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COMPUTER CONFERENCING FOR COLLABORATIVE LEARNING IN LARGE COLLEGE CLASSES

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Abstract:

This project explored how computer conferencing may facilitate
 collaborative learning and enhance social interactions in large college
 classes. We worked with a variety of instructors at Indiana
 University in Bloomington to support their use of the technology
 and to analyze its collaborative potential for their classes. The
 emphasis was on courses whose high enrollment normally allows
 little interaction with the instructor and among students. Computer
 conferencing seems to emerge as a medium that--if integrated well

into the course--can contribute significantly to a better, more student-centered learning climate. However, a variety of problems still need to be addressed. They result from three major sources: (a) Inadequacies of software and the system's availability on and off campus; (b) student expectations based on experiences of competitiveness in school; and (c) traditional teaching models that interfere with an effective use of the medium's interactive potential.

Computer Conferencing for Collaborative Learning in Large College Classes

Structural Problems in Today's Mass University

Higher education is currently undergoing its most significant changes in decades: Student populations are shifting from young students just out of high school to older students, who have been in the workplace for many years; college classes are becoming larger as a result of decreased public funding (The Chronicle of Higher Education, Jan. 9, 1991); and a significant shortage of faculty is predicted for the current decade (The Chronicle of Higher Education, Sept. 18, 1989; July 11, 1990). At the same time, universities are turning out degrees in record numbers. National studies of higher education have been critical, however, claiming that these degree programs do not develop students' critical thinking skills and social values (AAC-report Jan. 1991; Carnegie Foundation report 1987).

Faculty and instructional developers are exploring how instructional strategies and new educational technologies can contribute to solving these problems. There is evidence that the use of collaborative learning together with the concomitant development of a supportive social environment can revitalize the classroom process for both teachers and learners (Gabelnick et al. 1990; Gamson et al. 1984; Svinicki 1990). Special grouping procedures can be used to break up large classes and supplement lectures with highly interactive activities (Barrows et al. 1986; Brothen 1986; Gleason-Weimer 1987; McGee 1986; Michaelsen 1983), and new computer technology can contribute to a social infrastructure that allows instructors and students to distribute initiatives for the learning process in more democratic and reflective ways (Adams et al. 1990; Feenberg 1989; Galegher et al. 1990; Harasim 1990; Mason and Kaye 1989).

In the spring of 1990, the instructional development office at Indiana University received a grant from the Telecommunications Advancement Foundation/Japan to explore how electronic networking may facilitate collaborative learning and enhance social interaction in instructional contexts where face-to-face contact among the students is limited. Our research primarily relates to large college classes where high enrollment does not allow students to get to know each other and engage in meaningful discussions. It also includes a course taught on two campuses of Indiana University simultaneously via two-way television broadcast.

Computer conferencing (CC) has been shown to create new pathways for communication and social interaction in distance education (Ambron and Pennington 1988; Harasim 1990; Hiltz 1988; Mason 1988; Mason and Kaye 1989). The goal of our project was to find out whether some of the advantages CC has yielded with older and highly motivated populations could also be achieved in today's large and anonymous college classes. We therefore targeted

high-enrollment courses, mostly undergraduate, and looked at what electronic conferencing could do to break up the anonymity and passivity among the students.

Unfortunately, large classes taught by instructors who are experienced in both CC and collaborative learning, are hard to find. Under these circumstances, our project was at times as much an experiment in the adoption and diffusion of new instructional approaches as it was an investigation into the potentials of the electronic conferencing technology. This paper will concentrate on the latter part. We will discuss three different approaches to CC used in the project, describe the major technical and structural problems encountered, and reflect on the conceptual advantages the medium has to offer large classrooms.

Major CC-Functions Used by Instructors at IU

In using computer conferencing for collaborative learning in large classes, we have so far experienced three different approaches. Two of them were largely initiated by our team.

Content-Related Discussions Between Class Meetings

Probably the least demanding approach is to use CC as an extension of the classroom. There is never enough classtime when it comes to discussing complex issues, especially when "class" means 250 students in a lecture hall. The electronic conference is an ideal way to continue debates started during a class meeting. It can also be used in preparation for a class discussion. In that case, the instructor does an electronic survey of students' opinions on a certain issue so that in the following class session they can discuss the issue in a more focused way.

