Instant Messaging in Informal Learning via Interactive Television – Online Communities Among Children in a "Get Along" Program

PÄIVI AARRENIEMI-JOKIPELTO
Helsinki University of Technology, Finland

In the past few years, *instant messaging* (IM) has become increasingly popular on the Internet; IM via interactive television (iTV) is a new approach. The Education Department at the Finnish Broadcasting Company (YLE) offers a new afternoon club service for schoolchildren ages 9 to 11 via a program called "*Tuu juttuun*" (Get Along). The central goals of the MHP-based instant messaging service are to form and support a reciprocal community of users, as well as to utilize the community's interactions. Online community refers to the communication and social interaction that takes place on the Internet and web-based list servers, bulletin boards, newsgroups, and chat rooms. It aims to bring people closer and to link those who share the same interests, goals, activities, and governance. The goals of our research are to examine children's interactions and community in an iTV environment and to understand and identify the attributes of their instant messaging via iTV.

Categories and Subject Descriptors: H.1.2 [**Models and Principles**]: User/Machine Systems—*Human factors*; H.5.2 [**Information Interfaces and Presentation**]: User Interfaces—*Interaction styles*; *User-centered design*; H.5.1 [**Information Interfaces and Presentation**]: Multimedia Information Systems—*Video*; J.7 [**Computer Applications**]: Computers in Other Systems—*Consumer products*

General Terms: Design, Human Factors

Additional Key Words and Phrases: Instant messaging, iTV environment, MHP-based instant messaging service, children's communication and social interaction

ACM Reference Format:
Aarreniemi-Jokipelto, P., Instant messaging in informal learning via interactive television – online communities among children in a "get along" program. ACM Comput. Entertaint. Vol. 5, No. 2, Article 9 (August 2007), 11 pages. DOI=10.1145/1279540.1279549 http://doi.acm.org/10.1145/1279540.1279549

INTRODUCTION

T-learning refers to learning that is enhanced by technologies such as iTV, mobile technology, and IP [Aarreniemi-Jokipelto 2006]. Television, or a device suitable for viewing broadcast content, is the primary medium for t-learning, while the others are secondary. T-learning may be totally technically mediated or it may include traditional means like face-to-face lectures and printed books. T-learning exists in educational and corporate organizations and promotes lifetime learning by allowing access for people of all ages.

Television has been the most popular medium for distance learning for over 50 years [Pahwa et al. 2005], and there have been various methods used to enable learning

The study received financial support from YLE Education at the Finnish Broadcasting Company, YLE 75 Years Fund, and Digital-TV cluster program of the Ministry of Transport and Communications Finland. Author's address: Helsinki University of Technology, Industrial IT Laboratory; email: Paivi.aarreniemi-jokipelto@tkk.fi

through television, including the ones highlighted below [Aarreniemi-Jokipelto 2006b]:

- school/educational/instructional TV programs;
- taped television lectures;
- specially-equipped classrooms to connect distance and local students;
- connection of distance and local students to a TV screen;
- edutainment; and
- iTV educational services.

In Finland, the first televised school programs were broadcast in 1963; the Finnish Broadcasting Company (YLE) has a legal obligation to provide educational programs.

During 2005, YLE broadcast about 400 hours of educational programing on YLE Teema, which is an iTV channel specializing in culture, education, and science. Currently, programs on YLE Teema have mostly been on general education, language, and subjects for upper secondary-level distance learning. The majority of program services are implemented in a form of multimedia that includes TV, the Internet, and radio.

There are not many interactive educational services available via iTV. In Finland, interactive educational services were on a planning-level while we were doing our research in summer 2004; and the MHP-based course at the Helsinki University of Technology (HUT) was the only one being offered [Aarreniemi-Jokipelto 2005a]. According to the article cited immediately above, interactive and collaborative services and games were believed appropriate for DTV because television was considered a collaborative medium.

LITERATURE REVIEW

Instant Messaging

Instant messaging (IM) refers to an Internet-based synchronous text chat between users. It has become popular during the last few years first among teenagers and then increasingly among business people. It was popularized in the form of America Online's Instant Messenger [AOL 2005] and Microsoft's Messenger [Microsoft 2005]. They provide client software to log onto proprietary networks and an interface to write messages to other users [Frees et al. 2004]. Some IM systems offered versions that run on wireless devices; and pictures and URLs can be included in the messaging services of others.

