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RESHAPING EXPECTATIONS FOR WEB-BASED COLLABORATIVE LEARNING

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ABSTRACT: We offered an experimental graduate course built around a World Wide Web-based collaborative learning experience; five graduate students participated. The World Wide Web served as the primary platform on which knowledge was compiled, shared, and synthesized. We built a WWW-based annotated bibliography and synthesized information from several disciplines. NetForum-based discussions included student responses to questions posed by the instructors and by other students. The Web was valued most as a tool for information dispersal. As a result, students learned more from their peers than they had in other courses. However, students found brainstorming and “conversation” using NetForum, a list server, and electronic mail cumbersome and intimidating. Participants noted a need for personal contact to develop the sense of community critical to fruitful collaboration. Complex issues were brought to closure in several face-to-face meetings. In future offerings, we envision an extended course that begins with community-building meetings (live or video) before migrating to intense Web-based collaboration. We will use the Web’s text and image capabilities for sharing complex information over long distances and time periods, and we will downplay the expectation of immediate response and focus instead on considered response. We will use Web-based conferencing technology for brainstorming and real-time interaction among participants. Institutions may have to increase flexibility in the timing and structure of courses to facilitate inter-institutional offerings.

INTRODUCTION

What do you do when you want to make inroads into a complex question such as “What are the ecological and economic effects of forest clearcutting at regional scales over long periods of time?” Many effects of clearcutting have been studied intensively, but separately, and typically over relatively small areas and short time periods. In our view, addressing the more complex question of long-term, large-area effects calls for the synthesis of existing knowledge in a modeling framework. Yet, existing knowledge is scattered across the writings of many disciplines, each with its own perspective and jargon. One response to this situation would be to seek funding for a team of graduate students to gather and synthesize the information; another to work collaboratively with experts from appropriate disciplines. We decided to create a World Wide Web-based collaborative learning experience — The Ecology and Economics of Clearcutting — that could serve as one model for Web-based.

OUR VISION OF WEB-BASED COLLABORATIVE LEARNING

Our vision was of a group of experienced and highly motivated Ph.D. students, drawn from multiple disciplines, collaborating with us as peers. The World Wide Web would serve as the primary platform on which knowledge would be compiled, shared, and synthesized. We also planned to bring “stakeholders” — representatives of timber industry and environmental organizations interested in clearcutting — to the table to provide students with a variety of perspectives. Because we wanted to preserve the option of face-to-face meetings, our offering was advertised locally at North Carolina State University, Duke University, and the University of North Carolina at Chapel Hill. Our long-term vision is that an effective collaborative learning forum will attract participants world-wide.

The discussions that led to the development of this course were based on our interest in exploring potential long-term, regional consequences of various clearcutting policies. For example, many forest product companies are beginning to limit

the size of clearcuts under an industry-sponsored Sustainable Forestry Initiative. The overall ecological consequences of this policy are unclear. Smaller clearcuts are probably good for aesthetics and water quality but may fragment the landscape, to the detriment of wildlife that need large blocks of relatively undisturbed forest. Reviewing the literature covering clearcutting from a variety of disciplinary perspectives was a necessary first step in our effort to expand our understanding of these issues. By bringing together Ph.D. students from different fields, we felt we would strengthen our analysis and, by allowing students to participate in the synthesis of knowledge, provide a valuable educational opportunity.

Several factors led us to the Web as a vehicle for our effort. The Web has been promoted as a medium well-suited to the collaborative learning process and the model of "instructor as facilitator" that we wanted to use. The construction of an annotated bibliography and the interdisciplinary exchange we sought seemed amenable to a Web-based approach. Web-based discussion would allow everyone to react to new materials as they were posted and allow participation by geographically dispersed students and stakeholders. The North Carolina State University libraries offers access to a wide range of on-line, searchable bibliographic databases, and the Web would also be an excellent resource for following current debates on the ecology, economics, and politics of clearcutting. Given our vision of a collaborative learning experience, we felt the Web would enhance our ability to act as peers and facilitators rather than lecturers.

