Interaction and Collaborative Learning – If, Why and How?

Berit Östlund [berit.ostlund@educ.umu.se]

Department of Child and Youth Education, Special Education and Counselling

Umeå University [http://www.umu.se]

SE-90187 Umeå

Sweden

Abstracts

English

The main purpose of this explorative study was to develop further understanding of factors influencing peer-learner interactions and collaborative learning activities, in an asynchronous computer-mediated learning environment. The study was conducted with a small group of seven students enrolled in a supplementary course for special education teachers. Questionnaires, portfolios and transcriptions of the students' postings into WebBoard were used for collecting data. The results indicate that the students appreciated computer-mediated communication but they preferred face-to-face communication, did not collaborate with assignments beyond requirements. There was little evidence of factors characterizing effective collaborative learning activities. Several possible reasons were found and discussed, e.g., the design of assignments and assessments, the teacher's activity, the group-building process, the students' life situation outside of their studies, the students' motives to enrol in the course, their preferred learning style and their skills in how to collaborate effectively in an asynchronous computer-mediated environment.

Swedish

Syftet med studien var att få kunskap om faktorer som påverkar interaktion och kollaborativa läraktiviteter i en asynkron datormedierad lärmiljö. Studien genomfördes bland sju kvinnliga distansstudenter som deltog i en fortbildningskurs för specialpedagoger. Data samlades in via enkäter, portfolio och transkriptioner av studenternas textmeddelanden i en datorkonferens i WebBoard. Resultatet visar att studenterna uppskattade den datormedierade kommunikationen men de föredrog ansikte-mot-ansikte kommunikation. De samverkade enbart i den omfattning som krävdes för att få godkänt resultat på kursen och det förekom inte ett effektivt samverkanslärande utifrån Sollers (2001) modell. Flera möjliga förklaringar till resultatet hittades och diskuterades bl.a. examinationernas och uppgifternas utformning, lärarens aktivitet, gruppbildningsprocessen, studenternas övriga livssituation, deras motiv till att delta i kursen samt deras individuella lärstil och färdighet i att samverka effektivt i en asynkron datormedierad lärmiljö.

Keywords

Peer-learner interaction, collaborative learning, asynchronous computer-mediated distance education

Introduction

The use of the interest in distance education has increased during the last decades. One reason for this is the rapid economical and societal changes that make continuing education necessary for more people. In this context distance education is considered an important means to make higher education possible for those who otherwise have difficulties taking advantage of education at a campus. Another reason is the development of digital information and communication technologies (ICT), which entails logistical as well as pedagogical advantages. For distance-education students ICT involves possibilities to interact with teachers and peer-learners when learning online (Peters 2003). Consequently, it is currently possible to arrange courses based on collaborative learning principles grounded in socio-cultural and social constructivist theories. These theories, influenced by Lev Vygotskij, argue that learning is a social activity and knowledge is constructed through collaboration between the individual and the social surrounding.

There is a broad agreement among distance-education researchers that peer-learner interaction is a key element to increase interest and motivation among distance-education students as well as to promote successful studies and deep levels of learning (Saba, 2000; Hammond, 2005). Studies show that distance learners appreciate the possibility to interact and learn together with peers (Kumari, 2001; Piccano, 2002; Wännman Toresson, 2002; Rickardsson & Swan, 2003; Rovai & Barnum, 2003). However, studies also demonstrate that extensive interaction among participants commences naturally in some learning groups while in other groups interactions remain on a low level and an effective learning environment based on collaboration is never achieved (Kanuka & Anderson, 1998; Soller, 2001; Korsgaard-Sorensen, 2002; Weller, 2002). Students often communicate their thoughts and experiences with peers but they do not connect to the contributions of others. That means online discussions often involve sharing and exploring information rather than constructing a deep level of understanding in collaboration with others through synthesis of different perspectives (Gunawardena et al., 1997; Kanuka & Andersson, 1998; Wännman Toresson, 2002; Garrison, Anderson & Archer, 2001). This raises questions about factors influencing distance-education students' behaviours regarding peer-learner interaction and collaborative learning activities in computer-mediated learning environments.

Research about computer-mediated, peer-learner interaction and collaborative learning has to a great extent been focused on factors at an organisational level, e.g., course design, instructional methods and computer-mediated communication tools (Hammond, 2005).

Several researchers suggest that effective collaborative learning does not take place in online study groups if the course is not designed for it (Korsgaard-Sorensen, 2002; Weller, 2002; Swan et al., 2006). Collaboration should, for instance, be integrated into assignments and assessments (Swan et al., 2006).

Other studies emphasize the capabilities of the technologies themselves (Short et al., 1976; Soller, 2001). The most common distance-education course designs described in the literature are those based upon written asynchronous computer-mediated communication (Weller, 2002; Hammond, 2005). Many

researchers argue that the delayed responses in asynchronous computer-mediated communication are particularly useful for adult distance learners and for collaborative learning as it reduces time, place and situational barriers. In addition, they argue that asynchrony provides democratic participation and increased reflection time and thereby the possibility to generate more considered responses to discussion topics, which enhances deep-learning and critical thinking (Rovai, 2001; Weller, 2002; Holmberg, 2003; Hammond, 2005). Delayed responses may also influence the interactions negatively as the spontaneity associated with face-to-face learning environments may decrease as well as the development of interpersonal relationships, the sense of belonging to a group, and the sense of salience of an interaction partner (Walther, Slovacek & Tidwell, 2001; Kreijns, Krischner & Jochems, 2003).