Internet relay chat (IRC) systems tend to be used for communication between strangers on topics or activities of common interest; IM is used to communicate with known contacts.

Users can use nicknames to add their friends to so-called buddy (contact) lists by obtaining the nicknames through personal contact. Because messages cannot be sent to those who are offline, an IM application indicates who is online. However, since many people stay logged on for days or weeks at a time, seeing that someone is online does not mean that person is available [Isaacs et al. 2002].

IM has become a substantial part of young people's culture [Frees et al. 2004]. One possible reason why IM and SMS have become so popular among teenagers is that the applications are trivial to install, set up, and easy to use. The popularity of IM demonstrates that teenagers appreciate its synchronous or near-synchronous character and ubiquity, despite the fact that many other competing media exist [Schiano et al. 2002; Grinter et al. 2002].

The following results are based on a study of 16 IM users in the UK and US. According to Grinter et al. [2002], the primary reasons that teenagers use IM are as follows:

- to socialize;
- to plan events; and
- to collaborate on schoolwork

Multitasking seems to be characteristic of the way teenagers use IM. All the participants in the study performed other computer-based activities such as completing schoolwork, web surfing, and e-mailing simultaneously. Most of them interacted via IM with their real space relationships. The major obstacle to adopting IM was lack of system interoperability; but, for teenagers, peer pressure was an even greater factor *for* adopting IM. The participants knew when their friends would be online, and invited them to join in a chat or made arrangements at school to meet online later.

The IM ShowMe application promotes a "learn by doing" approach, allowing an instructor to view a student's desktop and use annotations and text messages to guide the student. In addition, the application provides the following functions [Frees et al. 2004]:

- to text-message any student or instructor in the course; and
- to search previous text conversations in a database

The IM application was tested during 2002 and 2003. In the last test, half of the students (11/22) took part in chat room conversations, which ranged from 10 minutes to over 2, 5 hours with a steady stream of text messages. A total of 975 messages were sent in 8 conversations. When students were asked whether the tools were useful, fewer than 50% agreed that they were. There was no significant relationship between use of IM and grades on assignments [Frees et al. 2004].

At the computer laboratory of a large university in Sweden an experiment was conducted on how the "awareness of presence" affected instant messaging. In the experiment the WebWho application was used to virtually locate other students, and among other functions, to communicate via an IM system. Students mainly used IM to keep in touch socially and to organize and coordinate group assignments, as well as coffee breaks. Of the total number of messages, 70% were sent between different laboratory rooms within the building; 8% were sent between different computers in the same laboratory room, where the students could actually see each other; 22% of the messages were sent outside the building [Ljungstrand et al. 2000].

A mobile IM called Hubbub, which runs on a wireless Palm or PC, was used in a 5,5 month-long study. The interviews indicate that most people developed a sense of connection with their remote- site colleagues, and some came to rely on their mobile IMs [Isaacs et al. 2002].

Research on IM use in the work place indicates that it improves productivity [Handel et al. 2002; Isaacs et al. 2002; Nardi et al. 2000; Frees et al. 2004]. The informal and communicative nature of IM supports work place activity and reinforces the social "glue" that ties people together [Grinder et al. 2002].

Community

The term "online community" refers to the communication and social interaction seen on the Internet and web-based list servers, bulletin boards, newsgroups, chat rooms, and iTV learning systems.

The online community is defined by the following features [Preece 2000]:

- people who interact socially while striving to satisfy their own needs;
- shared purpose (an interest, need, information exchange, or service) that provides a reason for the community to exist;
- policies in the form of tacit assumptions, rituals, protocols, rules, and laws that guide people's interactions; and
- computer systems that support and mediate social interactions and facilitate a sense of togetherness.

The introduction of new digital media can strengthen the traditional sense of community. Local communities are seen to erode at the same time that global communities via the Internet are being formed [Eronen 2005]. The human need for affiliation is at least as important as the need for the information that technology-mediated communities provide [Eronen 2005]. Users need to feel a sense of belonging and to "feel that this is our thing" [Isomursu et al. 2004]. The importance of community and belonging to a group was also recognized in research on the MHP-based learning environment at HUT in 2004.

