Awareness of Presence, Instant Messaging and WebWho

Peter Ljungstrand
PLAY Research Studio, Interactive Institute
Box 620, SE-40530 Göteborg, Sweden.
peter.ljungstrand@interactiveinstitute.se

Ylva Hård af Segerstad
Department of Linguistics, Göteborg University
Box 200, SE-40530 Göteborg, Sweden.
ylva@ling.gu.se

ABSTRACT

We report from a study of how awareness of presence can affect instant messaging behavior. WebWho is a web based awareness system that visualizes where people are located in a large university computer lab. It allows students to virtually locate one another and, among other functions, to communicate via an instant messaging system. Typically, instant messages are signed with the sender's name, but messages can also be sent anonymously. The students use the messaging system to support collaborative work and coordinate social activities, as well as for playful behavior. We have performed analyses of messages logs with respect to sender location, anonymous or not, and message content. Results show that awareness of both physical presence, i.e. when both when sender and recipient share the same room, and virtual presence, mediated via WebWho, affect the message contents.

Keywords

Instant messaging, computer-mediated communication, awareness of presence, web visualization

INTRODUCTION

WebWho [4,5] is a lightweight, web based awareness tool that shows a schematic view of the workstations in a large university computer lab, and who is currently logged in where. As the system is reachable through a web page the ease of deployment is enhanced, as well as the accessibility of the system. WebWho explicitly conveys place information (i.e. real world user location) and provides a good overview for the students to find the whereabouts of each other at-a-glance, as well as to find unoccupied computers in the lab (see Fig. 1). In addition to a schematic overview of the lab, WebWho provides simple messaging services: normal email can easily be sent using a shortcut to the user's default email program, directly selectable from a pull-down menu in the web page. In the same way, students can view someone's entry in the online student catalog, showing a photo and personal contact information, as well as access that person's home page (Fig. 1). The system also has a function for sending short messages that instantly pop up topmost on the recipient's computer screen. When sending instant messages, the sender can optionally choose to be anonymous to the recipient by consciously and manually checking a box before sending the message. The purpose of WebWho is to support collaboration and coordination between distributed users, primarily within different rooms in the lab building but also for people situated elsewhere, such as students with internet access at home.

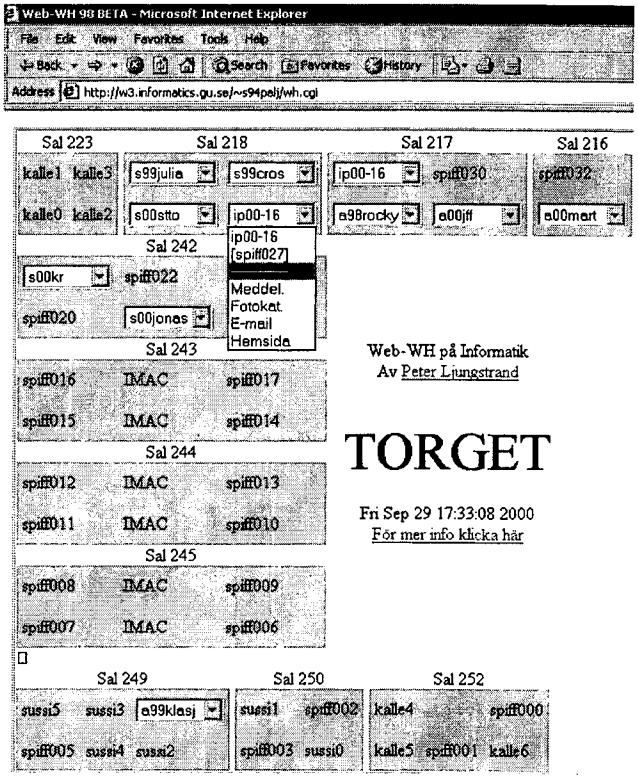

Figure 1. A WebWho screenshot with one user's pull-down menu activated. The shaded boxes symbolize different rooms in the lab, each with two, four or six workstations, spatially organized as shown on the screen.

Instant messaging and education

WebWho allows for sending instant messages to specific workstations where the identity of the person who is logged in is known to the sender of the message. Instant messaging systems of various forms have gained high popularity during the past few years. Commercial instant messaging systems such as ICQ and AOL Instant Messenger have attracted millions of daily users in recent years, and the instant messaging phenomenon has also recently attracted researchers [e.g. 9,10].