Researchers also highlight the social aspects of the online learning environment (Garrison et al., 1999; Rourke et al., 1999; Meyer, 2000; Haythornthwaite et al., 2000; Rovai, 2001). Garrison et al., (1999) argue that social presence, the perceived salience of others in a computer-mediated learning environment, has a positive influence on learning because it promotes and sustains interaction. That means that teachers and course designers have to organise distance-education courses in a way that facilitate acquaintance and trust among students. Some studies show that interaction-patterns are influenced by the participants' individual differences and preferences arising from, e.g., learning style (Faye & Ally, 2005), motives and intentions (Donath, 1999) and experiences with technologies used in the course (Shany & Nachmias, 2000).

There is no doubt that it is important to take factors of an organizational level into consideration when constructing a collaborative learning environment. However, a study-group is composed of students with individual differences and different preferences. The significance of factors on a group and individual level influencing the students' possibility or willingness to learn in collaboration in a study-group remain under-researched as do the distance-education students' own perceptions and opinions about learning together with others. This is investigated in the study presented in this article.

The study

Purpose

This study is included in the project "Interactive learning in distance education", that was granted funds from the Swedish Research Council.

The purpose was to develop a better understanding of factors influencing peer-learner interactions and collaborative learning activities, in an asynchronous computer-mediated learning environment. In focus are the students' online-activities, together with their prerequisites of and opinions about learning together with others in a computer-mediated educational setting. The results provide insights into the students' online behaviours and help educators to facilitate collaborative learning in computer-mediated distance education.

Important questions are:

- What are the students' perceptions of and attitudes toward computer-mediated distance education and the opportunity to communicate and learn together with others despite distance?
- To what extent and in what way did the students actually interact and collaborate for learning using computer-mediated communication?
- What factors may have influenced the group's online-behaviour?

The study was based on a small group of seven distance-education students participating in a supplementary education course for special education teachers. Quotations and print in italics illustrate the learners' expressions. Pseudonyms were assigned to maintain the participants´ anonymity.

Methodology

Questionnaires, portfolios and transcriptions of the students' postings to WebBoard were used to collect data relevant to address the research questions. There is evidence that some exchanges between students did occur via telephone, private e-mail messages and face to face meetings. However, these exchanges could not be followed and are not investigated in this study.

Questionnaires and portfolios were used to collect data about the students' background and life situation outside of their studies, their preferred learning-style and their perceptions about the course design, the groups' activity regarding peer-learner interactivity and collaborative learning. One questionnaire was handed out at the first meeting on campus and a second was mailed one month after the course was completed. The questionnaires contained both closed and open-ended questions. The portfolio was one of the assignments included in the course. The students were, among other things, supposed to write about the course and reflect on their learning process.

The total number of postings and the number of postings sent by each participant were counted during the 20 weeks in order to view the group's overall activity in WebBoard. The content in the postings was classified into two categories, obligatory, i.e., requirements to pass the course, and spontaneous. The spontaneous contributions were subdivided into the categories cognitive, social and practical content.

The contributions made by the students while they worked with a group-related assignment "Literature-discussion" were further investigated to look for utterances indicating effective collaborative learning activities, i.e., activities based on interdependence among participants to reach a common goal. The categories of analyses were derived from "The collaborative learning model" developed by Soller (1999). The model identifies five categories of characteristics shown in effective collaborative learning groups; *participation*, *social grounding*, *active learning conversation skills*, *performance analysis and group processing*, and *promotive interaction*.

Participation: If all members in a study group are actively participating in the group's activities the learning potential is maximized because it increases the amount of information, thoughts and experiences available to discuss and to use in the construction of knowledge. Additionally, active participation by all members increases the possibility that everybody in the group learns the subject discussed in the course and the risk that some students are left behind decreases.

Social grounding: Social grounding skills are essential for establishment and maintenance of shared understanding of meaning within a study group. In successful collaborative learning activities students connect to the contributions of others. They take turns in questioning, clarifying and rewarding others' comments to ensure a common understanding of the subject matter discussed as well as proposed solutions to problems. The students also take turns in playing different roles in discussions such as questioner, mediator, clarifier, facilitator, and motivator.

Active Learning Conversation Skills: The value of a student's contribution to learning in a group is settled by the quality of her conversation in the online discussions. Students with skills in how to learn collaboratively know how to mediate and facilitate conversation, how and when to ask questions, inform and motivate the participants in the group, and how to handle conflicting opinions. The Collaborative Learning Conversation Skills Taxonomy developed by Soller (1999) demonstrates three learning conversation skill types – Conversation, Active Learning and Creative Conflict – and breaks them down into related sub-skills and attributes. Active Learning conversation skills describe the core communication activities of effective learning groups. The three sub-skills related to active learning and their attributes are: Inform – assert, justify explain/clarify, elaborate, suggest, lead, rephrase; Request – asking for opinion, justification, clarification, elaboration, information; and Motivate – reinforce, encourage.