Field Study

Starting in January 2005, the YLE Education Department of the Finnish Broadcasting Company has offered a new afternoon club service for schoolchildren from the ages of 9 to 11. The name of the program is "*Tuu juttuun*" (Get Along). The service provides the children a safe option for lonely afternoons at a time when their parents are still at work. Childcare facilities are another major target group for the program, as many children spend their afternoons there.

Children actively participate in creating the program; they send paintings, which are used in the quizzes, and take part via telephone calls and the Internet. The MHP-based IM via iTV provides an opportunity for participating during a program, while the other formats require agreement with the participants beforehand.

The central goals of the IM service were to form a reciprocal community of users, to support it, as well as to utilize its interactions The objectives of the field study were to examine the students' interaction and sense of community in an ITV environment.

Materials and Methods

The data-gathering techniques were observation, interview, questionnaire, and log files. The children's background information was gathered via questionnaire; their work while using the IM application was observed; and the log files were analyzed afterwards. Children were interviewed in the same small groups in which they had done the work. The moderator was also interviewed; the interviews were based on the following themes: possible subjects for discussion via IM; guidance in the use of IM; communication as part of a TV program; learning with the help of TV; community via IM; the usability of the TV screen; and the IM application in use.

A quantitative method was used to analyze the children's background information, and a thematic analysis technique to analyze the interviews and log files (a quantitative approach was also used here) [Eskola et al. 2005]. The field study analysis focused on identifiable themes and patterns in the use of IM.

In total, 33 children between the ages of 10 and 13 participated in the field study; 18 girls and 15 boys. Most said that they watched TV daily; only one child said that he/she never watched TV. Approximately 30 % of the children said they used computers for instant messaging.

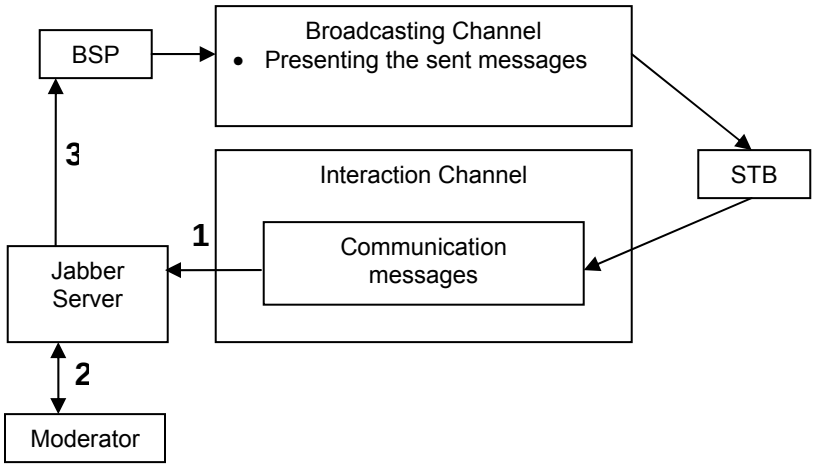

Fig. 1. Functions of a general communication system in an iTV learning system.

Instant Messenger Application and System

The MHP-based instant messenger application [Axel 2005], customized for YLE, was used in the field study. The application follows the Jabber protocol, and works with an analog modem or broadband connections. The text input mechanism is similar to the mobile phone's SMS input style. The application includes a virtual keyboard for writing messages.

The instant messenger also allows chat while watching the program. In this research IM was used to create program-specific communities, but it has other functionalities as well.

We also used Axel Technology's message room moderator tool in this research, to ensure that only suitable messages were broadcast to the children.

