

# ASYNCHRONOUS LEARNING NETWORKS AS A VIRTUAL CLASSROOM

*Despite the lack of physical space, an  
ALN's virtual facilities allow students to exchange emotional  
support, information, and a sense of belonging.*

Computer-mediated communication can enable people with shared interests to form and sustain relationships and communities. Compared to communities offline, computer-supported communities tend to be larger, more dispersed in space and time, more densely knit, and to have members with more heterogeneous social characteristics but with more homogeneous attitudes.

Despite earlier fears to the contrary by those who worry about the possible dehumanizing effects of computers, online communities provide emotional support and sociability as well as information and instrumental aid related to shared tasks. Online virtual classrooms combine the characteristics of online communities and computer-supported workgroups. New software tools and systems for coordinating interaction may alleviate some of the problems of interacting online, like information overload and normless behavior.

What kinds of communities are most suited to the virtual environment of computer networks? How does the medium affect interaction in online com-

munities and the types of social structures emerging in postindustrial societies, like North America and Europe? To address these questions, we provide historical perspective; define "community" as a social network; summarize studies of how computer-mediated communication (CMC) affects community interaction; survey examples of different kinds of communities communicating through the Internet; and look at asynchronous learning networks (ALNs) as an example of an online community.

With development of computer networks, the standalone computer was transformed into a technology that sustains the social networks of work and community. However, some of the debates about the nature of the Internet have continued the longstanding exchange between computerphiles and computerphobes. For example, John Perry Barlow, cofounder of the Electronic Frontier Foundation, has proclaimed, "With the development of the Internet and with the increasing pervasiveness of communication between networked computers, we are in the middle of the most transforming technological event since the capture of fire" [1, p. 40]. On the other side, an ad for Mark Slouka's 1995 book *War of the Worlds* warned, "Face-to-face communication is



quickly becoming obsolete; already we turn to computers for information, entertainment, companionship—even love. We are now poised on the threshold of turning life itself into a computer code.” As with most polemics, there are elements of truth at both extremes, but most of the evidence lies in between.

For more than two decades, CMC has built and sustained groups that work and find community together [5]. CMC includes email, bulletin boards and newsgroups, synchronous chat systems, computer conference systems, group decision support systems, and most recently, homepages on the World-Wide Web. Although computer conferencing systems are specifically structured to maintain the kind of ordered, permanent discussion database that nurtures online communities [6], in practice, other forms of CMC have also been actively sustaining a variety of online communities [9, 12].

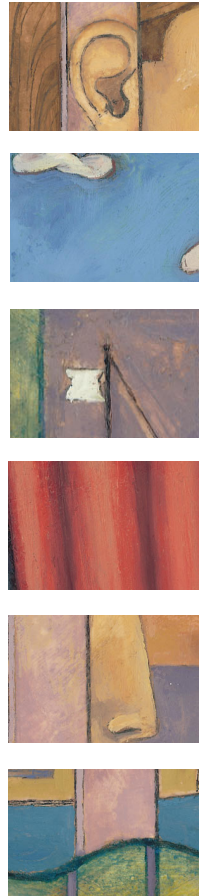
### **Social Networks, Cooperative Work, and Virtual Communities**

When computer networks link people as well as machines, they become social networks, or the basic building blocks of societies. (Social groups, for example, are relatively densely knit and tightly bound networks of people.) Most studies of computer-supported social networks have looked at computer-supported cooperative work, or how people work together online despite being separated in space (usually) and in time (often).

Computer-supported cooperative work relationships are generally narrowly focused and geared to accomplishing tasks through coordinating activities and providing information.

Although emotional support and sociability often accompany these exchanges, such communication is secondary to specific tasks at hand, and relationships often remain limited in content and emotionally distant. By contrast, virtual, or electronic, communities involve sociability, emotional support, and a sense of belonging as important ends in themselves, though they are often accompanied by exchanges of information and services.

The 19th-century German sociologist Ferdinand Tönnies defined “*gemeinschaft*,” or community, as small, geographically distinct, kinship-interwoven groupings characterized by intimate, overlapping, and stable relationships. Communities are now



defined in terms of social relationships, rather than in terms of space.

Network communities consist of sets of informal relationships of sociability and social support stretching beyond households to connect community members regardless of where they live or work.