Performance Analysis and Group Processing:

Group processing exists when groups discuss their progress and decide what behaviours to continue or change.

Promotive Interaction

A group achieves promotive interdependence when the students in the group perceive that their goals are positively correlated, so that an individual can only attain his goal if his team members also attain their goals. Students who are influenced by promotive interdependence engage in *promotive interaction*; they verbally promote each other's understanding through support, help, and encouragement. If a student does not understand the answer to a question or solution to a problem, his team-mates make special accommodations to address his misunderstanding before the group moves on.

Nature of the course

The context of this study was a 40-week, half-time, supplementary course for special education teachers. The course subject was "Speech and language disabilities among children". The study focused on students' activities and experiences during weeks 21-40. The design of the course is common in Sweden and no special arrangements were made to address the research questions. There were meetings on campus every seventh week, lasting three days each. At these meetings, the students had lectures, laboratory lessons, group discussions, tests and oral presentations. A study guide with reading instructions and assignments with deadlines was provided. There was a total of seven assignments. Five assignments were to be sent in to WebBoard and online interactions between the students was a compulsory component in three of those assignments. The 29 students taking part in the course were divided into four study groups of seven to eight individuals. The groups were formed so that the individuals were geographically dispersed and worked within different levels in the school system, from preschool to senior high school. This study was conducted in one of these study groups. This particular group was selected because the students in this group made the most contributions during the weeks 21-40 as compared to the other groups in the course. WebBoard, a tool for online conferencing, was used for distribution of course material and communication throughout the course. WebBoard provides the opportunity for threaded discussions and chats as well as the ability to post and download text. While the system supports both asynchronous and synchronous text-based communication, the assignments in the course required only asynchronous communication. Different forums were organised for different purposes, i.e., "Group" (one for each group in the class), "Whole Group", "Message" and "Break". The students were required to send the assignments to "Group" and "Whole Group". "Break" was a forum for social communication and "Message" was intended for exchange of information.

The participants

The students were all female adult learners (Table 1). All of them were professional teachers with further training in special-education. The students' principal motive to attend the course was their interest for the subject matter taught in the course. They had opted for this particular course course because they were dependent on a course design with flexibility with regard to time and space. Several students (Anna, Klara, Svea, Greta and Beda) reported that another important reason was that their place of work was in need of competence in this area. For instance, S1 expressed, "... *I need to learn more about this subject because my work requires that I keep up to date...*" S5 had been asked by her employer to enrol in the course.

The students pursued their studies from their own homes where they had access to computers and the Internet. Half of the students had broadband connections. All students worked while taking the course and half of them worked full-time (Table 1). As the students had already studied together for 20 weeks before this study was conducted, they were acquainted with each other and familiar with computer-mediated distance education and WebBoard. In addition, all students, except S5, had previous experience with computer-mediated distance education. S6, the youngest participant, was the only student who rated herself as having high computer competence, while S7 and S3 rated themselves as having low competence.

Table 1. Description of the participants N=7 .

	Anna	Lena	Greta	Ulla	Svea	K
Age	45	<30	>45	45	>45	>
Professional work	100%	65%	100%	50%	100 %	1(
Distance study experience	High	High	High	High	High	H
Computer experience	Medium	High	Medium	Low	Low	N
Study time/week	> 20h	8 h	15-20h	20h	15-18h	2:
Study time (%) (day/evening/weekend)	10/20/70	50/0/50	50/25/25	75/0/25	0/25/75	1(
Preferred learning style (Individual , group, listen, read, write, discuss)	-Group	-Individ	-Group -Not write	-Group - Not discuss and write	-Individ. or together with <u>one</u> person - Not write	-(

The amount of time spent studying varied among participants as did the way they scheduled their studies (Table 1). S1 and S3 studied mostly during the weekends while S? studied mainly daytime and S2 spent a great deal of evenings on her studies.

The students' preferred learning style differed (Table 1). Half of the students reported that they preferred to learn in a group, while the other half preferred to learn individually or together with only one person. Furthermore, two students did not prefer to discuss and three did not like to write. All of the students preferred listening to a professional when learning new subjects.

Participant perceptions and attitudes

The students expressed a high level of satisfaction with combination of distance study and on campus meetings. Despite the differences in preferred learning styles all participants reported that the way the course was designed suited their individual way of learning. Lena, an individual learner, stated, for example, that she enjoyed the course, because she "...*enjoy[s] to read and write alone and afterwards take part of the others' writings*..." Klara, a group-related learner, expressed that the course design was perfect because she had the opportunity to "...*reflect for myself and then exchange my thoughts with others*...". The students considered that the study guide with reading instructions and timetables had helped them to organise their studies. Even so, the students working full-time also suggested that the timetables to some extent had limited the flexibility within the course. All of the students stated that the activities on campus, e.g., attending lectures, listening to oral presentations from peers and participating in discussions, were important sources for their learning. They stated that it was easier to discuss and exchange experiences and knowledge when meeting face-to-face. Representative comments to that effect read as follows:

> "...*sometimes it feels difficult to discuss the assignments via the computer.../.../...When we meet on campus we definitely have no problems with discussions. We talk all the time and we have always more to discuss but there is no time...*"

> "...*distance studies imply that you are alone with your thoughts and therefore it is important to meet and discuss them with others...*"

Most of the students also used the telephone to keep in touch and two mainly collaborated with peers in other groups as they lived in the same municipality and therefore could meet in "here and now" situations.