Figure 1 shows the MHP-based instant messaging system for the "Get Along" program. When children watching the program, want to send a message, they use a virtu-

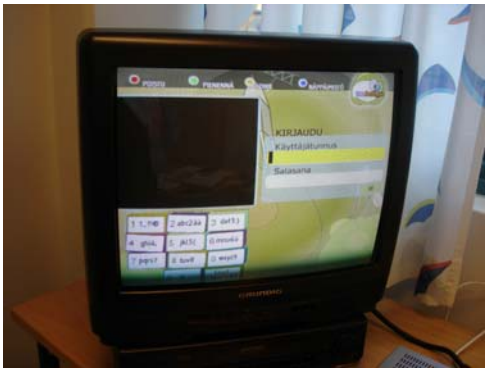

Fig. 2. An example of the MHP messenger application on a television screen.

al keyboard to write it. The message is delivered to the Jabber server via an interaction channel, the messages are received by the moderator, who can either accept or reject them. The moderator can also write his own messages. The accepted messages are delivered through a broadcasting channel to the children.

Procedure

Because the required MHP STBs were not available in time, the field study was performed at YLE and a PC emulator was substituted for the MHP STBs. On three Mondays (Oct.24 to Nov. 7, 2005), 33 children ages 9 to 13 participated in the field study. They watched the "*Tuu juttuun*" program on television in small groups of two or three and discussed its themes (helping people, fears, and use of money) with help provided by the PC emulator.

Figure 2 shows the login page on which children type in a username and a password to log on to the IM application.

RESULTS OF THE FIELD STUDY

Table I compares usage of IM on the Internet as against ITV. We used IM in the field study to enable children to participate in the "*Tuu juttuun*" program as fully and actively as possible. The broadcasting company created the framework for the program, but the children as a community created the outcome. They discussed the topic of the day and participated in quizzes.

There are differences (as noted in Table I) between using IM via the Internet and iTV: IM on the Internet is used for socializing and planning events; some if it was due to peer pressure, was more passive, and not as goal-directed as via ITV.

IM via the Internet works with friends, but iTV users can be strangers or community members who share a common purpose in exchanging ideas about a subject of a program. IM use via ITV has similarities to IRC, since IRC communication is between strangers.

Multitasking via the Internet has been characteristic of IM use by teenagers. According to the interviews, however, the situation will not be the same for iTV. Active participation demands concentration via iTV; there is no extra time for other activities.

One reason for IM's popularity among users is that applications have been trivial to install and easy to use. According to the interviews, the reasons for using IM via ITV are different; the most important being that it does not cost any extra.

There are no strict rules for using IM via the Internet. However, according to the participants in this experiment, IM via iTV requires rules because IM now has a different

Table I. IM Usage: Internet Compared to ITV

	Internet	*ITV*
Purpose	General communication	Value added to an TV program
Reason to use	Socializing, peer pressure	Participation in a program, community
Communicate with	Friends	Strangers,community members
Participation	Passive	Active
Tasking	Multitasking	Single-tasking
Reasons for use	Trivial to install, easy to use	Available without extra cost
Policies	Tacit assumptions	Rules
Availability	24/7/52	During the program
Functions	Communication Image and url delivery	Communication

purpose. Without rules, communication will not remain on topic. Service via iTV is available during a program, but IM use via the Internet is available 24/7.

To conclude, because the reasons for using IM in t-learning are different from those of IM via the Internet, the characteristics of IM use in t-learning are also different.

Sending Messages

The participants felt that a moderator was needed to keep the communication on topic. The moderator accepts all messages before they appear on the PC screen, asks the participants questions, and activates their work. The literature supports the active participation of a moderator [Maloney-Krichmar et al. 2003].

The participants felt that abusive (including cursing) messages should be rejected. Half of them wanted messages on off-topic subjects to be rejected.

A moderator's questions should be formed so that the answers are more than just a "yes" or "no," and patronising questions should be avoided. But where time is limited, questions should not require answers that are too long either.

Figure 3 shows the messages sent on the three Mondays; the numbers varied: The first group of participants sent 180 messages, the second 207, and the third 252. In total, almost 20% of the messages were rejected. Online communities have policies, in the form of rules--for example, to guide people's interactions. According to the participants in this study, some advance guidance regarding the rules would have limited the number of rejected messages. The importance of rules is greater if the goal is to add value to the program instead of having a general conversation. The number of rejected messages was lower the second time because the participants' teacher was told not to send messages that were off-topic.

The participants did not want the discussion to end at a particular time during the program, but to be extended for the duration of the entire program. They would also have liked to continue the discussion afterwards on the Internet.

On the three Mondays, the average length of sent messages varied from three to six words. The participants mostly answered the moderator's questions or made brief comments on the theme of the program.

