when we compare student tutors helping pupils in primary education (Topping & Hill, 1996) and

staff members that take up the tutor role (Lentell, 2003; Simpson, 2002). In line with the research of Jones, Garralda, Li, and Lock (2006) and De Smet, Van Keer, and Valcke (2007), follow-up research can also compare peer tutoring behaviour within an online and face-to-face learning environment. In the recent work of Price, Richardson, and Jelfs (2007) on staff tutoring, the experiences of students taking the same course by distance learning were compared when tutorial support was provided in a conventional way (using limited face-to-face sessions with some contact by telephone and e-mail) and online (using a combination of computer-mediated conferencing and e-mail). This variety of tutoring set-ups can follow the rich diversity of the design of innovative learning environments (Duran & Monereo, 2005).

Finally, the interpretation of the present research findings is limited due to the lack of empirical evidence from comparable studies focusing on online peer tutoring and research about tutors' role within computer-supported collaborative learning. This kind of empirical studies remains scarce (De Smet, Valcke, & Van Keer, 2008; de Vries, Kester, Sloep, van Rosmalen, Pannekeet, & Koper, 2005; McLuckie & Topping, 2004). The results, based on the studies discussed in the present dissertation present therefore a first point of reference when raising new research questions about online peer tutoring.

Implications of the research findings

The research results as presented in the previous sections present valuable information as to the definition of follow-up research and to direct educational practice. The empirical studies also yielded insights which have some practical and some theoretical implications.

Practical implications

From the perspective of practitioners in the field of education, the results of our study help to derive the following practical implications. First, an extensive pre-service tutor training is crucial and should pay attention to ICT-related issues. According to de Vries and colleagues (2005), higher education staff involved in e-learning often struggle with the integration of online support activities. We therefore stress the importance of advising and training both staff and peer tutors on how to use the electronic facilities. In our research, all participants were introduced to the conferencing technology by means of a brief software demonstration, trial discussions, and a website with technical and organisational guidelines on how to discuss online. An e-mail address to contact faculty was also made available to prevent frustration, and feelings of isolation.

Another practical implication of the studies reported here is that an extensive pre-service training should pay attention to the multidimensional nature of online peer tutoring behaviour. Regarding the preliminary tutor training, we suggest that besides a firm knowledge base on the dynamics of online facilitation, "good practice" examples and transcripts to be exercised in small groups should be available. Furthermore, the main practical implication of studying different approaches of tutor training is that specific training for multidimensional support inspired by the five-step model of e-moderating can help online peer tutors to adopt meaningful and varying tutor contributions, which could have been neglected otherwise. In

addition, it pays off to structure, balance, and guide the tutoring activities by asking tutors to reflect in one way or another on their tutoring interventions. In the present studies this was done by asking a group of tutors to label their interventions.

Next to a pre-service training, supporting peer tutors during the tutoring activities was experienced as beneficial by the tutors. A sound way for peer tutors to learn how to be an effective online facilitator is to experience the process first-hand and to negotiate those experiences through in-service tutor training components such as focus groups and ongoing reflection on the tutoring process. The focus groups, set up at regular intervals during the tutoring period, helped them to reflect on their own tutoring behaviour, to share concerns, experiences, and problems but also nice experiences and successful ideas to cope with particular topics. Though – next to the focus groups – the stimulated-recall interviews were set up as a research method to gather thoughts and concerns, tutors reacted positively to be able to express their ideas in a personal way to the researchers, supervising the studies.

On the pragmatics of peer tutoring, in order to keep the tutoring in the zone of proximal development online peer tutors should diminish their amount of tutor postings over time. In addition they should reduce a number of responsibilities such as making a planning. Our research fits in with the recurrent question for empowering people collaborating online (Falchikov, 2001). In this respect, the above results are quite promising apart from the remarkable finding that tutors evolve from a coach to a model over time (see Chapter 3). Nevertheless, we especially want to stress the temporary nature of the introduction of peer tutors in the online discussions of younger tutees. As it is the case with most types of structuring and scripting, the tutor should fade out assistance, keep in the background after a while, and in the end the tutees as a team should be able to discuss without an external form of facilitation.

Fifth, care should be taken that the tutors sufficiently master the subject content that is related to the discussion activities they have to tutor. It could be helpful to provide some extra support to tutors to recapitulate the learning contents. By providing cross-age peer tutors with mastery on the learning contents to be tutored, we believe that their tutoring behaviour with regard to the highest step of e-moderating, namely stimulating for tutees' personal development, can be fostered.

A final practical implication is that the tutoring process is to be viewed as developmental in the sense that tutors have the experience of becoming an online peer tutor. We mean that online peer tutors should have opportunities to advance in the ways they support and moderate an asynchronous discussion group. To gain from tutoring as suggested by many authors (Goodlad & Hirst, 1989; Falchikov, 2001; Topping, 1996), our findings suggest that they should have the opportunities of encountering difficulties, dilemma's, and concerns in the first tutorial sessions. Moreover, articulation of these concerns through stimulated-recall can help participants to become aware of their own thinking and to inquire their thinking and behaviour.

Theoretical implications

From a theoretical point of view, the following two implications can be put forward. First, theoretical models to explain the nature of tutoring behaviour should consider the antecedents at the individual level (cognitive and motivational processes) and in relation to contextual variables (e.g., the tutor training approach). This model should be expanded by adding additional individual and contextual variables and processes (e.g., nature and difficulty level of the task), but also by taking into account the reciprocal relationship between the variables and processes in play. Second, the identification of tutors' cognitive processing in terms of tutors' thoughts can reveal the motives underlying tutors' not to intervene in the discussion at a certain moment. As we have written in Chapter 6, there are contexts in which non-participation is a particular tutor strategy building on social constructivist principles. This is only one example of the fact that the research presented in this dissertation brings a variety of processes and variables to the notice of researchers and educators involved with online peer tutoring.