The participants expressed that they had developed a sense of community and felt secure in the study group when meeting on campus as well as in the online learning environment. Some students wrote "... *I have for the most part visited our small group conference, it was more personal...*" (Anna); *"... the small group has been a support through the course, you could bring up problems and thoughts which you hesitate to mention in the whole class ..."* (Klara). They appreciated that the teacher did not split the group between different modules in the course (which according to the students was common in earlier courses they had attended) because they stated that it was more time-consuming to become acquainted with one another and to build a warm and secure atmosphere in a group when studying at a distance.

Even though the students preferred to communicate and collaborate when meeting face-to-face, they enjoyed the opportunity to communicate via WebBoard. They saw it as an effective means for distribution of questions, answers and feedback:

> "... *you don't have to use the telephone and call many people, it is just to send a message and pretty soon you have got a lot of answers...*"

They rated the text-based asynchronous communication as excellent, because

> "...*you can save the texts and create a valuable library of ideas*"

> "...*had the possibility to reflect before answering or commenting on the assignments of others...*"and

> "... *could choose time for studies at your own convenience...*".

All but one also explicitly stated that the computer-mediated communication had been important for their learning. They mentioned that they had mainly engaged in exchanges about the course subject and that collaboration mostly implied providing feedback on each others' assignments. They had learned from reading others' texts:

> "...*you can understand the literature from different perspectives*..." (Klara)

> "...*We reflect on different parts and aspects though reading the same literature*..." (Greta)

> "...*their texts are like a goldmine regarding method and screening material*..." (Beda) and

> "...*I have saved texts as they could be useful in my professional work*..." (Anna).

They learned from finding out about the others' experiences from their workplace "...*they have informed me how they work in different special education teams*..." (Lena). Noteworthy is that none of the students reported on learning from obtaining feedback on their own thoughts and texts from their peers. Klara and Anna, who preferred to learn together with others in a group, rated the extent of collaboration slightly higher than Lena and Svea, who preferred to learn individually or together with just one person. Svea was also more hesitant about whether collaboration with peers had facilitated their learning. She stated, "...*study-guide, course literature and activities on campus was sufficient*..." and Lena declared that she had "... *not precisely collaborated when working with assignments, I have for the most part communicated regarding social matters*..."

Interactions for the purpose of promoting practical and social support occurred, according to the students, but to a minor extent. Some students expressed, for example: "...*we have supported and encouraged each other in different ways*..." (Anna); ...*it is nice to hear from the others, for instance if someone else also finds a task difficult. You don't feel alone...*" (Lena); "...*we supported each other if it became hard*..." (Greta); and "...*ask if the others had interpreted the task in the same way as I did*..." (Klara).

The online-activities during weeks 21-40

All students participated by sending messages to the group conference in WebBoard. In weeks 21-40 the students made 156 contributions, 76 of these were obligatory, i.e., task-related contributions as a requisite for grading. The students did not send additional comments beyond those required regarding assignments.

Approximately the same amount of messages (80) was sent by the students spontaneously. A majority of those had a social (61 percent) or practical (22 percent) content. Only 17 percent had content related to the course subject, e.g., information from corresponding courses and from their professional work.

The amount of spontaneous postings with social content and the fact that a majority of the messages sent to WebBoard had friendly and personal openings, sometimes with nicknames and often with terminating phrases such as *"...hugs from..."* and *"...take care..."*, indicates that the students felt social presence, community and trust in the study group.

The spontaneous contributions were in most cases replied to by one or two peers. Some postings with social and practical content received more responses, e.g., two messages with photos of a student's family and house received 11 and 8 replies, respectively and a summery of a discussion from campus about rules how to communicate while studying at a distance received 6 replies. The replies did not connect to one another but were directed to the student who sent the initiating messages, in this case Lena.

The students' participation in the spontaneous discussions was uneven. The most active students in the group were Anna and Lena. They contributed 33 percent and 19 percent of the postings, respectively. They initiated and replied to others´ contributions to the same extent. Beda who made 3 percent of the postings replied only. Neither Lena nor Beda preferred learning in a group. The other participants in the group made slightly more than 13 percent of the spontaneous postings to the group conference in WebBoard and a majority of those were replies to others. Anna and Klara also made the most spontaneous contributions to "Whole group" and "Message". None of the students contributed to the forum "Break" specifically organised for social communication.

The teacher made 6 percent of the postings to the group, containing mostly practical or social content. She did not participate in discussions related to assignments, and had informed the students about her chosen approach beforehand. She made 30 percent of the total postings to the conference "Message". Most of these had administrative or social content, e.g., schedule, study-guide, information relating to assignments and small talk. The teacher's postings consisted to a large extent of responses to students' contributions.