A favorite part of the program was the drawing competition. Two participants via telephone tried to guess what the picture being drawn on television would be. By means of the IM application they competed with each other to see who would guess first what the picture would be. According to the interviews, in addition to commenting on content, this application can be used in competitions such as this.

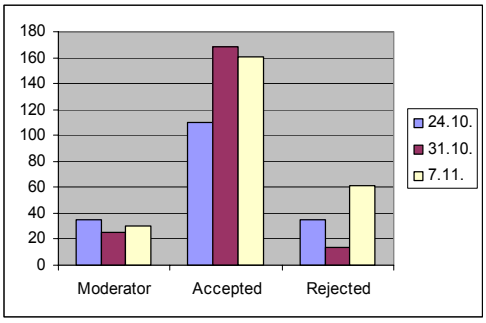

Fig.3. Number of messages sent to the moderator, accepted, and rejected.

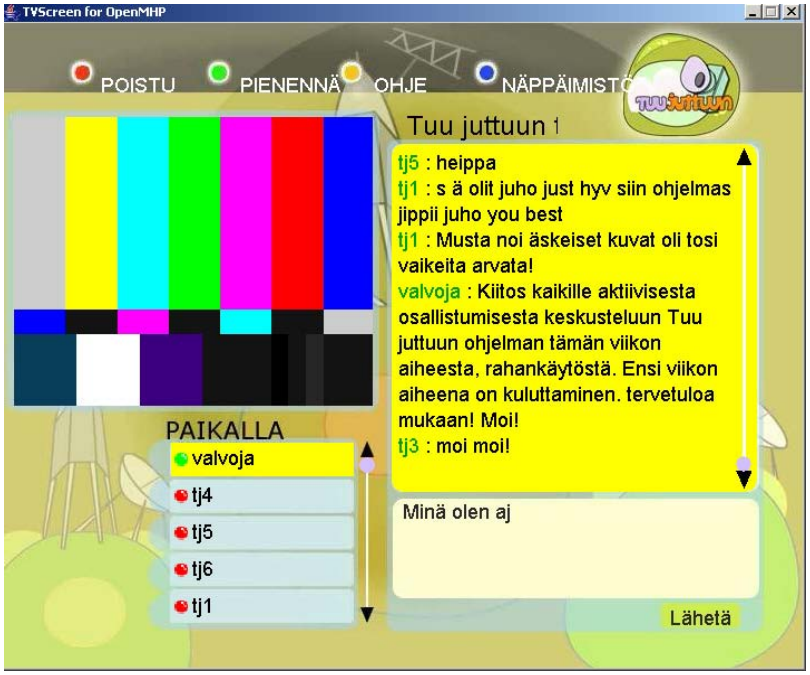

Fig.4. Another example of the communication application.

Types of IM Use via iTV

Table II shows the possible types of IM use via iTV. The IM via the Internet does not require a moderator. The need for a moderator and his or her role in iTV depends on the reason the IM is being used. It seems that a moderator is needed when IM is strictly connected to program content. That is, participants felt that a moderator was needed when the communication had to stay on topic, but was not needed for a general conversation.

Table II. Types of IM Use via iTV

	Educational	General
Purpose	Educational	General conversation
Connection to a programme	Added-value to the program	Socializing
Moderator	Yes	No
Subject of messaging	Desired subject	No topic subject Fluent stream
Example program	*Tuu juttuun* program	Sports program

Table III. Comparing IM Use in One or Several Communication Room(s)

	One Communication Room	Several Communication Rooms
Characteristics of communication	Commenting on a subject Answering questions	Deep communication
Communication based on	Questions	Themes
Time	Few minutes	Hour(s)
Subject	Changes frequently	Stays the same

Only one communication room was available to the field study; but the application includes an option for several communication rooms. According to the interviews, the use of one communication room did not allow a deep examination of the subject, since topics changed so quickly. It was characteristic of such discussions to comment on a subject and give short answers to questions. The use of several rooms would allow much lengthier communication on a theme than was possible in the field study, where the time for one question was limited to a few minutes. Several communication rooms would have allowed the discussion to last much longer (perhaps even hours longer). In the field study, subjects changed frequently, but if there were several communication rooms, a given subject could remain the same in one communication room.