Final conclusion

Although many researchers as well as educational practitioners are looking for solutions to foster student collaborating in computer-supported learning environments, online peer tutoring has thus far attracted the interest of few researchers. The central focus of this dissertation was on the nature of cross-age peer tutors' contributions when facilitating asynchronous discussion groups. The concrete analysis of online peer tutoring behaviour, the related cognitive and motivational processes and variables related to pre- and in-service training of the tutors has helped to develop a better understanding of the complex nature of peer tutoring in higher education. The results revealed that tutoring induces a multidimensional variety of support activities to foster collaboration in online discussions. In addition, the impact of external and internal variables and processes could be explored. The nature of in-service and pre-service training approaches could be discussed in detail. The impact of cognitive and motivational processes could be studied in the way they have a direct or mediating impact on tutoring behaviour. The resulting picture is that online peer tutoring clearly is a complex, interactive, and situated process. Although we realise that a number of questions remain unanswered, this dissertation has however contributed to a fuller recognition of what it means for Educational Sciences students to take up the role of an online peer tutor. Also a better understanding has been developed as to how the quality of tutoring might be improved. The results have also inspired directions for future research, issues to be raised in view of further theory development. At the same time, the research evidence is expected to direct a more evidence-based approach of tutoring practices in computer-supported collaborative learning.

References

Bandura, A. (1993). Perceived Self-Efficacy in Cognitive Development and Functioning. *Educational Psychologist, 28,* 117-148.

Bandura, A. (2000). Exercise of Human Agency Through Collective Efficacy. *Current Directions in Psychological Science, 9*, 75-78.

Benammar, K. (2006). *Reflectietools*. Lemma/Boom: Den Haag.

Bereiter, C. (2002). *Education and mind in the knowledge age.* Mahwah, NJ: Lawrence Erlbaum Associates.

Berttram, C. (1980). Learning and Transfer Effects of Three Different Training Approaches with First-Grade Students. *Reading Improvement, 17,* 237-242.

Billett, S. (1996). Situated learning: Bridging sociocultural and cognitive theorising. *Learning and Instruction, 6*, 263-280.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18,* 32-42.

Brown, T., & Morrissey, L. (2004). The effectiveness of verbal self-guidance as a transfer of training intervention: its impact on presentation performance, self efficacy and anxiety. *Innovations in Education and Teaching International, 41,* 255-269.

Bruner, J. (1986). *Actual Minds, Possible Worlds*. Cambridge, MA: Harvard University Press.

Chappell, V. A. (1995). Theorizing in Practice: Tutor Training "Live, from the VAX Lab". *Computers and Composition, 12*, 227-236.

Charlier, B., Daele, A., Cheffert, J-L., Peeters, R., & Lusalusa, S. (1999). Learning collaboratively in a virtual campus: teachers' experiences. Paper presented at the ISATT 99 conference, Dublin (Ireland).

Chi, M. T. H. (1997). Quantifying Qualitative Analyses of Verbal Data: A Practical Guide. *The Journal of the Learning Sciences, 6*, 271-315.

Clegg, S., Trayhum, D., & Johnson, A. (2004). Not just for men: A case study of the teaching and learning of information technology in higher education. *Higher Education, 40*, 123-145.

Cohen, E. G. (1994). Designing Groupwork. Strategies for the Heterogeneous Classroom. (2nd ed.) New York: Teachers College Press.

Crippen, K. J., & Earl, B. L. (2007). The impact of web-based worked examples and self-explanation on performance, problem solving, and self-efficacy. *Computers & Education, 49*, 809-821.

De Bono, E. (1991). *Six Thinking Hats for schools. Resource book for Adult Educators.* Logan (IA), USA Perfection Learning.

De Smet, M., Van Keer, H., & Valcke, M. (2007). Peer tutoring in het hoger onderwijs. Een studie naar tutorgedrag binnen een online en face-to-face setting. *Tijdschrift voor Hoger Onderwijs, 1*, 32-44.

De Smet, M., Van Keer, H., & Valcke, M. (2008). Blending Asynchronous Discussion Groups and Peer Tutoring in Higher Education: An Exploratory Study of Online Peer Tutoring Behaviour. *Computers & Education, 50,* 207-223.

de Vries, F., Kester, L., Sloep, P. B., van Rosmalen, P., Pannekeet, K, & Koper, R. (2005). Identification of critical time-consuming student support activities in e-learning. Retrieved August, 13, 2007, from: http://www.scribd.com/doc/14986/Online-Learning-Support-through-Peer-Tutoring-OpenUniversiteitNederland-2006.

De Wever, B., Schellens, T., Valcke, M., & Van Keer, H. (2006). Content analysis schemes to analyze transcripts of online asynchronous discussion groups: A review. *Computers & Education, 46,* 6-28.

De Wever, B., Van Winckel, M., & Valcke, M. (in press). Discussing patient management online: The impact of roles on knowledge construction for students interning at the paediatric ward. *Advances in Health Sciences Education.*

Dillenbourg, P. (2002). Over-scripting CSCL: The risks of blending collaborative learning with instructional design. In P.A. Kirshner (Ed.), *Three worlds of CSCL: Can we support CSCL?* (pp. 61-91). Heerlen: Open Universiteit Nederland.

