Allocated online reciprocal peer support via instant messaging as a candidate for decreasing the tutoring load of teachers

Summary

Influenced by various changes in higher education, such as an increase in learning independent of place and time, student populations have become increasingly heterogeneous. For example, with the increasing emphasis on self-regulation of students, teachers need to provide them with more individual tutoring. This increased need for guidance is reinforced by the younger students' expectations that others use modern communication tools the same way as they do themselves (Prensky, 2001; Simons, 2006). The increasing need for guidance among students increases teachers' tutoring workload (Fox & MacKeogh, 2003; Rumble, 2001). According to teachers, the answering of student questions is time-consuming (De Vries et al., 2005). As attempts to solve this problem systems for online reciprocal peer support have been introduced (e.g. Van Rosmalen et al., 2006; Sloep et al., 2007). In these cases, questions students have while studying are answered by fellow-students acting as peer tutors. Reciprocal here refers to the roles both the tutee and tutor can adopt. An important characteristic of such systems is that the allocation of peers is not self-regulated, as is for instance the case when using bulletin boards, but that peer tutors are allocated based on their competence to answer specific questions. This has some important benefits, as pointed out by Westera (2007): a) someone become explicitly responsible to offer the support, b) the likelihood of support becoming available is increased, c) allocation results in the selection of the most competent peer tutor, d) the time before getting an answer can be reduced, e) peer tutor load can be distributed more evenly over the population.

Previous initiatives for online peer support systems have some drawbacks, since the support is given asynchronously (Van Rosmalen et al., 2006) or the system needs larger populations to operate properly (Westera, 2007). This dissertation introduces the SAPS system (Synchronous Allocated Peer Support) that is suitable for smaller population sizes and provides students with support more quickly. Via this system, students' questions are forwarded to competent fellow-students for answering. The support takes place via instant messaging (IM). The SAPS system is designed to support reciprocal peer support activities among populations who are working on the same modular material, such as courses with separate chapters.

As any such system should meet certain requirements in order to be able to lay a claim to success, an analysis of the following requirements was conducted:

1 Students' positive attitude towards online reciprocal peer support. Students should have a positive attitude towards online reciprocal peer support. The way in which it is organised (e.g. online and via instant messaging) should actually fit their support demands. In other words, online reciprocal peer support should be an support medium appropriate to students' support needs. This first requirement was studied in Chapters 3 and 4.

2 Sufficient peer competence and sustainability. Via the system, sufficiently competent peers for the support need at hand should be selected. Furthermore, a sufficient number of peers should remain willing to act as peer tutors during the period their support is needed, i.e. that the system should be sustainable. This second requirement was studied in Chapters 5 and 7.

3 Sufficient support quality. In line with the requirement of peer competence, online reciprocal peer support should result in peers' answers that are of sufficient quality for tutees to continue studying, and the learning performance of students subjected to reciprocal online peer support should be high enough. This third requirement was studied in Chapters 6 and 7.

Requirement 1: Students' positive attitude towards online reciprocal peer support
As part of the first requirement, the study in Chapter 3 explored students' current IM use and their appreciation of a possible educational implementation. The central question was whether IM could be a suitable medium for online peer support. A survey was conducted among students at a higher education institute in the Netherlands, in which 481 students participated. The majority of the participants were aged 20-22, and they came from various disciplinary backgrounds. The following results were found:

- 74% Of the respondents indicated to be using IM on a daily basis.
- Students are already using IM to cooperate on school tasks, give each other feedback, etc.
- Students would like to see IM being implemented in their learning environment.
- Younger students tend to use IM more intensively than their older peers do and they are also seemingly keener on trying new features of the medium.

It was concluded that IM is a promising medium for online peer support. Students indicate they are already familiar with the medium and that it enables them to get their support more quickly than is the case with currently common asynchronous peer support tools (such as discussion boards), in Virtual Learning Environments (VLEs) such as BlackBoard or N@tschool). Only a third of the respondents indicated they would like to be guided by teachers via IM. This might indicate that students through IM prefer getting support from students.