The students' activities during the "Literature discussion"

The above results indicate that the students appreciated the opportunity to interact with peers, because it facilitated their studies and learning. All students completed the required contributions to pass the course and were more or less engaged in spontaneous communication. The question is: Did they engage in effective collaborative learning activities when working with group-related assignments? This question was investigated by analyzing the contributions made by the students when they worked with the assignment "Literature discussion". The students were supposed to asynchronously discuss a book about autism, a disability through which communication difficulties are central. The students were assessed individually. To obtain a passing grade each student had to both initiate a discussion by formulating a discussion question and contribute to all participants' initiated discussions, with at least one message to each participant. The assignment was to be finished in two weeks. Major findings are presented in Table 2.

Table 2. Analyses of the contributions made by the participants while working with "Literature-discussion"

	Anna	Lena	Greta	Ulla	Svea	Klara	Beda	tot
Number of words in initiating text	340	285	141	946	77	269	172	2230
Number of questions in initiating text	5	2	3	6	1	2	4	23
Number of words written by each participant	1599 15 %	1764 16,6%	1152 10,8%	3157 29,6%	987 9,3%	1140 10,7%	856 8%	10655 100%
Number of words received in response	21,1% 1783	10% 844	12,1% 1024	14,5% 1218	9% 723	15,6% 1320	17,7% 1503	8415
Numbers of questions in initiating text	5	2	3	6	1	2	4	23
Numbers of contributions addressed to the whole group	5	1	-	2	-	4	1	13
Numbers of contributions with references to others responses	3	2	-	2	-	6	3	16
Encouragements	4	3	3	1	1	3	2	18
Acknowledgements (response to response)	2	-	-	-	-	1	-	3
Maintaining discussion (further questions in responses)	7 in 2 responses	-	7 in 4 responses	-	-	-	-	14
Expressions of uncertainty because lack of experiences	0	1	5	5	4	2	6	23
Uncertain statements (perhaps, maybe)	8	5	2	7	2	7	4	35
Certain statements (It is, I think)	6	2	5	7	4	3	2	29

Participation: All students participated in the literature discussion but, as mentioned before, only to the extent that was required to pass the course. They initiated a discussion by posting a text with concluding questions (a total of 23 questions) to discuss in the group and they replied to the other participants' initial postings. The students did not respond to their peers' replies, except for Anna and Klara, who sent a few acknowledgments and thanked for the responses. Consequently, there were no extended discussions. The students' participation in the discussions was uneven regarding the number of words and formulated questions in the contributions initiating the discussions (Table 2). Ulla formulated six questions in her initiating text consisting of 946 words and she wrote a total of 3157 words in the literature discussion. Svea formulated only one question in her 77-word-long text, and she wrote 987 words in total. The number of words the participants received in response from their peers differed as well. Anna received the largest number of words (1783 words) and Svea the smallest amount (723 words). Anna also contributed with the second most number of words (1599 words) and questions (5).

Social Grounding: The students mostly addressed their replies directly to the student who initiated a discussion, with questions related to the literature. Greta wrote, "... *Hi Lena. Your question is very important...*" Now and then they also turned to the whole group. Klara wrote, "...*Hi Lena and the rest of you...*" They did not turn to other participants and connect to their replies. Although, there are a few examples where the students referred to contributions from others (see Table 2), but only indirectly and when they agreed entirely with their thoughts. Beda answered, for instance, "...*Hi Greta. I have the same opinion as Lena. I believe that people of average intelligence with social disabilities have a problematic situation in our society...*" There was no natural turn-taking either in the dialogue or in the group roles. They mainly followed the instructions, meaning that all participants first acted as questioners and then clarifiers when working with the assignment.

Collaborative learning skills: There was no coordination of the discussions. All students initiated their discussions about the same time and the discussions took place in parallel. The opening contributions were mainly composed of summaries from the course literature (never from other sources), and concluded with questions. The students did not communicate their viewpoints, justify their opinions or question the literature. They mainly asked questions to get information about the others' experiences of and opinions about the subject matter mentioned in the literature. Beda asked, for instance, "...*Is anyone experienced with teaching autistic children in special classes? How does it work...*?" As mentioned above, the students did not respond to responses of others. The students did not question or challenge the others' thoughts, they did not ask the peers to clarify their thoughts and they did not argue for or against opinions of others. Statements or opinions were often formulated with uncertainty (see Table 2). In 35 out of 41 replies the students expressed uncertainty , e.g., *maybe it is, I am not certain but, and I believe*. A majority of the contributions contained sentences where the students expressed their uncertainty because of lack of experience from the discussed subject area. Greta wrote, "...*Hi Ulla. Since I have no experiences from teaching children with autism is it difficult for me to have an opinion about the methods used, maybe it is* ...*" Now and then the students wrote encouraging statements, but simply to praise peers' questions. Beda wrote, for example, to Svea "...*your questions are very interesting...*". Anna and Greta tried to maintain the discussions by asking further questions in their replies, but these questions did not receive any responses from the others. The discussion was concluded as soon as everybody had made the contributions required to pass the course.