Dochy, F., Segers, M., & Sluijsmans, D. (1999). The use of self-, peer-, and co-assessment in higher education: A review. *Studies in Higher Education, 24*, 331-350.

Dolmans, D., Gijselaers, W., Moust, J., De Grave, W., Wolfhagen, I., & Van Der Vleuten, C. (2002). Trends in research on the tutor in problem-based learning: conclusions and implications for educational practice and research. *Medical Education, 24*, 173-180.

Donovan, L., Hartley, K., & Strudler, N. (2007). Teacher concerns during initial implementation of a one-to-one laptop initiative at the middle school level. *Journal of Research on Technology in Education, 39,* 263-286.

Duran, D., & Monereo, C. (2005). Styles and sequences of cooperative interaction in fixed and reciprocal peer tutoring. *Learning and Instruction, 15*, 179-199.

Ellis, D., & Zimmerman, B. J. (2001). Enhancing Self-Monitoring during Self-Regulated Learning of Speech. In H. J. Hartman, *Metacognition in Learning and Instruction. Theory, Research, and Practice.* (pp. 205-228). Dordrecht: Kluwer Academic Press.

Fahy, P., & Ally, M. (2005). Student Learning Style and Asynchronous Computer-Mediated Conferencing (CMC) Interaction. *The American Journal of Distance Education, 19*, 5-22.

Falchikov, N. (2001). *Learning together. Peer tutoring in higher education.* London: Routledge/Falmer.

Falchikov, N., & Boud, D. (1989). Student self-assessment in higher education: A meta-analysis. *Review of Educational Research, 59,* 395-430.

Frayne, C. A., & Latham, G. F. (1987). The application of social learning theory to employee self-management of attendance. *Journal of Applied Psychology, 72*, 387-392.

Garrison, R. D., Anderson, T., & Archer, W. (2000). Critical Inquiry in a text-based environment: computer conferencing in higher education. *The Internet and Higher Education, 2*, 87-105.

Goodlad, S., & Hirst, B. (1989). *Peer Tutoring: A Guide to Learning by Teaching*. London: Kogan Page.

Graneheim, U., & Lundman, B. (2003). Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness, *Nurse Education Today, 24*, 105–112.

Grant, A. M. (2003). The impact of life coaching on goal attainment, metacognition, and mental health. *Social Behavior and Personality, 3,* 253-264.

Grasha, A. F. (2002). *Teaching with style: a practical guide to enhancing learning by understanding teaching and learning styles*. San Bernandino, CA: Alliance Publishers.

Groves, M., Régo, P., & O'Rourke, P. (2005). Tutoring in problem-based learning medical curricula: the influence of tutor background and style on effectiveness. *BMC Medical Education, 5,* retrieved from http://www.biomedcentral.com/1472-6920/5/20 on December 1, 2007.

Hakkarainen, K., & Lipponen, L. (1998). *Epistemology of inquiry and computer supported collaborative learning.* Paper presented at the American Educational Research Association (AERA) Annual Meeting, San Diego, April 13-17, 1998.

Hammond, M. (2000). Communication within online forums: The opportunities, the constraints and the value of a communicative approach. *Computers & Education, 35*, 251-262.

Hampel, R., & Stickler, U. (2005). New Skills for new classrooms. Training tutors to teach languages online. *Computer Assisted Language Learning, 18,* 311 - 326.

Henninger, M., & Viswanathan, R. (2004). *Social presence in online tutoring – What we know and what we should know.* Proceedings of the first joint meeting of the EARLI SIGs Instructional Design and Learning and Instruction with Computers (CD-ROM). Tuebingen: Knowledge Media Research Center.

Huberty, C. J., & Davis, E. J. (1998). Evaluation of a state critical thinking skills training program. *Studies in Educational Evaluation, 24*, 45-69.

Innes, R. B. (2004). *Reconstructing undergraduate education: Using learning science to design effective courses.* Mahway, NJ: Lawrence Erlbaum Associates.

Jenkins, J. R., & Jenkins, L. M. (1987). Making peer tutoring work. *Educational Leadership, 44,* 64-68.

Johnson, D.W., & Johnson, R.T. (1996). Cooperation and the use of technology. In D. Jonassen (Ed.), *Handbook of Research for Educational Communications and Technology* (pp.1017-1044), London: MacMillan.

Jones, R. H., Garralda, A., Li, D., & Lock, D. (2006). Interactional dynamics in on-line and face-to-face peer-tutoring sessions for second language writers. *Journal of Second Language Writing, 15*, 1-23.

Kassab, S., Abu-Hijleh, M. F., Al-Shboul Q., & Hamdy, H. (2005). Student-led tutorials in problem-based learning: Educational outcomes and students' perceptions. *Medical Teacher, 27*, 521-526.

Kester, L., Kirschner, P. A., Merrienboer, J. J. G., & Baumer, A. (2001). Just-in-time information presentation and the acquisition of complex cognitive skills. *Computers in Human Behavior, 17*, 373-391.

Kim, J. H., & Chae, H.M. (2005). *Expert and Novice Algebra Tutor Behaviors Compared*. Poster presented at the 27th Annual Conference of the Cognitive Science Society, Stresa, Italy.

Kirschner, P. A. (2002). Cognitive load theory: Implications of cognitive load theory on the design of learning. *Learning and Instruction, 12,* 1-10.

Kolb, D. (1993). *Learning Style Inventory.* Boston: McBer and Company.

Kreijns, K., Kirschner, P. A., & Jochems, W. (2003). Identifying the pitfalls for social interaction in computer-supported collaborative learning environments: A review of the research. *Computers in Human Behavior, 19*, 335-353.