WebWho is deployed at a university, i.e., an educational setting, but it is not designed to specifically support education *per se* in a traditional sense. Research within the field of CSCL (computer-supported collaborative learning) and similar areas have investigated the use of CMC (computer-mediated communication) tools to

support for instance distance education [cf. 11]. This research has not specifically looked at instant messaging systems, perhaps partly because of the somewhat chaotic nature of such systems. CMC systems within CSCL research generally support a learning situation where one or more teachers are "in control of" and directing the learning situation for the students, or at least they assume a teacher-student relationship in some fashion. WebWho has no such built-in assumptions, it is more similar to generic communication tools such as email and telephones than to systems specifically designed to support an educational setting.

Awareness support and active maps

Research related to awareness in one form or another has gained much attention within the CSCW and HCI communities. However, most systems proposed to support awareness have involved quite some overhead in order to work: specific hardware and software to be installed, login procedures, the need to explicitly state one's current activity, etc. [3, 4]. This is understandable given the experimental nature of these systems, but most end users such as students simply want usable systems that work right away, without any hassle. A major requirement when designing WebWho was that it should not use any custom software at all on the client side, and that the user's explicit involvement should be kept at a minimum, especially in terms of updating profiles etc. To meet these criteria, WebWho relies on readily available server status information. No explicit actions (except the normal log in procedure for Windows or Linux) are needed on behalf of the students to make their online status available to others.

There have been other systems designed to support awareness of presence in real time by displaying a map, overlaid with up-to-date location information of people. For instance, ActiveMap [7] is a system deployed in a large corporate office setting. The system is based on active badges with a supporting infrastructure of beacons spread throughout the office environment. When running a custom application on a desktop PC, one can see a schematic map of the offices with information about who is where in the rooms and corridors. WebWho provides a much more lightweight and simplistic solution, with less location granularity, but much easier to deploy.

Other systems have been created for visualizing the dynamics of electronic communities based on log files [2] but such systems tend to be less useful for supporting synchronous or semi-synchronous activities. Smith et al. created Threaded Chat [10], a system for real-time visualizing of threaded chats between multiple distributed users, somewhat similar to how threads in Usenet newsgroups are organized. Threaded Chat was designed to make it easier for its users to follow the otherwise transient nature of chat or instant messaging. Some online presence information was presented, but there was no fine-grained cues as to the whereabouts of the users in relation to each other or a local physical area. Both these systems were also intended for geographically dispersed users rather than co-located or almost co-located people.

Churchill and Bly presented a study of how a text-based virtual environment (such as a MUD) can be used to support communication between non-collocated colleagues, and concluded that text-only communications can offer a high degree of richness of expression, despite the fact that it lacks almost all the visual and auditory cues known to be important in face-to-face collaboration [1]. This suggests that even a very simple instant messaging tool like WebWho still can be used for very expressive communication. Similar results were found by Mitsuoka et al. in a recent study of i-Mode based mobile phone services for university students in Japan [8].

A major difference between WebWho and many other awareness systems is that WebWho is primarily place-centered, and only secondary person-centered. As the students do not have their personal workstations but rather have to share them with all the other students, they typically sit at different physical locations in the lab from time to time. This is not the case with systems designed to support awareness of people's presence at a typical workplace, no matter if the system is intended to support collocated people, usually in one office [4, 7] or distributed people at different geographical locations [3, 10]. With these systems, a person described by the system is generally also associated with only one place (desk, room or cubicle). With the MediaSpace system [3], it was possible to sometimes see more than one person at a time, but the system was installed in an environment where people had their own offices and tended to be a relatively low number of places, in case one wanted to find them, rather than moving from place to place all the time. In the university computer lab, students can be logged in virtually anywhere; there are no often 'typical' places to look for them, at least not among the workstations. To students wanting to engage in face-to-face interaction with their friends and classmates (as is often the case), it is of uttermost importance to find out not only if the person they are looking for is in the lab, but also where he or she is situated. The rooms and the locations of the workstations in the lab are static, but the places where the students log in are not. Therefore, it seemed logical to have a schematic view of the workstations rather than a list of the currently logged-in students as the basis of the system.

WebWho in use

Using WebWho (as well as other types of communication such as email, ICQ, mobile phones and face-to-face communication), the students communicate and coordinate their actions both for work purposes and for social interaction. The university computer lab in which WebWho is used consists of a large number of rooms in one building, each with approximately six computer workstations. Most rooms are on the ground level in the building but some are located at higher levels. Since there

are many more students than workstations, the computer lab tend to be very busy at times and it is not always possible for students who are working together to get computers that are located right next to one another in the lab. WebWho allows for them to easily locate the whereabouts of each other in the computer lab, and to communicate one-to-one in a near-synchronous fashion using the instant messaging system. The visualization of the computer lab supports the sender's awareness of the recipient being logged in at a specific workstation prior to sending an instant message.