Because they are less constrained by geography (and group solidarity) than traditional communities, spatially dispersed communities in general, and virtual communities in particular, tend to be communities of shared interests. The ease of contacting other people facilitates the growth of relatively large virtual communities and the evolution of densely knit relationships among community members. The lack of traditional spatial and group constraints means that virtual communities are often more heterogeneous in social characteristics, such as lifecycle stage, gender, ethnicity, and socioeconomic status.

To what extent have virtual communities thrived as computerphiles have hoped or been weak simulacra of real-life communities as computerphobes have feared? Early experimental and field studies suggested that CMC could better support instrumental relationships than

supportive, sociable community ties, as in the following examples:

- The limited bandwidth of CMC can reduce “social presence” and “social cues” [8, 9].
- CMC seems good for giving and receiving information, opinions, and suggestions; it is less suited for communicating agreement and disagreement; and it is worst for social-emotional tasks involving conflict and negotiation, such as showing tension or tension release (e.g., laughing) or showing strong emotions [6].
- There is no “turn-taking,” so all participants can key in entries whenever they like.
- There is more equality of participation in CMC than in face-to-face group interaction.
- Asynchronicity makes interaction more convenient but raises new coordination problems, such as information overload.

However, field research has also shown substantial emotional support and sociability communicated online in both socially close and in weaker relationships. The relationships people develop and maintain



WE ANTICIPATE INSTANCES OF NEGATIVE BEHAVIOR  
(SUCH AS FLAMING AND NORMLESSNESS) WILL DECREASE WHEN  
STUDENTS SEE THEMSELVES NOT IN ONE-TIME EXPERIMENTS  
BUT IN LONG-TERM LEARNING COMMUNITIES.

online are much like those they develop off-line—intermittent, specialized, and varying in strength.

Moreover, ties initially narrowly defined and instrumental often broaden out to become socially supportive. Participants often form attachments to online communities.

### **Varieties of Virtual Communities**

Many relationships connect people off-line as well as online, and communities are not often neatly divided into discrete off-line and online sets. Most use of CMC occurs in social networks that are at least partially co-located, so online contact is interspersed with face-to-face, telephone, and written contact. In such situations, the norms of the community or group may predate the use of CMC. Hence, the medium itself plays a minor role in the overall functioning of the community, organization, or group, as shown by the following examples:

- Conferencing, groupware, and email systems in many corporations.
- Email and bulletin boards in such diverse noncorporate groups as senior citizens in the U.S., Maori tribe members in New Zealand, and striking teachers in Israel to communicate between meetings and to connect dispersed local groups.
- Interactive Web pages by organizations as diverse as the ACM, the Catholic Church, and Bloomingdale's department stores to exchange information among members or customers.

In other situations, the social network is formed and primarily sustained online, a scenario most likely to be adopted by communities that are dispersed geographically and that do not represent the primary paid job of the participants. In such cases, traveling to meet is not practical, and asynchronous CMC represents the most appropriate medium for the group, as in the following examples:

- 2,500 BMW enthusiasts exchanging up to five email digests daily filled with hundreds of messages on how to maintain and modify their cars.
- Virtual environments, such as multi-user domains

(MUDs), in which participants enter broadly encompassing, highly involving social worlds [7, 10].

- Temporary project teams formed around specific tasks, meeting primarily online, and then dissolving when the project is over.
- Courses and degree programs through the Virtual Classroom at the New Jersey Institute of Technology (NJIT), serving for the past decade as a detailed example of the nature of communities on the net.<sup>1</sup>

### **The Virtual Classroom**

An ALN is a teaching and learning environment located within a CMC system designed for anytime/anyplace use through computer networks. ALNs consist of a set of group communication and work “spaces” and facilities constructed in software. They are virtual facilities for interaction among the members of a class, rather than physical spaces. The Virtual Classroom is NJIT's trademarked name for versions of its electronic information exchange system (EIES) with special software structures designed to support collaborative learning, including those meant to force active participation, and to allocate unique assignment topics, and exam and gradebook facilities [4, 6]. A virtual classroom is both an instrumental group—in which students and instructors want to accomplish goals—and a community—in which students exchange emotional support, information, and a sense of belonging.