Also as part of the first requirement a pilot study was conducted, as is reported in Chapter 4. The central question was to what extent a system for online reciprocal peer support is feasible and acceptable to students, and by what factors these issues are influenced. The prototype was made available to students during a course. After the test phase, a group of students was interviewed. The following results were found:

- Students had a positive attitude towards online reciprocal peer support, but only if other more traditional ways to have their support needs fulfilled were not expected to be better. The interview data did not clarify whether this was due to students' technology preferences or a preference for teacher rather than peer tutoring.
- For this study specifically, students indicated that in their opinion more traditional ways to get their support needs fulfilled were better.
- The students noted that the system failed to incite the feeling of availability of peer tutors. The system appeared unoccupied by peers, because it lacked any indication of (virtual) presence of potential peers. This asked for stimulants for the sense of availability of peers or virtual presence in future peer support systems.
- Automatically that automatically keeps track of study progress (used to determine peer competence), for example via a VLE, is preferred over a situation in which students have to do that themselves, they find this time-consuming.
- On a technical level, the peer allocation algorithm used for the system was not able to provide a sufficient number of successful matches among the relatively small student group, as many of the tutees' requests remained unanswered. The logging data showed this was caused by the algorithm's selection criteria, which successively excluded more students, even to the point that none were left.

For the first requirement it was concluded that an online reciprocal peer support system via IM could be a successful support tool provided it is applied in a context in which alternatives to acquire support are not expected to be better. Also, to be able to serve populations smaller than the 100 the algorithm used in the pilot study required, a new allocation algorithm is needed.

Requirement 2: Sufficient peer competence and sustainability
Chapter 5 introduces the Synchronous Allocated Peer Support (SAPS) system, which is based on a new algorithm. SAPS is a support system for cohorts of students who work on the same modular learning material, such as chapters, topics or course modules. SAPS still forwards students' study questions to competent fellow-students. It also uses instant messaging as the support medium> IM was kept since students already use IM to support each other on study tasks (De Bakker et al., 2007).

To arrive at the most competent peer tutor for a specific question, the new computer algorithm uses the following selection criteria/parameters:

- Quality - proximity: prioritises peer candidates currently working on or having recently completed the same modular learning material as the tutee.
- Quality – question type: prioritises peer candidates who have indicated to be competent in the type of question asked by the tutee. What these question types are depends on the context in which the system is applied, but examples would be 'theoretical questions' or 'technical support questions'.
- Quality – previous result: prioritises peer candidates who have acquired high marks on e.g. courses with similar topics.
- Economy – favour-in-return: prioritises peer candidates who have already asked many questions themselves.
- Economy – uniformity: prioritises peer candidates who have previously had few tutor turns. NB: Economy principles are useful to prevent overload of individual peer tutors by spreading the tutor load evenly among the population.

All peer candidates are given points on each of these selection criteria. The candidate with the highest total score is selected as peer tutor.

The second requirement of the requirements analysis was sufficient peer competence and sustainability of the system. In order to find out whether the present (SAPS) system with the new algorithm ensures that the most competent peers are selected and that students remain sufficiently willing to help each other (sustainability), a simulation study was conducted. The following results were found:

- A sufficient number of competent peer tutors are selected in student populations counting as few as 50 students (but not fewer). However, the allocation algorithm is able to select a larger number of competent peers and fewer questions remain unanswered as the population increases in size.
- In order to enhance the general selection quality of the system, 'question theme' and 'prior result' were introduced as extra selection criteria on top of 'proximity' which is common in similar peer support systems. These criteria result in a larger number of competent peers being selected.
- Many peer allocation systems incorporate mechanisms to spread the tutor load evenly among the population (e.g. Van Rosmalen et al., 2006; Westera, 2007). As removing such mechanisms can have benefits, such as not selecting unmotivated peers who are not actively participating in the peer support activities, it was tested whether not incorporating such a mechanism lead to an overload of individual peers. This turned out not to be the case.
- Not implementing a tutor load spread mechanism increases the percentage of high-quality peers (i.e. peers that are given a high ranking score on one or more of the quality selection criteria by the allocation algorithm) that are selected by the algorithm.

It was concluded that the SAPS allocation algorithm simulated is superior to the algorithm used previously: it should be able to facilitate online peer support activities among groups of students, as a sufficient number of students remain willing and are competent to answer fellow-students'

questions. Also, fine-tuning the parameters (e.g. adding extra selection criteria) enhances the effectiveness of the algorithm.