Performance Analysis and Group Processing: The students did not conclude their mutual efforts or learning experience nor did they discuss how to continue to promote further understanding of the subject matter discussed.

Promotive interaction: The students' activities did not show any genuine interdependence. It seemed as though they mostly followed the instructions and were simply dependent on each others' questions so they could reply and thereby pass the assignment. They supported each other by answering questions they did not provide responses to responses nor answer further questions and they did not ensure that everybody in the group had learned.

Summary of the major findings

The students' comments indicate that they appreciated the course design of distance-education studies combined with meetings on campus. They stressed that on-campus activities were important for their learning because they could attend lectures, listen to oral presentations from their peers and join discussions. They stated that it was easier to communicate when meeting "face-to-face" compared to communicating via WebBoard. The opportunity to communicate via WebBoard was also highly appreciated. The participants stated that they had mainly communicated and collaborated regarding the course subject. The students felt community and security within the small study group. They stressed that the group had mainly served the purpose of giving cognitive support as they learned through discussing topics relating to the course subject, exchanging experiences from different areas in the subject, and giving feedback to each others' texts. The students did not report any benefits from receiving feedback from others and they did not emphasize social or psychological dimensions of interaction. Consequently, the students perceived the study group as an important source for individual learning, but they did not use the group for mutual knowledge construction.

The analyses of the postings during weeks 21-40 indicate that the amount of obligatory, task-related postings were equal to the spontaneous postings. The students did not collaborate beyond what was expected from them. The spontaneous postings mainly had a social content and received most replies from peers. Thus, the result from the analyses of the contributions in WebBoard differed to some extent from the students' perceptions of their online-behaviours, as they emphasized the social dimension to a minor extent compared to what they actually did. The participation regarding spontaneous communication was uneven, because a few students made a majority of the postings and most of the students only responded to others' contributions.

The analysis of students' contributions during the "Literature-discussion" provides little evidence of effective collaborative learning activities. The students mostly shared and compared information, i.e., they informed each other of their experiences, opinions and thoughts relating to the subject matter. They did not connect to the contributions of others besides that of the student initiating the discussion. There was no attempt to have extended discussions where the students followed up on their peers' statements or experiences. In addition, the students did not question either the literature or each other. Principally, there was no indication that the learners collaborated by building common knowledge from each other's ideas. Instead there was an accumulation of individual contributions.

Factors influencing the students' online behaviours

According to the literature (e.g., Swan et al., 2006) collaboration has to be integrated into assignments and assessments, otherwise collaboration among students will not take place. The assignment "Literature-

discussion" investigated in this study required peer-interaction as the students had to discuss and comment on peers' contributions to pass the examination. Yet, the assignments and assessments did not promote further interaction between the students as the students had no requirements on having extended discussions leading to common conclusions. Furthermore, an individual was not dependent on the content of her peer's contributions because the grades were awarded individually and the students did not have to incorporate their peers' thoughts in their written examination.

The students had commitments in their professional work and domestic lives that influenced the time and energy they could exert into their studies (see also Östlund, 2005 and 2007). Anna and Klara, who worked full-time, stated that it was very stressful to work in combination with studies. Klara expressed, "...*I lived as if in a bubble. The course took all of my spare time. Everything else in my life had to step aside ...*" Both of them felt that despite all the time they spent on their studies they did not manage to do the amount of coursework they had wanted to do. Anna wrote, "...*there was not enough time to read all contributions in the group conference. I plan to read them when the course is over...*" Because collaboration is time consuming (Weller, 2002), it is likely that the students had to keep the collaboration at a low level. Therefore, they did not collaborate beyond the requirements of the assignments. The students' different schedules for studies (according to non-university related commitments) could also have had a negative influence on collaboration and discussions as they had to wait for responses to their contributions. Consequently, the design of the assignment, the assessment along with the students' life situation outside of their university studies seem to be one probable explanation for the lack of sustained discussions and effective collaborative activities.

Asynchronous computer-mediated communication increases reflection-time and thereby the possibility to generate more considered texts to discuss (Weller, 2002). In this study, a majority of the texts initiating the discussions were extensive and formally written. This could also have influenced the collaborative activities negatively as creative half-finished thoughts, which could have resulted in further discussions, may have been filtered out. The students may have looked upon the contributions as more or less complete and further discussion was not necessary. Besides that, extensive posting takes more time to read. This may have reduced the discussions to a minimum because the students' time for studies was limited.

Studies show that students need practice, support, and guidance in how to learn collaboratively on-line (Gunawardena et al., 1998; Soller, 2001; Piskurich, 2003; Weller, 2002). Due to the fact that most of the students in the course were familiar with computer-mediated distance education, the teacher might have assumed that they had the skills to collaborate in this environment and did not give an introduction to this mode of study. But having experience with distance education does not imply having the experience or ability to be involved in collaborative learning. Consequently, another explanation for the absence of effective collaborative learning activities could be that the students did not have this knowledge. Moreover, research indicates that teacher's immediacy and involvement as mentors is important to promote a collaborative learning environment (Melrose & Bergeron; 2006). The teacher in this study responded to queries raised by students including content and administrative matters and she encouraged the students with greetings, but she was not involved in the on-line discussions. Yet, had she modelled interaction and collaboration for effective learning, at least by way of introduction, the students would probably have been more successful in doing so.