ALNs are best at enriching educational options when they serve as a way to create the feeling of a true “class” or group of people learning together and to structure and support carefully planned collaborative learning activities that constitute the assignments for a course. Emphasizing group or cooperative efforts among faculty and students, collaborative learning stresses that the educational process occurs through the active participation of

<sup>1</sup>Research on the B.A. in information systems via a combination of video and the Virtual Classroom is supported by the Alfred P. Sloan Foundation. Hiltz's continuing research on appropriate software structures and procedures for group collaboration in CMCs is supported by a grant from the National Science Foundation (NSF-IRI-9015236). Wellman's research on virtual communities, computer-supported cooperative work, and CMCs is supported by the Social Science and Humanities Research Council of Canada.



students and instructors in an environment that facilitates peer interaction, evaluation, and cooperation.

Most courses contain online “seminars,” a collaborative learning strategy in which students become teachers. Individuals or small groups of students are responsible for selecting topics, reading material not assigned to the rest of the class, preparing written summaries of the most important ideas in the material, and leading discussions on this material. Seminar-style presentations and discussions exemplify a collaborative learning activity that is often difficult in large traditional classrooms with many students but that tends to work in a virtual environment. Virtual Classroom courses often assess mastery of material by assigning students to identify key concepts or skills in each module of the course, to construct exam questions, and to answer each other’s questions. Students are made partners in deciding what course material is important to know.

Other examples of the collaborative learning strategy in the Virtual Classroom include debates, group projects, case-study discussions, simulation and role-playing exercises, the sharing of solutions to homework assignments, and collaborative composition of essays, stories, or research plans. (See [2] for more descriptions and examples of these collaborative learning strategies.)

Our research group’s first study of the Virtual Classroom began in 1986 and involved the comparison of a large number of courses in many disciplines (including sociology, mathematics, English composition, management, and computer science) over two years. For some courses, there were “matched” sections offered by the same instructor in a traditional classroom and through the Virtual Classroom (as the sole means of delivery or combined with a reduced number of face-to-face meetings). For other courses, there was no “match,” and the comparison was subjectively made by the students and instructors to previous, traditional courses. A second project (1993–1996) was designed to develop, offer, and assess the effectiveness of degree programs in information systems and computer science delivered via the Virtual Classroom plus videotaped lectures. Both studies used a “multi-method” approach to evaluation, including pre- and post-course questionnaires completed by students, direct observation of online activities, interviews with selected students, a quasi-experimental comparison of test or course grades, and other “objective” measures of performance for courses offered via different modes of delivery, as well as regular reports by faculty using a standard format.

The basic hypotheses about effects on students

were all supported by the results of both studies [4], including the following:

- Mastery of course material in the Virtual Classroom is equal or superior to that in the traditional classroom.
- Virtual Classroom students report higher subjective satisfaction with the Virtual Classroom than with the traditional classroom on a number of dimensions, including access to their professors and overall quality of the educational experience.
- Students perceive the experience as “group learning” rather than individual learning. The more they perceive collaborative learning as taking place, the more likely they are to judge the outcomes of the Virtual Classroom as superior to those of the traditional classroom.

Though the classroom is virtual, the relationships and the learning it supports are real.

Results from post-course questionnaires for students who used the Virtual Classroom ( $n = 692$ ) vs. those in comparison sections ( $n = 163$ ) in the most recent (1996) study support these hypotheses. Most surveyed students who used the Virtual Classroom (71%) felt it provides better access to their professors. Despite the reported problems of some students in reaching the NJIT computer facilities due to busy signals from modem banks and Internet providers, 73% feel virtual classrooms are “more convenient” overall. Only 16% did not “feel more involved in taking active part” in their courses.

Collaborative learning took place online and had its intended motivational and learning consequences; that is, there were “learning communities.” For example, 55% of surveyed students felt more motivated to be diligent in their assignments because other students would be reading them, and only 10% felt that reading the assignments of other students was not useful. Moreover, students (and faculty) tended to work harder in Virtual Classroom-based courses because of the convenient daily access to class interaction and the need and motivation to keep up with the contributions of their instructors and classmates.

Spontaneous comments and behavior also demonstrate increased student interest and satisfaction in virtual classrooms. For example, all the graduating students in a management class who had worked in a simulated online company had a party after their commencement ceremony. That they would choose to spend their graduation day with the members of a former online class indicates that the course was special for them.



## Disadvantages

Where the majority of traditional classroom students reported developing new friendships in class, only about 33% of Virtual Classroom students reported doing so. Although a substantial proportion of students made new friends via CMC, establishing close personal relationships was more difficult.