Laurillard, D. (1993). *Rethinking university teaching.* London: Routledge.

Lentell, H. (2003). The Importance of the Tutor in Open and Distance Learning. In A. Tait & R. Mills (Eds.), *Rethinking Learner Support In Distance Education,* pp. 64-76. London: Routledge Falmer Press.

Macdonald, J. (2006). *Blended Learning and Online Tutoring: A Good Practical Guide.* Hampshire: Gower.

Macdonald, J., Weller, M., & Mason, R. (2000). *Innovative assessment practices in networked courses at the Open University.* Cite Report no. 260. Milton Keynes, UK: IET, Open University.

Mason, J. (2000). Asking mathematical questions mathematically. *International Journal of Mathematical Education in Science and Technology, 31,* 97-111.

Mazzolini, M., & Maddison, S. (2007). When to jump in: The role of the instructor in online discussions forums. *Computers & Education, 49*, 193-213.

McDermott, J., Beck, D., Buffington, S. T., Annas, J., Supratikto, G., Prenggono, D., Ekonomi, Dra. M. F. Sri, & Achadi, E. (2001). Two models of in-service training to improve midwifery skills: how well do they work? *Journal of Midwifery & Women's Health, 46*, 217-225.

McLoughlin, C. & Marshall, L. (2000). Scaffolding: A model for learner support in an on-line teaching environment. In A. Herrmann and M.M. Kulski (Eds), *Flexible Futures in Tertiary Teaching.* Proceedings of the 9th Annual Teaching Learning Forum, 2-4 February 2000. Perth: Curtin University of Technology. Retrieved September, 18, 2004, from: http://lsn.curtin.edu.au/tlf/tlf2000/mcloughlin2.html

McLuckie, J. & Topping, K. J. (2004). Transferable skills for online peer learning. *Assessment & Evaluation in Higher Education, 29*, 563-584.

Michalski, G. M., & Cousins, J. B. (2000). Differences in stakeholder perceptions about training evaluation: A concept mapping/pattern matching investigation. *Evaluation and Program Planning, 23,* 211-230.

Moos, D. C., & Azevedo, R. (in press). Monitoring, planning, and self-efficacy during learning with hypermedia: The impact of conceptual scaffolds. *Computers in Human Behavior.*

Moule, P. (2007). Challenging the five-step model for e-learning: A new approach. *ALT-J, Research in Learning Technology, 1*, 37-50.

Moust, J. H. C., & Schmidt, H. G. (1994). De effectieve tutor: meer dan alleen een vakinhoudelijke deskundige? *Tijdschrift voor Hoger Onderwijs, 2*, 95-114.

Myers , N. D., Wolfe, E. W., & Feltz, D. L. (2005). An evaluation of the psychometric properties of the coaching efficacy scale for coaches from United States of America. *Measurement in Physical Education and Exercise Science*, *9*, 135-160.

Nath, L. R., & Ross, S. M. (2001). The Influence of a Peer-Tutoring Training Model for Implementing Cooperative Groupings with Elementary Students. *Educational Technology Research & Development, 49,* 41-56.

Neville, A. J. (1999). The problem-based learning tutor: Teacher? Facilitator? Evaluator? *Medical Teacher, 21*, 393-401.

Nicolay, J. A. (2002). Group assessment in the on-line learning environment. *Teaching & Learning, 91,* 43-53.

Nijman, D-J. (2004). *Supporting Transfer of Training. Effects of the Supervisor. Doctoral Dissertation.* Enschede, The Netherlands: University of Twente.

O'Donnell, A., Dansereau, D. F., & Hall, R. H. (2004). Knowledge Maps as Scaffolds for Cognitive Processing. *Educational Psychology Review, 14,* 71-86.

Pajares, F. (2004). Psychometric Analysis of Computer Science Help-Seeking Scales. *Educational and Psychological Measurement, 64*, 496-513.

Parr, J. M., & Townsend, M. A. R. (2002). Environments, processes, and mechanisms in peer learning. *International Journal of Educational Research, 37,* 403-423.

Pata, K., Sarapuu, T., & Lehtinen, E. (2005). Tutor scaffolding styles of dilemma solving in network-based role-play. *Learning and Instruction, 15,* 571-587.

Pilkington, R. (2004). Developing discussion for learning. Journal *of Computer Assisted Learning, 20*, 161-164.

Poole, M. S., & DeSanctis, G. (2003). Structuration theory in information systems research : Methods and controversies. In A. B. Woszczynski (Ed.), *The handbook of information systems research* (pp. 206-249). Hershey, PA: Idea Group.

Price, L., Richardson, J. T. E., & Jelfs, A. (2007). Face-to-face versus online tutoring support in distance education. *Studies in Higher Education, 32*, 1-20.

Quek, C. L., & Bopry, J. (2006). Book review. *Educational Media International, 43*, 87-89.

Reid, D., & Newhouse, C. P. (2004). But that didn't happen last semester: Explanations of the mediated environmental factors that affect online tutor capabilities. In R. Atkinson, C. McBeath, D. Jonas-Dwyer & R. Phillips (Eds), *Beyond the comfort zone: Proceedings of the 21st ASCILITE Conference* (pp. 791-797). Perth, 5-8 December.

Riva, G. (2001). The mind in the Web: Psychology in the Internet age. *CyberPsychology and Behavior, 4*, 1-6.

Rodrigues, C. A., Bu, N., & Min, B. (2000). Learners training approach preference: National culture as a determinant. *Cross Cultural Management, 7*, 23-32.