Some 700 students share the 120+ workstations in the lab, where WebWho has been online since November 1997. Even though WebWho has never been publicly advertised, the students have used it extensively. The instant messages sent through WebWho typically have a coordinating nature: they are used to arrange physical meetings (e.g., lunch, breaks for smoking etc.) and for short questions and answers (e.g. regarding details in how to solve a particular programming assignment).

In contrast to what one might expect, the students do not appear to conceive WebWho as an intrusion of privacy. During the three years WebWho has been running, not one single student has complained about the fact that his or her online presence and very precise location is available to anyone on the web. Perhaps this is due to the fact that there is an option to block annoying incoming messages (though hardly used at all), and that the system is based on server data that is already publicly available anyway to the students. Also, parts of the system (in particular, the online photo catalog) are unavailable from computers with IP-numbers outside the university network domain. There might be students who dislike the system but who still for some reason have not complained, but we have not found anything that indicated this. The system also informed the students about the logging features described below.

In general, privacy issues are of high concern for awareness systems, and in particular for systems conveying detailed user information to just about anyone who is watching, which is one way to interpret the way WebWho works. However, we have considered a detailed discussion of privacy issues to be beyond the scope of this paper.

THE STUDY

The aim of the study reported in this paper was to examine if and how awareness of the recipient's presence affected the content of the instant messages. To facilitate this, logs of instant messaging communication were collected during an extended period of time. The sender's and recipient's true identity were replaced with unique, but untraceable identification codes. We hypothesized that the sender being made aware of the recipient's actual and immediate presence, as well as her identity would affect the topic of the messages sent. Other factors, such as the electronic medium, user location, level of synchronicity, etc. were also taken to influence messages.

In this study, we have asked ourselves questions like: What are the students using the instant messaging service for? Does the awareness of the receiver's presence affect the content of the messages? As WebWho allows for messages to be sent anonymously (i.e. the recipient cannot tell who sent the message, and the pop-up window is quite similar to a system error message window), an analysis of these particular messages are especially intriguing: what kind of messages did the senders choose to send anonymously, and why were they sent?

Hypotheses

We predicted that WebWho would be used by students to coordinate their work in group assignments and to coordinate their social activities. Being aware that the receiver is actually there to read the message at the time it is sent was taken to affect the topic of the message. The identity of the receiver is shown as the system account name used when logging in, whose referent is most probably known to other students within an assignment group, but not easily decipherable by people outside the university environment.

Our predictions concerning how awareness of presence affects the text of messages had to consider not only the "virtual presence" as visualized through WebWho, but also physical presence when the recipient is in the same lab room as the sender of the message.

The messages sent between students were divided into the following settings, based on the message logs.

Collocated: both the sender and the recipient were within the same lab room at the same time, hence it was possible to have physical awareness of each other's presence, and of course to see and talk directly to each other (physical awareness of presence).

Distributed: the sender and the recipient were located in different lab rooms in the same building, using WebWho to locate the presence of each other (virtual awareness of presence).

Distant: access to WebWho from outside the building, using a dial-up connection or the like (virtual awareness of presence).

Data collection and analyses

We have gathered different types of logs during several years of WebWho usage, e.g. frequency of use of the main page visualizing the lab, frequency of use of the instant messaging service, usage from within or without the university network domain, etc. We have also extracted a number of messages from the instant messaging service (see below). These messages were anonymized during collection so that the original sender cannot be identified,

but the logs still contain the essential text of the messages being sent.

The collected messages were automatically analyzed using computer programs in order to find out the number of messages sent, word frequency (also applies to "word-like" elements such as smileys), sender's location (in the same lab room, elsewhere in the lab, at home or somewhere else away from the lab), and sender status (anonymous vs. identified).

Qualitative, manual analyses of the message topics were carried out by cross-analyzing three categories of sender location (collocated, distributed, and distant as defined above) and two categories of sender (and receiver) status (anonymous and identified). In order to make a closer analysis of each message, a set of 100 messages from a chunk of continuous messages were extracted from each category, resulting in 600 messages out of the total number of 8231 logged messages sent during the period September 1, 1998 – December 31, 1999. The decision to extract messages in succession was made in order to follow possible dialogs, and thus get some clues to how the content should be interpreted [cf. 9].