Many universities see the Web as an important new medium for education that will allow them to meet changing and expanding demands for learning opportunities. North Carolina State University and the College of Forest Resources are strong supporters of innovative teaching experiments and encouraged us to pursue our interests. The College of Forest Resources, in partnership with the NCSU Libraries and the Computing Center, was bringing to completion a two-year project focusing on "Student-Directed, Information-Rich" education. This project explored the use of Web-based multimedia materials, databases, and other information resources to create a more student-driven, self-paced educational experience. The project had prepared the library staff to offer support in delivering Web-based course materials. Carolyn Argentati, head of the Natural Resources Library, played a pivotal role in this project and was eager to support our experiment in Web-based collaborative learning. The University supported our efforts with a grant that enabled us to hire a part-time Web consultant to take care of day-to-day operations, and to contract with education specialist Dr. Robert Serow to evaluate the outcome of our efforts.

COURSE ORGANIZATION, STRUCTURE, AND PHASES

The face-to-face course organizational meeting brought us a reality rather different from our vision: a group of four enthusiastic, but inexperienced, Masters students and one Ph.D. student. Three of the students were from North Carolina State University and two were from Duke University. We considered canceling the course but decided that there was still ample opportunity to test some of our ideas and to provide these eager learners with an exciting educational experience. We laid the groundwork for the course and made it plain that we were not clearcutting experts ready to profess our knowledge to receptive students. Instead, we intended to function as both peers and facilitators in an intensive, collaborative process of synthesizing existing scientific knowledge.

We created a Web site flexible enough to change with the nature of our activities. The home page (<http://www2.ncsu.edu/unity/lockers/class/for692e/>) was streamlined so that course participants and other browsers could find information quickly. Early on, we developed the concept of a "workroom" as the focal point for current activities (Figure 1). The workroom included links to the project we were focusing on at the time, a Web-based bibliographic entry system, a text-based electronic discussion forum for the interchange of ideas among participants, and archival links to information gathered during earlier phases of the course. We used NetForum, a software system developed by the University of Wisconsin's Biomedical Computing Group (www.biostat.wisc.edu/nf_home), for Web-based discussion. Because our investigation was to be science-based, we insisted that NetForum postings include citations of relevant scientific literature. A list server was provided for more informal conversation, and on-line contact information included electronic mail and telephone numbers for all participants. We did not install any security measures to prevent Web surfers at large from posting information or comments on our site.

FOR 692E The Ecology and Economics of Clearcutting

North Carolina State University, Fall 1996

We will document the scientific understanding of the ecological and economic benefits and costs of clearcutting.

WORKROOM...

Read and Create Citations

- [Browse Annotated Bibliography](#)
- [Tips for Citation Entry](#)
- [Citation Style Guidelines for Internet Sources](#)

- [Add a Citation](#)

Discussion Forum

- [Readings & Issues Forum](#)
- [Forum Guidelines](#)
- [NetForum Use Tips](#)

Archive of Completed Work

- [Evaluating the Long-Term Effects of Clearcutting](#)
- [Maine Clearcutting Referenda](#)
- [Synthesis Papers](#)

[Return to FOR692E Home Page](#)

Figure 1. The workroom was the center of activity and evolved throughout the course to focus on current projects.

The course moved through three phases, only the first of which was planned in advance: 1) literature search and summarization, 2) synthesis through analysis of a current issue, and 3) design of research to fill knowledge gaps. In our original vision we had imagined students coming to the table with a strong background in some field relevant to clearcutting. Instead, most students were in the early stages of their graduate studies and needed to build their own knowledge base before meaningful collaboration could occur. During the organizational meeting we each selected an aspect of clearcutting to research and share with the group over the next five weeks. To ensure progress, we agreed on weekly milestones in terms of the number of citations to be entered into the on-line bibliography by each participant.

The second phase required application of our newfound knowledge to a current issue in clearcutting. After group discussion, we agreed to analyze the competing clearcutting referenda on the 1996 Maine ballot. Each participant was to analyze the referenda from the perspective of his or her area of study, and the group would synthesize these perspectives. During the first phase we learned that face-to-face interaction among participants was needed to bring issues to closure in a reasonable amount of time. Therefore, we scheduled a face-to-face meeting — on election eve — during which we would develop a one-page consensus recommendation designed to be distributed to voters. Again, milestones were set for each step.

During the third phase, participants were asked to begin designing a research program to address some of the key unanswered questions we had uncovered. Each participant was to determine the research needs in their area of study, and the group was to determine how to address all needs in a coordinated effort. Several milestones were set and two face-to-face meetings were scheduled. We also scheduled a final presentation of results before a panel of forestry experts.