Roscoe, R. D., & Chi, M.T.H. (in press). The tutor learning effect: Why do students learn by tutoring other students? *Review of Educational Research.*

Rose, C. P., Moore, J. D., VanLehn, K., & Allbritton, D. (2001). *A Comparative Evaluation of Socratic versus Didactic Tutoring*. Proceedings of Cognitive Sciences Society. Retrieved June, 6, 2007, from: http://www.cs.cmu.edu/~cprose/pubweb/cogsci01.pdf.

Rovai, A. (2002). Building Sense of Community at a Distance. *International Review of Research in Open and Distance Learning*, *4*, 1-9.

Saks, A. M. (1995). Longitudinal field investigation of the moderating and mediating effects of self-efficacy on the relationship between training and newcomer adjustment. *Journal of Applied Psychology, 80,* 211-225.

Salmon, G. (2000). A model for CMC in education and training. *E-moderating. The key to teaching and learning online.* London: Kogan Page.

Samaras, A., & Gismondi, S. (1998). Scaffolds in the field: Vygotskian interpretation in a teacher education program. *Teaching and Teacher Education, 14*, 715-733.

Schellens, T. (2004). Studying in a blended learning environment: Researching congruency between learning environment and student characteristics and the impact of CSCL on knowledge construction. Unpublished doctoral dissertation. Ghent: Ghent University.

Schellens, T., & Valcke, M. (2005). Collaborative learning in asynchronous discussion groups: What about the impact on cognitive processing? *Computers in Human Behavior*, *21*, 957-975.

Seale, J. K., & Cann, A. J. (2000). Reflection online or off-line: The role of learning technologies in encouraging students to reflect. *Computers & Education, 34*, 309-320.

Sherry, L., Tavalin, F., & Billig, S. (2000). Good Online Conversation: Building Research to Inform Practice. *Journal of Interactive Learning Research, 11*, 85-127.

Silverman, D. (2001). *Interpreting qualitative data. Methods for analysing talk, text and interaction*. London: SAGE Publications.

Simpson, O. (2002). *Supporting Students in Open and Distance Learning*. London: Kogan.

Sobral, D. (2002). Cross-year peer tutoring experience in a medical school: Conditions and outcomes for student tutors. *Medical Education, 36*, 1064-1070.

Sobral, D. (2006). Influences on choice of surgery as a career: A study of consecutive cohorts in a medical school. *Medical Education, 40*, 522-529.

Solomon, P., & Crowe, J. (2001). Perceptions of student peer tutors in a problem-based learning programme. *Medical Education, 23*, 181-186.

Sosik, J. J., Avolio, B. J., Kahai, S. S., & Jung, D. I. (1998). Computer-Supported Work Group Potency and Effectiveness: The Role of Transformational Leadership, Anonymity, and Task Interpendence. *Computers in Human Behavior, 14*, 491-511.

Stromso, H. I., Grottum, P., & Lycke K. H. (2004). Changes in student approaches to learning with the introduction of computer-supported problem-based learning. *Medical Education, 38*, 390-398.

Swan, K. (2002). Building communities in online courses: the importance of interaction. *Education, Communication and Information*, *2*, 23-49.

Tagg, A.C., & Dickinson, J. A., (1994). Tutor Messaging and Its Effectiveness in Encouraging Student Participation on Computer Conferences. *Journal of Distance Education/Revue de l'enseignement à distance*. Retrieved from on December 1, 2007.

Tashakkori, A., & Creswell, J .W. (2007). Editorial: The New Era of Mixed Methods. *Journal of Mixed Methods Research, 1,* 242 - 266.

Teasley, S. D. (1995). The role of talk in children's peer collaborations. *Developmental Psychology, 31*, 207-220.

Topping, K. J. & Hill, S. (1996). Capability through Student Tutoring: Research on effectiveness. *The Journal of Higher Education for Capability, 2*, 30-38.

Topping, K. J. (1996). The effectiveness of peer tutoring in further and higher education: A typology and review of the literature. *Higher Education, 32*, 321-345.

Topping, K. J., Smith, E., Swanson, I., & Elliot, A. (2000). Formative peer assessment of academic writing between postgraduate students. *Assessment and Evaluation in Higher Education, 25,* 149-169.

Tschannen-Moran, M., & Woolfolk Hoy, A. W. (2001). Teacher efficacy: capturing an elusive construct. *Teaching and Teacher Education, 17*, 783-805.

Tuovinen, J. E., & Sweller, J. (1999). A comparison of cognitive load associated with discovery learning and worked examples. *Journal of Educational Psychology, 91*, 334-342.

Valcke, M., Sang, G., Rots, I., & Hermans, R. (in press). Taking prospective teachers' beliefs into account in teacher education. In E. Baker, B. McGaw, and P. Peterson (Eds.), *International Encyclopedia of Education*, 3rd edition, pp. xxx-yyy. Oxford: Elsevier.

Verba, M. (1998). Tutoring interactions between young children: How symmetry can modify asymmetrical interactions. *International Journal of Behavioral Development, 22,* 195-216.

Vygotsky, L.S. (1978). *Mind in society: The development of higher psychological processes.* Cambridge, MA: Harvard University Press.

Wang, Q. (in press). Student-facilitators' roles in moderating online discussions. *British Journal of Educational Technology*.

Wang, S-L & Lin, S. S. J. (2007). The effects of group composition of self-efficacy and collective efficacy on computer-supported collaborative learning Source. *Computers in Human Behavior; 23*, 2256-2268.

Weinberger, A., & Fischer, F. (2006). A Framework to Analyze Argumentative Knowledge Construction in Computer-Supported Collaborative Learning. *Computers & Education, 46,* 71-95.