A greater percentage (52%) of Virtual Classroom students reported they were more likely to stop "attending class" when busy with other things. As classes do not meet at any particular time but only when students log on, it is easy to postpone attendance—procrastination that can easily turn into falling seriously behind.

Computer conferencing enables active participation, and active conferences generate a rich database of information. However, large groups and high levels of activity can lead to information overload if the tools meant to help manage the information flows are inadequate. Conference structures are valuable but can't deal with information overload, which surveyed students and teachers reported as a significant problem. Some causes of the feeling of overload can be dealt with. For example, early in a course, as students learn to navigate the system, the sense of being lost can trigger a sense of overload. Students new to computer conferencing initially may send notes to the wrong conference, creating confusion for other participants.

Moreover, the high level of student enthusiasm in the early weeks of online activity motivates some students to overload others by writing voluminous and numerous messages. However, with some experience online, students refine their skills, and such problems are overcome. Still, the larger problem of overload accompanying an active online class remains to be solved.

Identifying and chastising rule-breakers reinforces the norms and behavior that help hold communities together. Yet it is difficult to identify and control rule-breakers in big cities where many participants may not be known personally and where there is less interconnection among participants. Hence, crime rates are generally higher in big cities than in small towns, according to FBI statistics. Online communities are no different from any large population of people. The more numerous and anonymous their members, the more likely there will be antisocial behavior. Thus, the limits to the size of online classes are more social than technical. Beyond a certain size, the amount of material generated in the class leads to information overload, and the number of people

involved gets too high to foster a sense of community.

The result may be electronic normlessness, or a lack of conformity to shared guidelines for behavior. In one class at NJIT, there were so many students (96) the participants had trouble getting a personal feeling for each other. There was an apparent mid-semester revolt, with several students suddenly entering complaints, demanding that an upcoming assignment be canceled to allow everybody a chance to catch up. This behavior was puzzling until it was later discovered that one particular student's research project was based on the hypothesis that it would be easy in large online communities to foment rebellion against authority. The project took the form of an experiment. The "rebellious student" sent personal messages to all his classmates urging that they follow his lead in the class conference by complaining and demanding less work. Enough classmates complied that his experiment can be considered a success. The real subjects of the experiment, the instructors, gave a week's extension on an assignment in the face of what seemed overwhelming student opinion.

Fortunately, this phase of the student rebellion was followed by the failure of phase two—an attempt to prove that CMC could be used to foment ethnic or subcultural conflict. The same student entered nasty ethnic attacks in the class conference, making disparaging remarks about practically every ethnic group but his own. The other students did not follow his lead, expressing strong disagreement and censure. So there are some limits to rule-breaking, even in a large virtual classroom.

However, large classes or other types of large online communities do not necessarily lead to information overload and normlessness. Special software tools and software-supported interaction structures and roles can aid coordination of large online groups. For example, an important kind of tool for supporting ALN is a way to categorize, re-sort, and annotate items for later use. A process that allows larger classes to function well involves dividing them into small teams with role structures that facilitate the teams' specific collaborative work.

These examples derive from the experience of students who usually took only one Virtual Classroom course. Many universities besides NJIT are moving toward complete online degree programs in which students encounter each other over several years in online courses and informal gathering spaces. We anticipate instances of negative behavior (such as flaming and normlessness) will decrease when students see themselves not in one-time experiments but in long-term learning communities. The num-



ber of friendships formed among virtual classmates should also increase as the length of interaction increases.

## Conclusions

The Internet provides information and social support in both specialized and broadly based virtual communities. Due to its reduced social presence, the Internet will never replace face-to-face meetings for engendering and nurturing primary group relationships. It is possible to make friends, even close, personal friends, online, but it is less likely. There is no risk that the only smiles and hugs and kisses children receive from their parents in the future will be emoticons :-), xxx, <>, :-(. Yet because CMC has less social presence than face-to-face communication, online communications are often more uninhibited, creative, and blunt.

On the other hand, the Internet can provide emotional support, companionship, and a sense of belonging when real hugs are impossible. For example, many spouses use email to communicate when one or both are traveling, parents exchange email with their children attending college, and there are large and active parenting-skills newsgroups through which parents share their problems and information and support one another during parent-child crises. These new kinds of online ties are real and not virtually second-rate. Witness cases of marriages among former electronic pen pals or the virtual classmates who hug each other on graduation day. The Internet today is being used in the same way as letters and, later, the telephone were used to sustain traditional community relationships.