Collaborative Test Preparation

Students frequently form study groups to review material on upcoming tests. This format can be used as a model for electronic collaboration that allows test preparation to become a meaningful instructional goal in itself. We have tried two versions of this approach. In the first, the instructor enters review questions after each lecture and appoints a number of student groups to discuss the answers in the conference. Different groups take turns throughout the semester. In the second version, groups of students are given electronically protected conference space to discuss the answers to a study guide. This second model includes an element of competition between groups in that the instructor evaluates the quality of each group's preparation and assigns extra points. Both approaches require careful planning and monitoring.

Work on Case Studies

This approach uses the electronic conference as a bulletin board to publish the products of individuals and groups in preparation for further live discussion. The logistics of sharing written information becomes a complicated (and costly) problem in large classes. At the same time, such classes offer the opportunity for comparing a range of opinions and interpretations that approaches demographic proportions. One way to exploit this opportunity is in conjunction with the case study approach to teaching. Individual students analyze relevant case scenarios.

Then, the multiple viewpoints generated by the whole class are used as stimuli for further discussion.

Problems Encountered

In undertaking such a project, one is bound to encounter a multitude of problems. Most of the variables were not under our control, and identifying the main hurdles seemed one of the most important results of our project. Besides reporting the problems, we propose some potential remedies. However, it is premature at this point to suggest that these are ultimate solutions.

Problems With Technology

At the time of this project, the total number of computers in public clusters on the Bloomington campus was about 700. Most computer rooms were closed in the evening limiting student access. At busy times, students became frustrated when unable to obtain a place at a terminal. Dorms were not yet equipped with significant numbers of computers, and only a minority of undergraduate students had invested in PC's and modem hook-ups.

The situation is still worse on other IU campuses. It is also structurally different. A high percentage of students on the other campuses, often the majority, consists of commuting students who shuttle between class, home, and work without spending much time using campus facilities. Under these conditions, even an abundance of public computer clusters on campus might not be enough to encourage regular use.

The conferencing software that IU uses is DEC's VAX- Notes. Although it is relatively easy to learn, it has several drawbacks:

1. The commands in VAX-Notes are not very intuitive or user friendly.
2. Notes can only be made on two levels, as "topics" or "replies," with little capability for cross-referencing.
3. Editors on a VAX computer are less powerful than a word processor.
4. Printing entails a cumbersome and time-consuming procedure.

University Computing Services offer JumpStart classes designed to familiarize students with the basics of handling VAX accounts. These classes are open to all students. The largest course on campus currently using computer conferencing has over 500 students. Few campus computing offices in the country are prepared to train such a large student population efficiently enough to enable classes to communicate electronically within two weeks. This leaves the major training responsibility to the individual instructor, creating a formidable challenge for her or him, especially in the case of large classes.

Possible Remedies for these Problems:

1. Lobby for computer clusters to be open longer.
2. Advise students as to the best times for working on the system (hours of the day, days of the week).
3. Provide good handouts, comprehensive ones for initial familiarization and short ones for daily use.
4. Require students to train each other in the use of the technology.

Problems with Teaching Approach

CC is convenient for the instructor who wants to free his or her class sessions from "housekeeping" that eats up precious time. CC's main potential, however, is as a true communication and learning medium for students. Through it, they can take on a more active role in the learning process and thus expand their available resources beyond the instructor and the textbook to include every member of the class.

Unfortunately, this is not yet a common concept in college teaching. It seems that many college instructors, especially when dealing with large, entry-level classes, distrust their students' abilities to contribute significantly to course content. The predominant agenda in their classes is, therefore, to "cover the material," usually requiring the instructor to do the talking and the students to do the listening.

This approach directly conflicts with the interactive orientation of computer conferencing. We observed an example of this conflict in one of the courses we followed. The instructor inserted lecture review questions into the CC for student groups to discuss. The review questions were to function as preparation for the tests. The students' responses to this task, however, were largely negative. They were less interested in what their fellow students had to say about a question than in what the "right" answer was. The instructor's overall orientation toward knowledge transmission in the course, always implying right and wrong answers, had undermined students' readiness for open-ended discussion.