Weinberger, A., Reiserer, M., Ertl, B., Fischer, F., & Mandl, H. (2005). Facilitating collaborative knowledge construction in computer-mediated learning environments with cooperation scripts. In R. Bromme, F. W. Hesse, & H. Spada (Eds.), *Barriers and biases in computer-mediated knowledge communication* (pp. 15-38). Boston: Kluwer.

Wenzel, T. J. (2007). Evaluation tools to guide students' peer assessment and self-assessment in group activities for the lab and classroom. *Journal of Chemical Education, 84*, 182-186.

Wigfield, A., & Eccles, J. S. (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology, 25*, 68-81.

Wood, D., & Wood, H. (1996). Vygotsky, Tutoring, and Learning. *Oxford Review of Education, 22,* 5-16.

Nederlandstalige samenvatting

(Summary in Dutch)

Online peer tutorgedrag binnen een hoger onderwijs context

In voorliggend onderzoek staat online peer tutoring in het hoger onderwijs centraal. Binnen het domein van computer-supported collaborative learning (CSCL) (computer-ondersteund samenwerkend leren) zoeken zowel onderzoekers als mensen uit de praktijk naar mogelijkheden om het samenwerkend leren van studenten te bevorderen. Dit proefschrift sluit aan bij die zoektocht met de introductie van peer tutors in asynchrone discussiegroepen. Bijzondere aandacht gaat daarbij naar zowel de voorbereiding van de begeleidingsactiviteiten van een peer tutor als naar de concrete uitvoer ervan ter bevordering van de kennisconstructie van de tutees tijdens het werken aan een groepstaak.

Het eerste hoofdstuk van dit proefschrift start met een overzicht van de verschillende definities en achterliggende praktijken die verband houden met de werkvorm peer tutoring. Bij deze welbepaalde vorm van samenwerkend leren is duidelijk sprake van een helpersrelatie tussen twee of meer studenten. Topping (1996, p. 322) definieert deze werkvorm als "people from similar social groupings who are not professional teachers helping each other to learn, and learning themselves by teaching". Wat de praktische uitvoering van de werkvorm peer tutoring betreft, kunnen diverse varianten worden onderscheiden. In de context van dit proefschrift is geopteerd voor cross-age peer tutoring in een digitale leeromgeving. Dit impliceert dat de tutors verder zitten in hun studietraject dan de tutees en dat de taakgerichte samenwerking plaats- en/of tijdonafhankelijk verloopt via geschreven communicatie.

In de peer tutoring literatuur neemt effectonderzoek binnen face-to-face contexten vooralsnog de voornaamste plaats in. Tal van studies wijzen op verbeterde leerprestaties in voornamelijk onderwijskundige en medische toepassingsgebieden, en dit zowel voor de begeleidende (tutors) als begeleide studenten (tutees). Niettegenstaande de toenemende aandacht voor implementatie in het hoger onderwijs, is onderzoek met betrekking tot peer tutoring hoofdzakelijk verricht binnen het leerplichtonderwijs. Een derde leemte in de peer tutoring literatuur is vergelijkend onderzoek naar de differentiële impact van tutor training programma's. Ondanks het feit dat er in de literatuur overeenstemming heerst over de nood aan een training voor peer tutors om hun begeleidingsactiviteiten zo effectief mogelijk te maken voor alle betrokkenen, zijn tot op heden weinig studies gerapporteerd waarin een conceptueel model voor tutor training wordt voorgesteld en gevalideerd. Tot slot gaat er - in tegenstelling tot de sterke aandacht voor effectonderzoek - in de literatuur weinig aandacht uit naar de processen die zich in peer tutoring settings voltrekken en naar factoren ter verklaring van de meerwaarde van peer tutoring. Zo is er bijvoorbeeld weinig onderzoek voorhanden dat de effectiviteit van de werkvorm toelicht als functie van de kwaliteit van de begeleiding voorzien door de tutor. De resultaten van recent onderzoek (Duran & Monereo, 2005; Pata, Sarapuu, & Lehtinen, 2005) bevestigen echter dat de aard van de begeleiding een toonaangevende rol speelt om effectief samenwerkend leren en onderhandeling over kennis te bereiken. Deze bevinding sluit aan bij de idee dat niet het laten samenwerken op zich

bepalend is bij samenwerkend leren (Dillenbourg, 2002), maar wel het soort communicatie tussen de partners en de sturing van het leerproces (Teasley, 1995). Ook naar de inzetbaarheid van peer tutoring in online leeromgevingen is weinig onderzoek verricht. Het is in deze context dat het doel van dit proefschrift zich situeert, namelijk de aard en beïnvloedbaarheid van online peer tutorgedrag bestuderen.

Voorliggend onderzoek belicht online peer tutoring gedrag vanuit het perspectief van de tutor, dit is de student die de rol van begeleider vervult. In de eerste plaats is het de bedoeling om enerzijds de frequentie en anderzijds de aard van de tutorberichten in kaart te brengen. Vervolgens wordt de impact van zowel contextspecifieke als persoonsgebonden factoren op de kwantiteit en kwaliteit van tutorgedrag onder de loep genomen. De verschillende factoren opgenomen in dit proefschrift kunnen gestructureerd worden aan de hand van het expectancy-value model van Wigfield en Eccles (2000). De externe factoren die we onderzochten betreffen de aard van de tutor training en een tijdsopname. De interne factoren betreffen de bekwaamheidspercepties van elke peer tutor ten aanzien van zichzelf en de discussiegroep waarvoor hij/zij verantwoordelijk is, een evaluatie van de bijgewoonde voorbereidende tutor training en tot slot de denkprocessen die ten grondslag liggen aan de begeleidingsactiviteiten.