Message categories

The messages may in many cases contain several topics, but were categorized according to topic by what seemed to be the main content. These categories have been chosen somewhat arbitrary, but we have tried to find categories that were clearly representative for almost all the analyzed messages. A number of categories emerged:

1. *Task related* ("have you finished task 4 yet?", "just click NO till it beeps"). 15.8% of the sample.
2. *Greeting* ("good morning", "I just wanted to say hello"). 12.8% of the sample.
3. *Meta comments* ("just testing the messaging system..."). 5.3% of the sample.
4. *Mischief* (funny comments). 18.2% of the sample.
5. *Sexual content.* (all these messages appear to be friendly but with some sexual allusion). 6.5% of the sample.
6. *Social coordination* (coordinate coffee breaks, invitation to parties and games). 13.8% of the sample.
7. *Activity request* ("what are you doing"). 3.2% of the sample. *Awareness comment* ("I can see you"). 0.5% of the sample.
8. *System imitation* (imitation of system messages: "your computer is going to reboot in 5 seconds"). 4.3% of the sample.
9. *Reprimands* ("quit it", "get on with it"). 4.5% of the sample.
10. *Encouragement* ("cheer up, work hard"). 2.5% of the sample.
11. *Location* (coordination and computer lab bookings: "the computer next to mine is free now", "is X here", "who are you"). 7.2% of the sample. *Awareness comment* ("I can see you"). 0.5% of the sample.
12. *Late hours* ("are you here this late?!"). 0.3% of the sample.
13. *Other.* (messages that didn't quite fit any other categories). 5.0% of the sample

RESULTS

Figure 2 shows the distribution of the various categories of message topic vs. sender location for the messages with identified senders. The largest number of messages in both settings of sender status and location (70% of the total number of messages) were, not surprisingly, sent between different lab rooms within the building. This is what the students mainly used the instant messaging service for; to keep in touch socially and to organize and coordinate their group assignments or to coordinate coffee breaks and such. 8% of the messages were sent between different computers within the same lab room, in which case the students could actually see each other physically. 22% of the messages were sent from outside the building, using a modem for instance. This could be other students contacting the ones that they could perceive being logged onto computers in the lab, or friends and family who knew where to look for a person being logged in.