Such contradictions are not always recognized by instructors. We have been involved with several faculty members who were willing to give this new technology a try, but were not willing to change their established modes of teaching (i.e., lecturing). As a consequence, the two instructional contexts were running parallel to each other, and activities that were initiated in the CC were largely ignored during regular classtime. For example, one instructor wanted to develop her students' awareness of special populations in our society. A case-study approach was chosen to accomplish this goal, and computer conferencing was selected as the medium to communicate students' analyses and reflections. However, the instructor felt unable to give up any classtime to discuss the activities occurring in the electronic medium. Students understood very quickly which medium was relevant and which one wasn't for their success in the course.

Another element that is usually neglected in traditional teaching approaches, is the social nature of learning. The classroom is generally considered a place for cognitive, not for social activities. Instructors are busy connecting students with the content, not with each other. Nevertheless, colleges are without a doubt places to meet people. Intellectual growth is intrinsically connected with the opportunity for social exchange. So far, we have found very few instructors who were willing to consider the legitimacy of this connection in their classrooms and provide a place for both.

Possible Remedies for These Problems:

1. Target instructors who feel comfortable with the technology and with interactive classroom teaching.
2. Target courses that permit a close match between course topic

and collaborative technology use.

3. Support informal use of CC for social functions by offering designated spaces in the conference and making expectations that it be so used explicit.

Problems with Face-to-Face Collaboration

Some CC activities may call for accompanying face-to-face collaboration of students (see 3rd function of CC, above!). This may raise significant difficulties in large classes where the instructor cannot possibly go into each group and provide guidance with corrective feedback. Students rarely have any kind of systematic preparation in high school for collaborating effectively in unmonitored work groups.

We observed small student groups trying to work on case studies outside of class. The task required students to question each others' positions while collaboratively working out a group consensus that reflected more than the mere total of their individual opinions. Our observations showed that students approached this task as they frequently approach homework assignments done in study groups: they quickly adopted an answer but failed to explore the issues. There was rarely an element of questioning, no struggle for a consensus, and little support for group members who had problems participating.

Besides the lack of reflection and group skills, there are also logistical problems that hamper student collaboration. Some of the groups mentioned above were incapable of arranging to meet for even one hour in a given week. Students were commuting to campus and had packed all their courses into two days; others had part-time jobs or had taken a heavy course load that left little space to maneuver.

Even when meeting times are not a problem, the unavailability of appropriate meeting places may dampen the enthusiasm for group work. IU's main areas for study groups are in the main library: the lobby and a large open space on the fifth floor. Neither area has any provisions for partitioning off group space or lowering the overall noise level. The other options are large, empty classrooms or small dormitory rooms. All of these locations have one thing in common: they all suggest to students that small-group work is not a regular thing to do in college, and none of them is convenient for an instructor who is willing to help with the group process.

Possible Remedies for these Problems:

1. Model collaborative behavior in class and have students reflect upon the social dynamics of their group work.
2. Add lab or discussion sections to the course.
3. Reserve large rooms for labs so that small groups can be distributed across the room.
4. Employ undergraduate teaching interns (for course credit) to facilitate group meetings.

Problems for the Instructor

The main reason for having large lectures is maximal use of scarce instructor time. The less individualized the instruction, the more time-efficient it is for the instructor. Adding a new channel for

communicating with students seems counterproductive toward this goal. Instructors need to set up conferences both physically and conceptually. They also need to make some arrangements for training students to use the technology. They need to spend time monitoring CC activities, and they need to incorporate all this into the regular course curriculum.

When students start entering their comments into the electronic conference, the instructor immediately feels confronted with a new and overwhelming assessment task. Students have come to expect that everything they put in writing will be graded by the instructor. Talking in class means communicating, but writing for class means performing, and performance warrants assessment. It seems that most instructors who use computer conferencing for the first time, feel trapped when they notice that student participation is no longer ephemeral but preserved in screens full of text, many screens of text.

Even when constant grading is avoided, a conscientious instructor feels the need to provide feedback to students' writings. One of the instructors we worked with seemed to feel guilty, initially, when realizing that she was unable to respond to everybody's notes. She finally resorted to telling her students that as long as their notes were of acceptable quality, she would not provide specific comments. Another instructor, who assigned case analyses to her students, gave feedback by exemplars illustrating what constituted a strong versus a weak analysis. But the young undergraduate students did not like this procedure. They seemed to need not only the guidance but also the encouragement and motivation from more individualized instructor feedback.