Usability

The participants felt that they could watch the incoming messages simultaneously with watching the program. In practice, in many small groups one child was writing and one or two children were watching the program. According to them it would be easier to follow the program and the messages simultaneously when both could be seen on the same television screen. According to the interviews, it is at least as easy to read text on television screen as it is on a PC screen.

The children learned how to use the application well. After a little guidance, they were able to write messages, and despite a few technical problems, they felt that the application was easy to use. According to them, the application did not limit the subjects being discussed. The application's main importance was that it allowed the children to participate actively in the program.

Some participants mentioned that Scandinavian letters were difficult to type because a virtual keyboard had to be used or else a button had to be pressed several times on a PC keyboard. A child/participant said "It was irritating and slow to write ä and ö." Because the participants had experience using PCs, the iTV functions (based on those for the mobile phone) were unfamiliar to them, and this led to difficulties. The results could have been different had the field study environment been as originally designed.

Some child/participants had difficulty navigating. They were not able to move from the "message writing" field to check their messages. In addition, not all of them noticed that they could see their archived messages. But these types of problems would have appeared even if the environment had been iTV.

DISCUSSION AND CONCLUSIONS

The moderator's role depends on the purpose of instant messaging service. If the service is goal- directed, the moderator's role is important. Based on research results, a moderator needs to guide and activate the discussion with comments and questions, in addition to accepting and rejecting sent messages.

The children's IM use via iTV was characterized by commenting on a subject and answering questions.

Instant messaging via iTV includes the four aspects of the online community: people, purpose, rules, and technology. The people are children who watch the "*Tuu juttuun*" program; and according to them, the main purpose of instant messaging is to allow them to actively participate in the program. The children made the rules for what was allowed in IM. They felt that messages that included swearing and abuse should be rejected; half of them felt that messaging that were off-topic should also be rejected.

Because the field study was performed with the help of a PC emulator, new research is required to verify the results for iTV and to find out more about the characteristics of online community via iTV.

According to our research, a program-specific instant messaging application can be used to comment on a program, answer questions, and participate in program quizzes. The application includes an option for using several messaging rooms, which would allow communication on a particular topic to last longer than it would in one messaging room. It would also make deeper communication on the topic possible.

The character of program-specific instant messaging differs from instant messaging on the Internet. On the Internet, the participants are messaging to friends, but not via iTV. In this sense MHP-based instant messaging is similar\ to Internet relay chat (IRC) systems, which tend to be used for communication between strangers around topics or activities of common interest.

There are three major components that affect IM utility: purpose, community, and program. The purpose of a user or a user group affects IM utility, but it also affects the community and program. If the purpose is educational and goal-directed, it affects participation, tasking, and policy, and may need a moderator. If participation is active, there is no extra time for other tasks, and rules will become necessary. A student stated that "if there are no rules, the messaging will be general communication and communication will be off-topic."

The community and program aspects in t-learning are a combination of pedagogy and technology. The final form of the program and the goal of community are created in the production of content. In this type of service, both the program and the IM community are needed for IM utility. If IM is to be value-added to a program, the IM community has to have the characteristics defined by Pierce. But it must also include a new, fifth part: connection to a program. The design of the program will defines the type of connection, which can be answering questions, participating in quizzes, or discussing a topic.

The program will affects how IM is used. If the tempo is fast, only short comments or answers are expected. If the tempo is slow, deeper communication about a subject will be requested.

ACKNOWLEDGMENTS

The author would like to thank the children who participated in the study. The study received financial support from YLE Education at the Finnish Broadcasting Company, YLE 75 Years Fund, and Digital-TV cluster program of the Ministry of Transport and Communications Finland.

REFERENCES

AARRENIEMI-JOKIPELTO, P. AND KALLI, S. 2006. Open standard-based digital TV browser in t-learning, In *Interactive Television, the Media Landscape, the Users and the Applications*, T. Rasmussen and J. Jensen (eds.).

AARRENIEMI-JOKIPELTO, P. 2005a. The current state and the future of t-learning in Finland – Results of a study. In *Proceedings of the Society for Technology and Teacher Education* (SITE 2005), 1859–1866.