Hoofdstuk 1 gaat vervolgens dieper in op de onderzoekssetting. Het onderzoek naar tutorgedrag binnen een digitale leeromgeving werd gestart in het academiejaar 2004-2005 binnen de opleiding Pedagogische Wetenschappen aan de Universiteit Gent. Concreet werd geopteerd voor cross-age peer tutoring waarbij het leerproces van eerstejaarsstudenten wordt ondersteund door tutors uit een hoger jaar van dezelfde opleiding. Eerstejaarsstudenten Pedagogische Wetenschappen zijn at random gegroepeerd in asynchrone discussiegroepen, waarvan de samenstelling stabiel blijft doorheen de hele discussieperiode. In groepen van ongeveer tien studenten werken ze samen om de leerinhouden bij het opleidingsonderdeel Onderwijskunde, die wekelijks in hoorcolleges worden toegelicht, toe te passen aan de hand van authentieke groepstaken. De tutorbegeleiding kadert zich binnen drie of vier opeenvolgende discussiethema's van telkens twee weken. Voor zowel de eerstejaarsstudenten als hun oudere tutor is participatie in hun discussiegroep verplicht aangezien dit voor de eerst vermelde studenten opgevat wordt als een formeel deel van de cursus en voor de peer tutors als verplichte stage.

Na een korte toelichting bij de dataverzameling in een dergelijke onderzoekssetting worden de objectieven en onderzoeksvragen die doorheen het proefschrift aan bod komen, opgesomd en besproken. De zeven onderzoeksvragen worden behandeld in de hoofdstukken twee tot en met zes.

In hoofdstuk 2 wordt onderzocht welke types begeleidingsactiviteiten de peer tutors toepassen. Daarenboven wordt in kaart gebracht hoe vaak tutors per discussiethema tussenkomen. Met de onderzoeksvragen in hoofdstuk 2 wordt beoogd te achterhalen of er verandering is vast te stellen in tutorgedrag en of de tutors een eigen tutorstijl aanhouden. Tutorgedrag wordt in kaart gebracht via een inhoudsanalyse, waarbij de tussenkomsten van tutors worden gekarakteriseerd in termen van Salmon's (2000) vijfstappenmodel: 'introductie van de leeromgeving', 'socialisatie', 'informatie-uitwisseling', 'kennisconstructie bevorderen' en 'stimuleren van reflectie en persoonlijke ontwikkeling'. De resultaten laten zien dat

begeleiding kan worden opgevat als een brede term die een waaier aan vaardigheden en verantwoordelijkheden in zich draagt die verder reiken dan vakinhoudelijke ondersteuning alleen. Clusteranalyse wordt gehanteerd om tutorstijlen te achterhalen. We kunnen concluderen dat er drie verschillende tutorstijlen vast te stellen zijn, maar dat de tutors niet steeds diezelfde stijl aanhouden over de tijd of discussiethema's heen. Hierbij aansluitend kan een discussie worden opgestart over de meetbaarheid en stabiliteit van tutorstijlen.

In hoofdstuk 3 wordt aangetoond dat de begeleidingsrol van een online peer tutor naast meervoudig ook dynamisch van aard is. De beschrijvende resultaten geven aan dat het aantal tutorberichten daalt over de tijd. Multinomiale logistische regressies tonen verder dat naarmate de discussiethema's vorderen, peer tutors het meest blijven tussenkomen op organisatorisch en sociaal vlak en minder op het vlak van het stimuleren van kennisconstructie, dat ze evolueren van coach naar model en, tot slot, dat peer tutors hun voorkeur geven aan interventies die zich richten tot de groep in plaats van het individu. Op basis van de voorgaande resultaten kunnen we dan ook concluderen dat het tijdstip van tussenkomen mee de manier waarop bepaalt.

De bevindingen in hoofdstuk 2 en 3 hebben ertoe geleid dat in de volgende twee hoofdstukken de bestaande tutor training wordt aangepast met het oog op een gedragsverandering bij de tutors. Meer bepaald worden de tutors at random toegewezen aan diverse training condities die zowel pre-service als in-service training componenten omvatten. De tutor training is in hoofdzaak bijgesteld om ervoor te zorgen dat de tutors hun tussenkomsten meer gaan variëren. Daarbij wordt de aandacht op het arsenaal aan begeleidingsmogelijkheden en hun eigen functioneren daaromtrent gevestigd, wat hun reflectie bevordert.

In deze context onderzoeken we in hoofdstuk 4 in hoeverre drie tutor training condities elk hun invloed uitoefenen op tutorgedrag en op de bekwaamheidspercepties van de tutor ten aanzien van zichzelf en de groep. Het voornaamste resultaat luidt als volgt: tutors expliciet inleiden in de multidimensionale aard van tutorgedrag en van hen verlangen dat ze hun berichten labellen volgens een theoretisch model bevordert zowel de frequentie van tussenkomen in de beginfase als de inhoudelijke spreiding van hun begeleiding. Tegen de achtergrond van de onderzoeksvraag over de invloed van specifieke training op bekwaamheidspercepties blijkt dat labelen een minder positieve perceptie van de bekwaamheid van de groep in de hand kan werken. Tot slot vermoeden we dat labelen een cognitief belastende taak is die verband houdt met zelfregulatie. Uit de resultaten blijkt dat peer tutors hun berichten niet altijd accuraat labelen.