Possible remedies for these problems:

1. When first introducing CC to your course, limit its use to one main function that is clearly integrated into the course agenda.
2. Whenever possible, make students conference moderators.
3. Avoid the need for instructor feedback to every student entry.
4. Grade only a small percentage of "randomly" selected student work in the CC.
5. Create mechanisms of peer feedback.
6. Give exemplary feedback to CC assignments orally in class.

Problems for the Students

Collaborative learning approaches are threatening to students who are used to competitiveness in school settings. Collaborative learning implies a change of values. Not only are students required to work together, they are also asked to help one another and to take responsibility for the whole group's progress. This responsibility to their fellow students is crucial if the group work is to result in more than a pile of individual pieces of work. It also contradicts students' socialization and their belief in the fairness of individual reward structures. Even minor attempts to award group grades for a small part of student performance met with bitter resistance from some students. They needed top grades to get into a competitive graduate program, and they complained vehemently about what they perceived as being "dragged down" by less competitive group members.

Another student complaint is based on expectations about the average work load. Instructional innovations are often rejected (at

least initially) because they are incompatible with the separation between class and private preparation time. Doing an assignment on the University's computing system means having to schedule extra time on campus rather than fitting it in with the rest of the homework. Student resistance is also encountered because instructors are frequently unclear about how a technological innovation fits into their course design. As a consequence they fail to clearly explain its function and simply add it to the already existing course requirements.

When it comes to information overload, students may have the same reaction as the instructor. The multitude of comments entered into the CC by their classmates can easily become too much to handle. Some of the instructors in our project found considerable redundancy in students' CC-notes, and students complained that they couldn't find anything new to say once they had read the comments of others. They also complained that going through 30 screens of text became tiresome and did not increase their readiness to engage in a meaningful discussion. On the other hand, the instructor of a large class of 350 students told us that she considered the large forum important in providing her students with a sense of community unobtainable in any other way.

Possible Remedies for these Problems:

1. Reward individual efforts by grading a small percentage of "randomly selected" CC contributions from each student.
2. Give students the choice of group participation or an equivalent increase in individual work load.
3. Reduce the regular course requirements sufficiently to make space for the CC use.
4. Divide large classes into smaller subunits and provide separate discussion spaces for them in the CC.

Emerging Advantages of CC for Large Classes and ITV-Classes

Computer conferencing has demonstrated a variety of advantages over traditional forms of classroom instruction. The following are the main ones to emerge from the literature and our own research.

Activates Individual and Group Participation

Students have an equal opportunity to participate. They are no longer restricted by the limited classroom time available in a given lecture or seminar session. They are no longer restricted by fellow students who are quicker and more eloquent in their oral contributions. This is true for large classes on campus, and it is even more relevant for distance education classes across different sites. Having time to compose a response in a thoughtful fashion is a major condition for educating reflective learners. But the medium goes further and adds an important element that instructors of large lectures have mostly given up on: the element of writing for an audience. When everybody in class can read everyone else's comments, the motivation increases to express original ideas rather than parrot those of the instructor (see Harasim 1990).

Many of today's students lead hectic lives, especially the growing number of non-traditional, older students. Time for a college education is limited increasingly by other obligations. Systematic group work outside of class is not always possible

because class and work schedules (possibly combined with family responsibilities) leave little flexibility for extra activities. The only way to accomplish collaborative work is through a medium that allows people to interact with each other at their convenience rather than a mutually agreed upon time and place.

Allows Practice of Collaborative Learning Modes at Reduced Risk

Younger students have little experience in conducting discussions. Constructing arguments in a logical fashion that build on previous premises while keeping in mind a general goal and direction, is a difficult task. In our observations of small group discussions, we have seen students exhaust complex topics in only a few minutes. They had problems staying on topic and lacked strategies for overcoming uncomfortable periods of silence. A discussion via computer conference allows participants ample time to plan their next move and connect it with what has been said before. It is an ideal way to practice in "slow motion" what often cannot yet be handled in real time. This asynchronism in the communication process is a major pedagogical asset of the medium.

In addition, it avoids, at least partially, some of the common problems with social dynamics in face-to-face interaction: talkative students dominating the more silent ones; adolescent shyness in front of members of the opposite sex; environmental distractions that lead a group meeting off track; and conflict with group members who tend to come unprepared to the meetings.