Computerphobes like Slouka worry that virtual communities may not be true communities. They are confusing the pastoralist myth of "real community" for the reality. There is little community life in many urban neighborhoods in North America. Off-line community ties are geographically dispersed, sparsely knit, connected heavily by telecommunications, and specialized in content, according to Wellman's studies [11]. Just as the Internet supports neighborhood-like virtual communities of tightly knit groups, it also supports more sparsely knit and specialized communities.

The word "superconnectivity" [5] describes the impact of CMC on people, communities, organizations, and society, as well as the ability to "network" among larger groupings of individuals and to make any link available when needed. When the computer is introduced to mediate—organizing, filtering, summarizing, categorizing, directing, sequencing, and regulating—the human communication process,

the number of relationships can expand at least tenfold.

Peoples' lives are likely to become more fragmented as CMC fosters their participation in more organizations and communities. For instance, many of the NJIT Virtual Classroom students pursue their college degrees while working full time because they can pursue anytime/anywhere interaction with their online peers and mentors. Loyalties to a few local communities of, say, residence and work, are likely to weaken, while ties to geographically dispersed "communities of interest" will strengthen. The end results are part of the continuing social transformation toward global connectivity. If there is a pseudo-anthropological novel written in the future about the early 21st century, perhaps we will be called The People of the Web. **C**

## REFERENCES

1. Barlow, J.P., Birkets, S., Kelly, K., and Slouka, M. What are we doing online? *Harper's* 291, 1,743 (Aug. 1995), 35–46.
2. Harasim, L., Hiltz, S. R., Teles, L., and Turoff, M. *Learning Networks: A Field Guide to Teaching and Learning Online*. MIT Press, Cambridge, Mass., 1995.
3. Hiltz, S.R. The virtual classroom: Using computer-mediated communication for university teaching. *J. Commun.* 36, 2 (Spring 1986), 95–104.
4. Hiltz, S.R. *The Virtual Classroom: Learning Without Limits via Computer Networks*. Human-Computer Interaction Series. Ablex, Norwood, N.J., 1994.
5. Hiltz, S.R., and Turoff, M. *The Network Nation: Human Communication via Computer*. Addison-Wesley, Reading, Mass., 1978; rev. ed., MIT Press, Cambridge, Mass., 1993.
6. Hiltz, S.R., Johnson, K.D., and Turoff, M. Experiments in group decision making: Communication process and outcome in face-to-face versus computerized conferences. *Hum. Commun. Res.* 13, 2 (winter 1986), 225–252.
7. Rheingold, H. *The Virtual Community: Homesteading on the Electronic Frontier*. Addison-Wesley, Reading, Mass., 1993.
8. Rice, R.E. *The New Media*. Sage Publications, Beverly Hills, Cal., 1984.
9. Sproull, L., and Kiesler, S. *Connections: New Ways of Working in the Networked Organization*. MIT Press, Cambridge, Mass., 1991.
10. Turkle, S. *Life on the Screen: Identity in the Age of the Internet*. Simon & Schuster, New York, 1995.
11. Wellman, B. The community question re-evaluated. In *Power, Community and the City*, M.P. Smith, Ed. Transaction Books, New Brunswick, N.J., 1988, pp. 81–107.
12. Wellman, B., Salaff, J., Dimitrova, L.G., Garton, L. Gulia, M., and Haythornthwaite, C. Computer networks as social networks: Collaborative work, telework, and virtual community. *Annu. Rev. Sociol.* 22 (1996), 213–238.

---

STARR ROXANNE HILTZ (roxanne@vc.njit.edu) is a distinguished professor of computer and information science at the New Jersey Institute of Technology.

BARRY WELLMAN (wellman@chass.utoronto.ca) is a professor of sociology at the University of Toronto.

---

Permission to make digital/hard copy of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage, the copyright notice, the title of the publication and its date appear, and notice is given that copying is by permission of ACM, Inc. To copy otherwise, to republish, to post on servers, or to redistribute to lists requires prior specific permission and/or a fee.

---

© ACM 0002-0782/97/0900 \$3.50