Requirement 3: Sufficient support quality
Chapter 6 reported on an empirical study on answer quality, learning performance and student appreciation of online reciprocal peer support and the SAPS system specifically. The following results were found:

- Based on experts' ratings, the majority (63%) of the answers given by peer tutors selected via the SAPS algorithm can be considered as a solution to the question asked. Experts rate teachers' answers higher than peer tutors' answers (82% solved). Looking at the ratings themselves, the difference between peers' and teachers' ratings was not significant.
- Based on students' ratings, 43% of the answers given by peer tutors selected via the SAPS algorithm can be marked as a solution to the question asked. Students rate teachers' answers slightly better (51% solved). Looking at the ratings themselves, the difference between peers' and teachers' ratings was not significant.
- Peer-supported students' do not perform significantly worse or better on multiple-choice tests than do teacher-supported students.
- Students are generally more inclined to ask their questions to fellow-students instead of teachers, and consequently do so.
- A system for online synchronous reciprocal peer support is perceived as useful and usable by students.

It was concluded that online reciprocal peer support on questions via the SAPS system is a proper alternative for teacher support when that is not available. In terms of quality, peer support is only slightly inferior to teacher support, and peer-supported students do not perform worse than teacher-supported students on multiple-choice tests. No less important is the conclusion that the majority of the participating students appreciate an online reciprocal peer support system that uses instant messaging. The results could have been influenced by the fact that they were found in a face-to-face setting, in which student-teacher and student-student contact was still available during lectures. This may have resulted in more complex questions not being asked via the system.

As part of the second and third requirement, Chapter 7 describes an empirical study is described that was conducted to measure the peers' answer quality, their willingness to help each other and students' attitude towards online peer support in a setting in which no teachers were available. The SAPS system was made available to participants in an online self-study course. Most participants were aged 41-70. The following results were found:

- Experts rate the majority (57%) of peers' answers in a setting in which teacher support is unavailable with a 4 or 5 on a 5 point Likert scale. Therefore the majority of the answers is considered solved.
- Students rate the majority (51%) of peers' answers in a setting in which teacher support is unavailable with a 4 or 5 on a 5 point Likert scale. Therefore the majority of the answers is considered solved.
- 29% Of the questions asked by students remain unanswered, far more than the 10% hypothesised. However, many of these unanswered questions where situations in which no communication took place, though chats where initiated (i.e. accepted by a tutor). The data did not provide a clue to the reason for this, but it may have to do with the unfamiliarity of students with IM or with technical problems. When these as well as the cancelled requests by the tutee themselves are not counted, 16% of the questions posed remain unanswered, a percentage much closer to the hypothesized 10%.
- The percentage of unanswered questions remains constant over time.

- Most students are satisfied with being supported by peers via an online peer support system. IM is however less appreciated for such purposes, which might be due to participants' unfamiliarity with the medium, as the largest group was aged 41-70.

It was concluded that online reciprocal peer support via the SAPS system is a proper alternative for teacher support if that is unavailable, as peers answer the majority of fellow-students' questions sufficiently well. Important issues are students' willingness to help each other and the participants' age, as this might influence their attitude towards and their familiarity with an online reciprocal peer support system using instant messaging, which is possibly reflected in the outcomes of the study (e.g. the high percentage of unanswered questions).

Discussing the main findings in the light of the requirements analysis framework introduced earlier the following overall conclusions can be drawn from the entire study.

1 Students' positive attitude towards online reciprocal peer support. Students generally appreciate online reciprocal peer support. Among younger students IM is a suitable medium for handling the support, older students are less keen on and less familiar with using the medium appropriately for such purposes.
2 Sufficient peer competence and sustainability. The SAPS system has demonstrated its ability to select competent peer tutors for answering questions. Regarding the system's sustainability, students are willing to answer fellow-students' questions. Willingness could however be problematic when students are unfamiliar with IM, since it was found that in such a setting more questions remain unanswered.
3 Sufficient support quality. The general quality of peers' answers is sufficient given the context of teacher unavailability. Peers are able to answer the majority of fellow-students' questions sufficiently well. Importantly, peer-supported students' learning performance does not differ significantly from that of teacher-supported students.

In general, the studies conducted in the context of this research project indicate that an online reciprocal peer support system could serve as an appropriate alternative for teacher support when that is unavailable.