Kreijns et al. (2003) state the importance of an open and respectful climate where the learners are acquainted with each other if one hopes to establish a collaborative learning environment. The students' reports and postings to WebBoard indicate that they had developed feelings of solidarity and sympathy in the study group. The lack of different opinions, argumentations and challenges during the "Literature discussion" phase of their studies could be explained by the group being caught in an early phase of the group-building process (Schutz, 1998; Tuckman, 1965). They may have been afraid of destroying the warm climate in the group by arguing against each other. The development of a work-group on-line is probably more complicated and time-consuming in an asynchronous computer-mediated environment as compared to face-to-face settings due to a lack of nonverbal cues and the time delay.

The students in the group had a common knowledge base because they were professional teachers with further studies in special education. This could have facilitated discussions and collaboration because the participants had a common understanding of fundamental ideas and useful concepts. On the other hand, the common knowledge base could also have had an impeding effect on the discussions because the participants may have had the same opinions or at least knew the "right" thoughts to make in the group. Most of the students were inexperienced in the subject matter discussed in the particular assignment "Literature discussion". A probable explanation to why they did not question the literature or their peers' contributions is that they gave credence to the more experienced peers and the literature. They had no reason to argue. A majority of the students also expressed a certain degree of ignorance in their replies.

Collaborative learning activities are based on interdependence among participants to reach a common goal. The students in this study did not have a common goal, they had the same goal, namely, to increase the individual competence in the subject area and to pass the course. They did not apply for the course to collaborate with others to create common knowledge. On the contrary, they had applied to the distance-education course because they were dependent on a course design offering maximum flexibility in terms of when and where they study. Because collaboration to some extent decreases flexibility the students may not have seen any advantages with collaborative learning activities. Moreover, as mentioned before, the learners were not dependent on each other to reach their goals according to the design of assignments and assessments. Thus, a further reason for the students' on-line behaviour could be the lack of interdependence and a common goal.

The differences in the students' preferred learning style could be another factor influencing the students' online behaviour regarding effective collaborative activities. The analyses of the postings show, for instance, that two of the most active students, Anna and Klara, were to be found among the group-related students. They also made the most contributions addressed to all participants in the group, contributions with references to others' replies, and contributions with encouragements, i.e., contributions with the intention of maintaining coherence in the group. One of the least active students, Svea, preferred to learn individually or together with only one other person. Furthermore, she did not like to write, which could have influenced the collaborative activities negatively because the communication was text based.

Conclusion

The main purpose of this study was to develop a better understandings of factors that influence peer-learner interactions and collaborative learning activities in an asynchronous computer-mediated learning environment. Because the investigation was conducted in a small group of seven distance-education students, general conclusions cannot be drawn from the findings. Nevertheless, several possible influencing factors were found and discussed, e.g., the design of assignments and assessments, the

teacher's activity and involvement in online activities, the group-building process, the students' life situation beyond their university studies and its effects on when and how much time they could spend on their studies along with their motives for enrolling in the course, their preferred learning style, and their skills in how to effectively collaborate in an asynchronous computer-mediated environment.

The findings indicate that the students visited the conference and interacted with their peers when they were motivated for their own needs and had time for it. They also suggest that one can more or less force students to interact and collaborate by assigning them tasks with requirements of collaboration to pass the course. But if the students do not have the skills, motivation or time they do not interact or collaborate beyond requirements.

Consequently, there are a number of factors on an organisational level to take into consideration when planning for collaborative learning in computer-mediated distance education, but at least as important are the students' prerequisites, interests and preferences. In conclusion, there is a challenge to adjust a collaborative learning environment in which busy, adult, distance-education students perceive that collaboration and interaction add more in terms of learning than they lose in time and flexibility.

References

[1] Donath, J. (1999). Identity and deception in the virtual community. *Communities in cyberspace*, ed. Smith, M. & Kollock, 29-59. London: Routledge. Retrieved Mars, 2007 from http://smg.media.mit.edu /people/Judith/Identity/IdentityDeception.html

[2] Fahy, P.J. & Ally, M. (2005). Student Learning Style and Asynchronous Computer-Mediated Conferencing (CMC) Interaction. *The American Journal of Distance Education,* 19(1), 5-22

[3] Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking and computer conferencing; a model and a tool to access cognitive presence. *American journal of distance education,* 15(1), 7-23

[4] Gunawardena, L., Lowe, C., & Anderson, T. (1997). Interaction analysis of a global on-line debate and the development of a constructivist interaction analysis model for computer conferencing. *Journal of Educational Computing Research,* 17(4), 395-429.