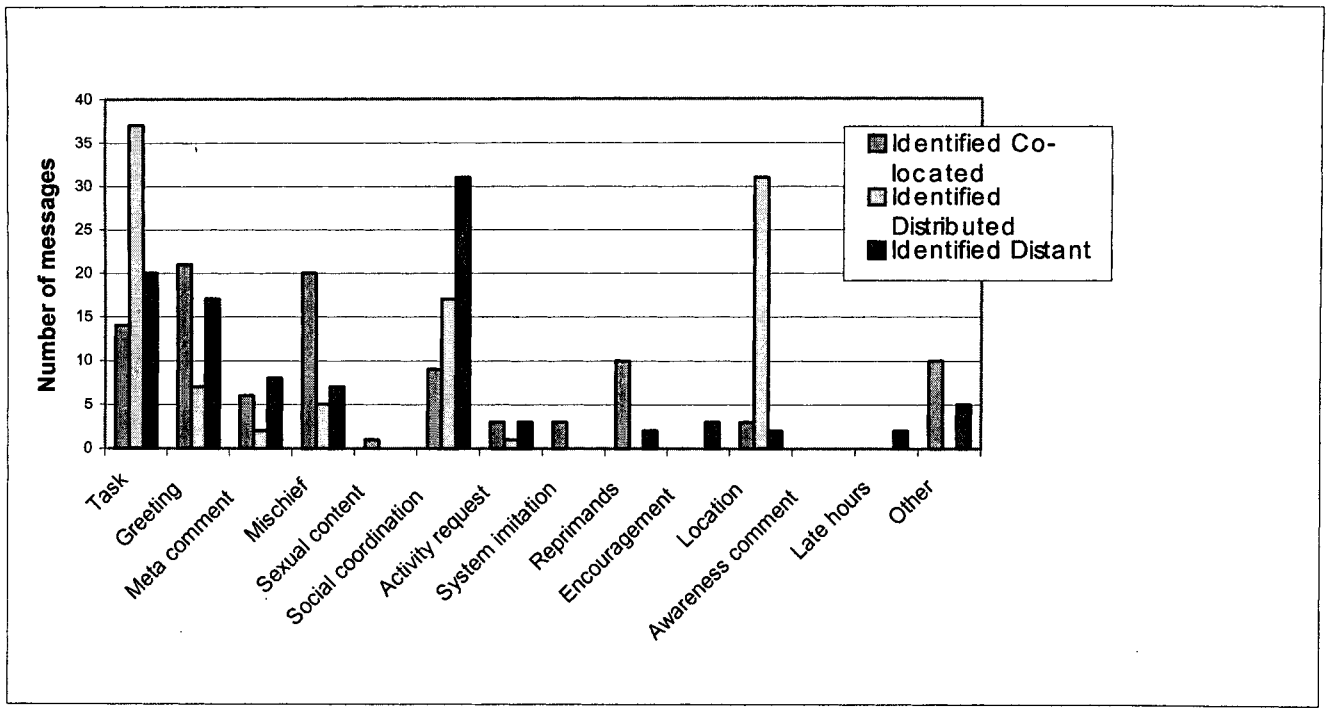

Figure 2. Messages with identified sender. We can clearly see that the topic of the messages are different in the three settings. On the whole, messages sent between different lab rooms (distributed) are more about social coordination, such as coordinating for going to lunch together. This group also contains more work-related messages with assignment coordination content.

Physical awareness of presence

Messages from the first group, which we called "collocated", were all sent within the same lab rooms in which the senders of messages could be physically aware of the receiver. 8% of all messages were sent in this setting (692 messages in total).

Virtual awareness of presence

Two categories are forming the second group: the first one we called "distributed"; these messages were sent between different lab rooms (70% of the total number of messages; 5675 messages). 22% of the total number of messages were sent from somewhere outside the university computer lab (1864 messages), and form the second category of the second group. We called this setting "distant". Since these messages were sent using a dial-up connection, for instance, the senders had no physical evidence of the recipients' presence, but were informed of their presence virtually through the WebWho web page.

From the analyses of the messages, we can see that the topics are different in the three settings. On the whole, messages sent between lab rooms (distributed) are more related to social coordination, such as coordinating for going to lunch together. This group also contains more work-related messages with assignment coordination content. Messages sent within the same rooms tend to be more mischievous in nature.

DISCUSSION

The aim of this study was to attempt to find out if and how awareness of the recipient's presence affects written messages. We hypothesized that the sender's knowledge of the recipient's actual and immediate presence, being visualized through WebWho, would affect the topic of the messages sent. Other factors, such as the electronic medium, user location, level of synchronicity, etc. were also taken to influence messages. While there are many factors that influence message composition; awareness of presence clearly seems to be one of them, as well as the purpose of the interaction and the nature of the medium. We conclude that the instant messages sent via WebWho – with respect to topic – can be argued to be affected by the senders' awareness of both the receivers' physical presence and of virtual presence, as visualized on the web page.

Much of our preliminary results follow what could be anticipated intuitively, and confirm our hypotheses about what WebWho is used for. We found it to be used extensively for collaborating on mutual assignments and for coordinating social activities. 15.8% of the messages of our sample were task related, and 13.8% were related to social coordination. As we have seen, instant messaging using WebWho is also used for playful behavior, 18.2% of the messages in our sample were nonsense and mischief, another 6.5% were mischief with sexual content (however, we could not see any obvious harassments). The latter two categories together forming 24.7% - which is the largest category in the sample. Sending mischievous messages anonymously seems like a good way to avoid "being

caught", for example. It is possible that text-only communication in combination with the virtual awareness of presence increase the temptation to toy with the possibilities of the messaging system. Awareness of physical presence might also make people send messages anonymously, perhaps to be able to view the effect of the text in person. Messages of the meta comment-type often explored the possibilities of the system and reflect the users' unfamiliarity with what it can do and curiosity to find out what they can actually use it for. A total of 11 messages were sent but never received, because of the fact that the system does not allow users located in the computer lab to send messages to people outside the building. Here is an example of a message of this type, where people tried to send messages to other people outside the building (by manually altering the CGI parameters in the URL string):

"Får du detta skall du inte vara glad, för då kan jag terra dig järnet i fortsättningen :)"

("You shouldn't be glad if you get this because then I can harass you a lot in the future :)")

So far, most results confirmed our hypotheses and intuitions. Some results, though, seem to be contrary to expectation. Most of what intuitively feels like contradictory results are found among the messages that were sent anonymously. At first, it seems pointless and strange to be anonymous in discussing mutual assignments, or to send anonymous greetings, comment on the system and ask for feedback without telling who you are, receive encouragement from someone who is unwilling to give away their identity, or to try to coordinate your social interaction without giving deictic reference. Shared background knowledge, previous experience and contextual information which is outside the messages themselves surely accounts for relevant explanation in most cases. Human interaction may not always be rational or has different goals than one expects it to have, though, and everything cannot be rationally accounted for.