EVALUATION

To evaluate the course, we conducted pre- and post-class surveys and focus groups, and we administered our department's standard course evaluation. The departmental evaluation is designed to determine if expectations are communicated clearly by the instructors, whether a balanced presentation of material is provided, and that instructors and students each uphold their responsibilities in the learning process. Through the surveys we collected information about experience with, and expectations for, Web-based learning; knowledge and attitudes about clearcutting; and reactions to the teaching techniques we used (Table 1). Focus group sessions were conducted in our absence. They provided information about students' reactions to the course as a whole and to five specific

issues we identified in advance: 1) learning and attitude changes about clearcutting; 2) the interdisciplinary nature of the course; 3) the peer-group model of instruction; 4) the use of Web-based communication technologies; and 5) the involvement of stakeholders.

Good Tool For Information Dispersal

It's no surprise that the Web was highly valued as an information dispersal vehicle. We used the Web to post assignment details, enter bibliographic citations and notes, share ideas using NetForum, and post preliminary and final documents we produced. Participants were able to read and comment on the work of others at their convenience.

A Whole New Way Of Creating Permanent Citations

One of the most successful aspects of the course was a Web-based bibliographic entry system developed specifically for our use. Chris Floyd, a North Carolina State University library computer consultant, developed software that

Table 1. A summary of our vision and expectations, what we learned from the course evaluation, and a reshaped vision based on our findings.

Our original vision • A group of motivated, experienced graduate students from multiple disciplines, collaborating with us as peers. • Use the Web's text- and image-based tools as the primary means of compiling, sharing, and synthesizing knowledge. • Use text-based forums for brainstorming and "conversation" among participants. • Bring "stakeholders" — representatives of organizations interested in our research — to our Web site to provide a variety of perspectives.

Expectation

The Web will enhance collaboration and learning.

What we learned (7 participants)

Yes and no.

- Valuable for sharing detailed, written information.
- Web-based bibliography an excellent information sharing tool.
- Web could not replace face-to-face meetings. Participants needed personal contact to develop the sense of community critical to fruitful collaboration. Some felt that video technology might substitute for face-to-face meetings.
- NetForum was an unsatisfactory substitute for conversation.
- Participants became frustrated when they did not get quick responses to their postings. Some participants were intimidated by the prospect of posting their thoughts for all the world to see.

Expectation

Participants will learn more from one another using a Web-based, collaborative approach.

What we learned (7 participants)

Yes, but . . .

- Participants felt they learned more from their peers in this course than in other courses, largely because of the ease with which complex information can be shared using the Web.
- Personal interaction is needed to build a sense of community among participants before they will buy into Web-based collaboration.
- Face-to-face interaction was more highly valued than Web interaction for brainstorming and bringing complex issues to closure.

Expectation

The Web will enhance our ability to bringing diverse stakeholders to the table.

What we learned (7 participants)

No.

- Some stakeholders agree to participate, but none did.
- Failure to participate attributed to lack of time and concern about voicing opinions on controversial issues on an open Web site.
- Personal interaction is needed to build a sense of community before stakeholders will buy in to Web-based collaboration.
- Providing restricted access forums might increase participation.

Our reshaped vision

- A group of motivated, experienced graduate students from multiple disciplines, collaborating with us as peers.
- First build community identity among participants through face-to-face meetings when possible, and Web-based conferencing technology if participants are scattered geographically.
- Migrate to Web interaction as participants become more comfortable with one another.
- Use the Web's text and image based tools for in-depth analyses and considered responses.
- Provide a mixture of secure and open forums to reduce intimidation and increase probability of stakeholder participation.
- Form teams in response to common interests, geographic proximity, and scheduling realities.
- Schedule progress meetings with individual students, either in person or using a video link.

allowed us to enter complete citation information and notes for all the literature we read. As citations were entered, the software created a citation index. Using this system participants could discover what everyone was learning as soon as citations were entered. Web-savvy participants were soon putting hyperlinks to bibliographic entries in their written submissions and NetForum postings. The students had several suggestions for improving the bibliographic software, most of which were implemented during the early weeks of the course. With our guidance, staff members from the North Carolina State University Libraries are currently enhancing the software to include edit, search, and other capabilities.

Once improved, this software has potential for wide application in collaborative research projects.

Intimidating Forum — Cannot Retract Statements

As part of the first phase, we began a NetForum discussion about the definition of clearcutting. Students are accustomed to writing for the instructor alone, and some in the class were intimidated by the prospect of exposing their ideas to classmates and Web surfers at large in such a public forum. Given time for adjustment, we feel this is a positive force that will drive students to put more thought and effort into their work. For our course, it unfortunately meant that several participants were largely silent in NetForum discussions.