[5] Hammond, M. (2005). A review of recent papers on online discussion in teaching and learning in higher education. *Journal of Asynchronous Learning Networks, 9(3).*

[6] Haythornthwaite, C., Kazmer, M., Robins, J., & Shoemaker, S. (2000). Community development among distance learners: Temporal and technological dimensions. *Journal of Computer Mediated Communication, 6*(1). Retrieved January 2004 from http://www.ascusc.org/jcmc/vol6/issue1/haythornthwaite.html.

[7] Holmberg, B. (2003). *Distance Education in Essence – an overview of theory and practice in the early twenty-first century. 2nd edition.* Oldenburg: Bibliotheks- und Informationssystem der Carl von Ossietzky Universität Oldenburg

[8] Kanuka, H & Anderson, T. (1998). On-line interchange, discord, and knowledge construction. *Journal of Distance Education*, 13(1), 57-74

[9] Korsgaard Sorensen, E (2002). Utformning av kollaborativ kunskapsbyggnad i nätbaserad communities of practice. Hansson, H. (Red.) *Kvalitet och flexibel utbildning – En antologi.* Distans utbildnings myndigheten. Rapport 1:2002

[10] Kreijns, K., Krischner, 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 Behaviour*, 19, 335-353

[11] Kumari, D.S. (2001). Connecting graduate students to virtual guests through asynchronous discussions: analysis of an experience. *Journal of asynchronous Learning Networks*, 5(2)

[12] Melrose, S. & Bergeron, K. (2006). Online Graduate Study of Health Care Learners´ Perceptions of Instructional Immediacy. International Review of Research in Open and Distance Learning

[13] Peters, O. (2003). *Distance Education in Transition New Trends and challenges, 3rd edition.* Bibliotheks- und Informations system der Carl von Ossietzky Universität Oldenburg (BIS) – Verlag

[14] Piccano, A. G. (2002). Beyond Student Perception: issues of interaction, presence, and performance in an online course. *Journal of Asynchronous learning networks* 6(1)

[15] Piskurich, G. M (Ed) (2003). *Preparing Learners for e-learning*. San Francisco: Jossey-Bass/Pfeiffer

[16] Richardson, J, C & Swan K. (2003). Examining Social Presence in online courses in relation to students´ perceived learning and satisfaction. *Journal of Asynchronous learning networks* 7 (1)

[17] Rovai, A. P. (2001). Building classroom community at a distance: a case study. *Education Technology Research and Development, 49*(4).

[18] Rovai, A, P. & Barnum, K, T. (2003). On-Line Course Effectiveness: An analysis of student Interactions and Perceptions of learning. *Journal of Distance Education*. 18 (1), 57-73

[19] Rourke, L., Anderson, T., Garrison, D. R., & Archer, W. (1999). Assessing social presence in asynchronous text-based computer conferencing. *Journal of Distance Education, 14*(2), 50-71.

[20] Saba, F. (2000). Research in distant education: A status report. *International Review of Research in Open and Distance Learning*, 1(1) 1-9.

[21] Shany, N. & Nachmias, R. (2000). *The relationship between performances in a virtual course and thinking styles, gender, and ICT experience.* Science and Technology Education Center. Tel-Aviv University. Research report no 64 Retrieved September 2007 from http://muse.tau.ac.il/publications /64.pdf

[22] Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications*. Toronto, ON: Wiley.

[23] Schutz, W. (1998). *Profound Simplicity*, 3rd ed., Muir Beach, CA: WSA

[24] Soller, A.L. (2001). Supporting Social Interaction in an Intelligent Collaborative Learning System. *International Journal of Artificial Intelligence in Education*, 12(1), 40-62. Retrieved January 2004 from http://aied.inf.ed.ac.uk/members01/archive/vol_12/soller/paper.pdf

[25] Swan, K., Shen, J. & Hiltz, S. R. (2006). Assessment and collaboration in online learning. *Journal of Asynchronous Learning Networks*. 10 (1)

[26] Swan, K. (2006). Threaded Discussion. Paper presented at Ohio Digital Commons for Education (ODCE) 2006 Conference. Retrieved Mars, 2007 from http://www.oln.org/conferences/ODCE2006 /papers/Swan_Threaded_Discussion.pdf

[27] Walther, J. B. & Slovacek, C. L & Tidwell, L. C. (2001). Is a Picture Worth a Thousand Words? Photographic Images in Long-Term and Short-Term Computer-Mediated Communication. *Communication Research*, 28(1), 105-134

[28] Weller, M. (2002). *Delivering Learning on the Net. The Why, what & how of online education.* London and New York: Routledge Falmer

[29] Wännman Toresson, G. (2002). *Kvinnor skapar kunskap på nätet. Datorbaserad fortbildning för lärare.* Akademiska avhandlingar vid Pedagogiska institutionen, Umeå Universitet Nr 62

[30] Tuckman, B. (1965). Developmental sequence in small groups. Psychological Bulletin, 63(6).

[31] Östlund, B. (2005). Stress, Disruption and Community- adult learners experiences of obstacles and opportunities in distance education. *European Journal of Open, Distance and E-learning.*

[32] Östlund, B. (2007). Prerequisites for interactive learning in distance education - A student perspective. Accepted for publication in *Australasian Journal of Educational Technology*