AARRENIEMI-JOKIPELTO, P. 2006b. Modelling and content production of distance learning concept for interactive digital television, Unpublished doctoral dissertation, Helsinki University of Technology.

AARRENIEMI-JOKIPELTO, P. AND KALLI, S. 2005. Open standard-based digital TV browser in t-learning. In *Proceedings of EuroITV 2005: The 3rd European Conference on Interactive Television, User-Centered ITV Systems, Programs and Applications* (Mar. 30–Apr. 1), 69–77.

AOL. 2005. AOL instant messenger. http://www.aim.com/index.adp. Sept. 30.

ERONEN, L. 2005. User centered research methods for interactive television. In *Proceedings of EuroITV 2005: The 3rd European Conference on Interactive Television, User-Centred ITV Systems, Programs and Applications* (Mar. 30–Apr. 1), 15–26.

ESKOLA, J. AND SUORANTA, J. 2005. *Johdatus laadulliseen tutkimukseen*. Vastapaino.

FREES, S. AND KESSLER, G. 2004. Developing collaborative tools to promote communication and active learning in academia. In *Proceedings of the 34th Annual Frontiers in Education Conf.,,vol.3,* S3B–20-5.

Grinter, R. and Palen, L. 2002. Instant messaging in teen life. In *Proceedings of the 2002 ACM Conference on Computer Supported Cooperative Work*, ACM, New York, 21–30.

HANDEL, M. AND HERBSLEB, J. 2002. What is chat doing in the workplace?, In *Proceedings of the 2002 ACM Conference on Computer Supported Cooperative Work,* ACM, New York, 1–10.

HENTEA, M., SHEA, M., AND PENNINGTON, L. 2003. A perspective on fulfilling the expectations of distance learning. In *Proceedings of the 4th Conference on Information Technology Curriculum,* 160–167.

ISAACS, E., WALENDOWSKI, A., AND RANGANTHAN, D. 2002. Hubbub: A sound enhanced mobile instant messenger that supports awareness and opportunistic interactions. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: Changing our World, Changing Ourselves,* ACM, New York, 179–186.

ISOMURSU, P., PERÄLÄ, M., TASAJÄRVI, L., AND ISOMURSU, M. 2004. Internet-based amateur video delivery: The users and their requirements. In *Proceedings of the 37th Hawaii International Conference on System Sciences* (Jan. 5–8), 97–104.

LJUNGSTRAND, P. AND SEGERSTAD, Y. 2000. Awareness of presence: Instant messaging and WebWho. *SIGGROUP Bull. 21*, 3, 21–27.

MALONEY-KRICHMAR, D., ABRAS, C., AND PREECE, J. 2002. Revitalizing an online community. In *Proceedings of the International Symposium on Technology and Society* (ISTAS ´02), 13–19.

MICROSOFT 2005. MSN messenger. http://messenger.msn.com. Sept. 30.

NARDI, B., WHITTAKER, S., AND BRADNER, E. 2000. Interaction and outeraction: Instant messaging in action. In *Proceedings of the 2000 ACM Conf. on Computer Supported Cooperative Work,* ACM, New York, 79–88.

PAHWA, A., GRUENBACHER, D., STARRETT, S., AND MORCOS, M. 2005. Distance learning for power professionals. *IEEE Power and Energy Mag. 3,* 1 (Jan.–Feb.), 53–58.

PREECE, J. 2000. *Online Communities: Designing Usability, Supporting Sociability.* Wiley, Chichester, UK.

SCHIANO, D., CHEN, C., GINSGER, J., GRETASDOTTIR, U., HUDDLESTON, M., AND ISAACS, E. 2002. Teen use of messaging media. In *Proceedings of the ACM Conference on Human Factors in Computing Systems* (CHI 02), ACM, New York, 594–595.

SCHOBERTH, T., PREECE, J., AND HEINZL, A. 2003. Online communities: A longitudinal analysis of communication activities. In *Procs. of the 36th Hawaii International Conference on System Sciences*, 10.

ZAKON, R. H. 2005. Hobbes' Internet timeline, v. 8.1. http://www.zakon.org/robert/internet/timeline/. Sept. 13.

Received July 2006; revised July 2006; accepted July 2006