This phenomenon was not limited to student participants, but explains partly the lack of stakeholder participation. We approached people from several environmental organizations and forest products companies about participating in our course. We pitched it as an opportunity to educate an open-minded group about the role of clearcutting in forest management and the environment. Most of those we approached expressed interest, and two were enthusiastic enough to agree to participate. In the end not one stakeholder joined in, despite our attempts to make participation as easy as possible. This was a great disappointment to our students who viewed stakeholder participation as an excellent way to bring a "real world" perspective to our analyses. After the course was over, we learned that failure to participate was due in part to concern among stakeholders about voicing opinions on controversial and sensitive issues on an open Web site.

Our demand that postings contain appropriate citations further increased anxiety about the process. This requirement was a two-edged sword. It reduced the number of postings, but it generally increased the quality of the postings that were made. Several early postings were heavily documented and well reasoned and set a standard that some participants felt they could not meet; the reaction of some was to withdraw from discussions. Based on the level and quality of our one Ph.D. student's participation, we suspect this would have been less of a problem had we attracted the group of Ph.D. students we initially envisioned. Nevertheless, we feel that quality is more important than quantity and will maintain the citation requirement in future course offerings of this type.

Several "flames" — a term used to describe inflammatory statements sent by electronic mail or list servers — from outside readers reinforced feelings of intimidation. We encouraged the students to respond in a reasoned manner or to ignore "flames," but to avoid involvement in "flame wars." The negative comments petered out quickly. We might have avoided this problem by installing security features, but we had made a conscious decision not to do so because we wanted to expose participants to varied perspectives. However, lack of security hampered open discussion among our students and between students and stakeholders. In the future, we may

provide a balance of secure forums for class members and stakeholders and open forums for wider participation.

It's Easier To Procrastinate On The Web

With the flexibility to complete work at one's convenience comes the flexibility to procrastinate, particularly in the face of other more immediate deadlines. The first milestone of the second phase was for each participant to post an analysis of the Maine clearcutting referenda on NetForum. Almost everyone missed this milestone, and one participant never posted an analysis. This hampered our ability to move forward on a project that required sharing knowledge among individuals. While this is not a phenomenon limited to the Web, we find it hard to imagine that so many students in such a small group would arrive so unprepared for a traditional class. During the post-course interviews, students indicated that the flexibility inherent in our Web-based course led them to approach their academic responsibilities more casually than in a conventional course. The lack of face-to-face accountability makes it much easier to procrastinate, and even to "blow off" an assignment. One way to overcome this barrier is to schedule a progress meeting with each student. We found this effective in a later assignment for which we scheduled a one-half hour face-to-face meeting with each participant. This meeting could easily be conducted using Web-based audio-video technology.

By The Time You Got A Response, You Had Forgotten The Question

When a participant posted a burning question or a hard-won insight, there was an expectation of quick response from others. Often, that expectation was not met. Students became frustrated after checking frequently for replies and finding none. This frustration ultimately led participants to stop posting. Our reaction was to maintain an almost constant presence on the Web, firing off comments about postings and reacting quickly to student inquiries. This shifted the dynamics from interaction among participants to interaction between participants and instructors. The group dynamics we sought just didn't materialize using text-based Web tools.

One response to this situation is to require postings by a specific deadline. We tried this but felt that it was counter to the spirit of the course, which was to be a free and open exchange of information. The students did not like being forced to say something about everything, and we disliked having to police the Web site to make sure people were participating actively. This is a problem of unrealistic expectations that is perhaps best addressed by reshaping expectations.

We're Human, We Need Contact

The students felt strongly that the human chemistry of face-to-face meetings was critical to the full development of ideas.

We agree. As instructors, we clearly saw a difference between face-to-face and on-line interactions. The students were more open and took more risks in person. Technology-oriented people have been quick to offer Web-based conferencing software as a solution to this problem. Although imperfect, this software allows people to see one another, converse in real time, and share visual information while discussing it.

While conferencing technology may help, this cry of frustration — "we're human, we need contact" — may be at the heart of the difficulties we encountered. In their article on "Universities in the Digital Age", Brown and Duguid (1996) stressed the function of Universities as a place where students — and especially graduate students — gain access to the communities of practice relevant to their disciplines. They also note that on-line participation in substantive, collaborative thinking may be "significantly dependent on a deep base of off-line experiences." We brought together a group of students who did not know one another and expected them to collaborate using Web-based tools; we also expected stakeholders to join us under the same conditions. "We need contact" was the students' way of telling us that they need to know, understand, and trust one another before they can collaborate using a medium that filters out much of the social context that drives fruitful collaboration. Lack of participation by stakeholders may be viewed in the same light. We find ourselves agreeing with Dan Huttenlocher's comment, as quoted by Brown and Duguid (1996), that "The Net isn't a good place to form communities, though it's a very good place to keep them going."