Hoofdstuk 5 gaat verder in op de invloed van tutor training op tutorgedrag en controleert voor persoonsgebonden factoren zoals bekwaamheidspercepties en training evaluatie. Drie tutor training condities worden onderscheiden. Ofwel gaat er bijzondere aandacht naar de multidimensionale aard van tutorgedrag, ofwel naar de evolutie van model naar coach, ofwel is de training eerder all-round zoals beschreven in hoofdstuk 2 en 3. De resultaten van de multinomiale logistische regressie-analyses laten zien dat ten opzichte van de all-round training conditie de tutors in de experimentele training condities significant meer aandacht besteden aan het stimuleren van persoonlijke ontwikkeling en aan modelgedrag. Ten opzichte

van de model/coach conditie vertonen de tutors in de training conditie die zich richt op de multidimensionale aard van tutorgedrag hogere zelfbekwaamheidspercepties met betrekking tot ‘zichzelf in staat zien tot het uitlokken van kennisconstructie’. Deze bevinding herhaalde zich echter niet op het einde van het peer tutoring project. Wat de bekwaamheidspercepties van tutors ten aanzien van hun discussiegroep betreft zijn geen verschillen gevonden tussen de experimentele training condities. Verder is het zo dat tutors in de model/coach conditie hun voorbereidende training meer positief evalueren. Tot slot geven de resultaten in het vijfde hoofdstuk aan dat de bekwaamheidspercepties van online peer tutors ten aanzien van zichzelf dalen terwijl deze ten aanzien van de groep stijgen over de tijd heen.

Hoofdstuk 6 onderscheidt zich van de vorige in die zin dat het onderzoek kwalitatief van aard is in plaats van kwantitatief. Via stimulated-recall interviews achterhalen we de denkprocessen van tutors die ten grondslag liggen aan het al dan niet posten van een tutorbericht in de discussiegroep. Hoofdstuk 6 gaat dus verder dan het meten van gedrag. Twee types van gegevens kunnen worden afgeleid uit de resultaten. Ten eerste vermelden de tutors dat ze doelgericht en weloverwogen willen tussenkomen, bijvoorbeeld aan de hand van specifieke tutorstrategieën om de discussie op gang te houden en er diepgang in te steken. Ten tweede worden de tutors in het kader van hun begeleidingsactiviteiten geconfronteerd met een aantal dilemma’s die voornamelijk verband houden met wanneer en hoe precies een bericht plaatsen. Het valt op dat peer tutors niet belerend willen overkomen of verkeerd begrepen worden. Dat ze geen inhoudsexperten zijn, baart de peer tutors ook zorgen.

Hoofdstuk 7 herhaalt de focus van het proefschrift en de onderzoeksvragen. Vervolgens bevat het hoofdstuk een algemene discussie waarin de resultaten die doorheen de vorige hoofdstukken werden voorgesteld, kort samengevat en met elkaar in verband gebracht worden. De conclusies bevestigen de meervoudigheid van het e-moderating concept (Salmon, 2000), hetgeen een instap kan betekenen voor verder grootschalig onderzoek naar de effectiviteit van online peer tutoring en de meerwaarde van de online tutor daarbinnen. De algemene conclusie die getrokken kan worden is dat online peer tutoring een complex proces is en dat peer tutorgedrag in wisselwerking staat met contextfactoren. Bijvoorbeeld, specifieke tutor training kan bepaald tutorgedrag aanmoedigen en de aard van de begeleidingsactiviteiten op een hoger niveau tillen. Onze resultaten kunnen worden beschouwd als een aanwijzing voor de mate waarin de leeromgeving een invloed heeft op de begeleidingsactiviteiten van een peer tutor. Deze bevindingen moeten echter ook gezien worden met enkele beperkingen indachtig aangaande de dataverzameling, de onderzoeksdesign en de methodologische technieken. De tekortkomingen van dit proefschrift duiden op interessante mogelijkheden voor toekomstig onderzoek. In een verder portret van tutorgedrag is het onder andere aangewezen om de tutees en taakeigenschappen op te nemen in de dataverzameling. Een tweede suggestie is het opzetten van vergelijkend onderzoek binnen een ander kennisdomein. Op het einde van hoofdstuk 7 worden een aantal praktische en theoretische implicaties vermeld, verbonden aan de resultaten opgenomen in dit proefschrift. Voor docenten kunnen vooral de implicaties met betrekking tot de design en de implementatie van tutor training hun nut bewijzen. Bij het ontwerp van een tutor training raden we aan in te gaan op hoe en

wanneer reflectie kan gestimuleerd worden en om peer tutors de mogelijkheid te geven om deel te nemen aan intervisiegesprekken.

Referenties

Dillenbourg, P. (2002). Over-scripting CSCL: The risks of blending collaborative learning with instructional design. In P.A. Kirshner (Ed.), *Three worlds of CSCL: Can we support CSCL?* (pp. 61-91). Heerlen: Open Universiteit Nederland.

Duran, D., & Monereo, C. (2005). Styles and sequences of cooperative interaction in fixed and reciprocal peer tutoring. *Learning and Instruction, 15*, 179-199.

Pata, K., Sarapuu, T., & Lehtinen, E. (2005). Tutor scaffolding styles of dilemma solving in network-based role-play. *Learning and Instruction, 15,* 571-587.

Salmon, G. (2000). A model for CMC in education and training. *E-moderating. The key to teaching and learning online.* London: Kogan Page.

Teasley, S. D. (1995). The role of talk in children's peer collaborations. *Developmental Psychology, 31*, 207-220.

Topping, K. J. (1996). The effectiveness of peer tutoring in further and higher education: A typology and review of the literature. *Higher Education, 32*, 321-345.

Wigfield, A., & Eccles, J. S. (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology, 25*, 68-81.