A special case of deploying the anonymity-feature are the several examples of anonymous messages that were signed with the sender's name, which seems to eliminate the whole idea of going anonymous. Why do people explicitly make the message anonymous to the receiver, by consciously checking a box to make it anonymous to the receiver, and then sign the actual message with their names in the end? Out of a total number of 1067 anonymous messages, 19 messages were signed with the sender's name (1.8%), the majority of these were sent in the distant anonymous category (14 messages). In some cases one could perhaps guess that the sender wished to make the receiver believe that someone else sent it, like in this example:

"tyvärr lunch stängt, åter 990402 Mvh NN"

("sorry closed for lunch, back April 2, 1999 Best regards NN")

This message is an ironic imitation of a possible message sent by the department secretary, which the sender seems to think is having too long lunch breaks (the message was sent on February 2, 1999).

In most cases the messages seem just ordinary, and probably reflects the same idea as noted by Nardi et al. [9] – it's a nice way of saying hi without being too intrusive. Here is an example:

"Gomorron!/NN"

("Good morning!/NN")

Another way of using the instant messaging system, which seems intuitively strange, is when people communicate anonymously about their mutual assignments. It seems difficult to be able to collaborate on a mutual task, when the person who keeps sending you messages is anonymous.

"nää nu får du lösa det *här"*

("noo you've got to solve this one now")

The study presented in this paper has indicated that the instant messages sent via WebWho – with respect to topic – can be argued to be affected by the senders' awareness of both the receivers' physical presence and of virtual presence, when visualized on the WebWho web page. However, further research is clearly needed to gain a more thorough understanding of how awareness of presence affects written messages.

To conclude, we found that WebWho was mainly used for supporting collaborative work and for coordinating social activities. It was also used for playful behavior and for simply keeping in touch, which are just as important means for working together, or for just having fun, for that matter.

REFERENCES

1. Churchill, E. and Bly, S. (1999). It's all in the words: Supporting work activities with lightweight tools. In *Proceedings of GROUP '99*, ACM Press.
2. Donath, J. (1995). Visual Who: Animating the affinities and activities of an electronic community. In *Proceedings of ACM Multimedia '95*, ACM Press.
3. Dourish, P. and Bellotti, V. (1992). Awareness and Coordination in Shared Workspaces. In *Proceedings of CSCW'92*, pp. 107-114, ACM Press.
4. Erickson, T., Smith, D., Kellogg, W., et al. (1999). Socially translucent systems: social proxies, persistent conversation, and the design of "Babble." In *Proceedings of CHI'99*, ACM Press, pp. 72-79.

5. Hård af Segerstad, Y. and Ljungstrand, P. (2001). Instant Messaging and Awareness of Presence in WebWho. In *Proceedings of Mobilize!, the 2nd digital world research center interdisciplinary international workshop*, May 29 - 30, Windsor, UK.
6. Ljungstrand, P. (1999). WebWho: Support for Student Awareness and Coordination. In *Proceedings supplement of ESCSW'99* (Poster presentation), Copenhagen, Denmark.
7. McCarthy, J. and Meidel, E. (1999). ActiveMap: A Visualization Tool for Location Awareness to Support Informal Interactions. In *Proceedings of HUC '99*, Springer-Verlag, Berlin.
8. Mitsuoka, M., Watanabe, S., Kakuta, J. and Okuyama, S. (2001). Instant Messaging with Mobile Phones to Support Awareness. In *proceedings of the 2001 Symposium on Applications and the Internet (SAINT 2001)*, San Diego, CA, January 8-12. IEEE Press.
9. Nardi, B., Whittaker, S. and Bradner, E. (2000). Interaction and Outeraction: Instant Messaging in Action. In *Proceedings CSCW'2000*, ACM Press.
10. Smith, M., Cadiz; J.J., and Burkhalter, B. (2000). Conversation Trees and Threaded Chats. In *Proceedings of CSCW'2000*, ACM Press.

Wolz, U., Palme, J., Anderson, P. et al. (1997). Computer-mediated communication in collaborative educational settings. In *Supplemental proceedings of ITiCSE'97*. ACM Press, pp. 51-69.