RESHAPING EXPECTATIONS

The expectation that the Web will duplicate a classroom experience is a problem. This expectation is part of the phenomenon discussed by Batson and Bass (1996) in their article on "Teaching and Learning in the Computer Age" — namely, an attempt to use this new medium to teach in the same manner we already do. As instructors, we created the expectation that Web-based interaction would be like an ongoing conversation in the classroom. It is not, and we don't believe emulating the classroom experience should be the goal of Web-based discourse. Our instructional approach changed in reaction to unmet expectations, and we found ourselves imposing more and more of a conventional structure on the course. The students also reacted to unmet expectations by abandoning the exchange of text-based ideas in favor of the more conventional and comfortable format of face-to-face meetings. We all wandered back to more familiar territory. The key question is "Why?"

One might argue that scheduling face-to-face meetings allowed us to retreat too easily to more familiar ground. We don't believe we could have forced the kind of interaction we sought on the Web by simply eliminating face-to-face meetings. Quite the opposite, we believe that early face-to-face

meetings, or perhaps video conferences, are critical to establishing the sense of community needed for the kind of collaboration we sought. People need time to get to know one another personally and to “buy in” before they will commit themselves to an intense, collaborative effort.

We’re convinced that courses based on the concept of Web-based collaborative learning can work, but we believe they must be built on the foundation of an established community. Our initial instinct was to enroll experienced doctoral students. Although we didn’t recognize it at the time, perhaps what we really meant was “students who are already part of an established community of learners.” Unless the participants already know one another, some early portion of the course must be devoted to community building. We expect that more time will be required for this phase for students early in their academic career. During this part of the course, frequent face-to-face or video conference meetings will be needed. One of the students evaluating our course suggested a “pre-course” in which the fundamentals of the subject are presented before launching into the main event — intense, Web-based collaboration. This would have been difficult for us because our intent was that we all learn together. However, the idea has merit as a way of involving undergraduates and new graduate students in collaborative learning efforts. In fact, efforts like ours would be more fruitful if students were exposed and acclimated to this kind of learning earlier in their careers.

The rub here is that scheduling meetings recreates one of the problems Web-based interaction is designed to circumvent. A major advantage the Web offers — and one attested to by participants in our course — is the flexibility to work when one can or wants to. We had difficulty scheduling meetings among seven participants from two universities separated by 25 miles and can imagine the difficulties created by spanning time zones and mixing semesters with quarters. One way to resolve this is to have teams meet and report the outcome of their deliberations by posting minutes or through audio-video meetings among team leaders. Each team might need independent faculty and technical support, particularly if they are spread among institutions. This, of course, creates the need for another level of community building among teams or team leaders.

Web-based collaborative learning courses may also have to be designed without regard to semester and quarter constraints, particularly if more than one institution is involved. The integration of personal and group schedules to meet deadlines is difficult, particularly for students with job responsibilities and heavy course loads. It may be more realistic to schedule collaborative courses for a full academic year or as on-going forums to which people come and go. Filling these prescriptions will require significant intra- and inter-institutional organizational effort and cooperation.

OUR RESHAPED VISION

Our reshaped vision is of a multidisciplinary, collaborative effort in which the Web serves a central role in cementing together a community of learners. We envision an extended course, the first portion of which relies heavily on personal contact and face-to-face meetings to establish a sense of community and obtain buy-in from all participants. As the course proceeds and the participants become comfortable with one another, we can move more activity to the Web. The Web provides a varied and powerful set of tools, each of which should be used to its own advantage. We will use the Web’s text and image capabilities for sharing complex information over long distances and time periods, and we will downplay the expectation of immediate response and focus instead on considered response. We will use face-to-face meetings or Web-based conferencing technology — depending on the geographic distribution of participants — for periodic brainstorming and consensus-building sessions. Teams will be formed as needed in response to geographic limitations, common interests, and scheduling realities. Finally, we will hold periodic face-to-face, video-link, or telephone progress meetings with class members and team leaders to maintain a level of personal interaction and accountability.

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