Creates New Networks Between Students

There are classes at IU with more members than the home communities of some of the students. Getting to know each other can be difficult under these circumstances. Social contact is probably the main "motivational glue" (Harasim 1990b) that holds a class together and creates an atmosphere conducive to learning. Many young people are willing to use new avenues for making social contacts when they are encouraged and provided with a minimum structure. Computer conferencing provides such new avenues.

Large classes are certainly not a desirable phenomenon. Occasionally, however, they may serve a valuable pedagogical function by providing practical experience in the ground rules of a democratic society. One of the instructors in our project is teaching introductory computer science to 350 students. She sees the size of her class as an opportunity to practice the values of social tolerance and responsibility. She intentionally uses the electronic conference as a general forum with no smaller sections for group interaction. She hopes to encourage the development of a sense of community in which class members learn to respect different opinions of others' while at the same time arguing their point and developing their own convictions.

Such a mechanism becomes even more intriguing when applied to distance education classes taught by one or two-way video connections and offered on different campuses across the state. IU's seven campuses outside of Bloomington are largely frequented by part-time students, who are significantly older, often with family, professional career, and very specific educational interests. Linking these student populations with the mostly traditional students on the

Bloomington campus via electronic conferencing would open up a whole new dimension of the educational process that no current classroom can provide.

Helps Instructors Reevaluate their Assumptions About Teaching

If students are to communicate with each other in this medium, instructors need to be concerned with student motivation. They need to create stimuli that will enable students to express meaningful ideas, which in turn might motivate other students to make meaningful responses. All this needs to be accomplished without constant instructor interference. Whether these stimuli are discussion questions, study guides, or cases to be analyzed (see the three CC-functions discussed earlier), the main issue is how students will react to such a task. Is it motivation enough to keep them going? What are the likely dynamics of the social interactions that are being initiated? In other words, the instructor has to first and foremost be concerned with students' learning, i.e., with that part of the instructional process that in the traditional knowledge-transfer model of teaching has been taken for granted.

This difference in orientation may cause considerable alterations in various aspects of the classroom. Encouraged by the new dynamics of the medium, instructors may begin to question their traditional role. They may begin to entrust students with more influence on the direction a class takes. They may find themselves becoming more of an observer studying the learning processes of their students. One of the instructors in our project reported he had gained increased respect for his students after reading their thoughtful self-introductions in the computer conference. He would not have considered collecting this type of information from a hundred or more students in hard copy format, and students would not have provided the same information about themselves, had this information only been for the instructor's benefit.

Instructors can gain better insight into their students' social needs by opening informal conference topics that encourage communication about issues not directly related to course content. Getting to know the learners, not only in their narrow academic abilities but also in their diverse social-motivational characteristics, has long been considered good instructional practice. Few if any technological developments have provided our educational institutions with such convenient opportunities for achieving this goal, especially under conditions of inflated student-teacher ratios.

Computer conferencing can bring the learners closer to the teachers, it can bring the learners closer to each other, but it can also create new contacts among teachers. Instructors have typically been a species of isolated individuals with little knowledge of what other instructors do in their classrooms. Exploring the capabilities of a new teaching-learning medium presents a unique opportunity for instructors to communicate with each other about their teaching. We have opened an electronic conference for instructors on the Bloomington campus to exchange their experiences in using the medium, and we hope that this may be the beginning of an ongoing, interdisciplinary discussion by teachers about their teaching.

Conclusion

Although the examples of computer conferencing we observed

were not employing the medium to its full potential, our experiences indicate that thoughtful use of CC can improve student involvement in the learning process, even in large and distance education classes. It can help reduce the feeling of anonymity that many students have in such courses and also contribute to a sense of community if students recognize that their conference notes are given serious attention by instructor and classmates.

Important problems, however, have yet to be addressed if the medium is to reach its full pedagogical potential. Besides issues of access and ease of use of the technology, the traditional structures of university teaching and learning create the biggest hurdles. Instructors will have to rethink their assumptions about teaching, and students will have to confront their entrenched expectations about classroom learning.

Even if such attitudinal changes are taking place, computer conferencing will not solve the problem of overcrowded classrooms. Still, it can alleviate some of the worst threats to intellectual and social deprivation in today's mass universities. Its most promising potential, however, may be in the effect it can have on helping students, instructors, and administrators rethink the communicative context required for a creative and socially responsible learning environment.

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[Top of Page](#)