

Using An Unstructured Collaboration Tool to Support Peer Interaction in Large College Classes

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Abstract: Peer interaction may be a useful strategy for having students express their knowledge and get personalized feedback in large classes. In this paper we look at how a CoWeb – an unstructured collaboration space – was used to support a large college design class. Although the CoWeb was used for several purposes, we focus specifically on how it was used to support class discussions. We start with why we feel CoWeb discussions, and more generally online peer interaction, may be useful in light of our pedagogical goals. We then analyze the structure of the discussions and how students perceived them, and discuss how the online environment may have influenced behavior. From this analysis, we conclude the CoWeb was effective in helping students think about open-ended issues through online peer interaction. However, we also conclude that providing some structure might help online discussions appear more coherent and productive.

Keywords: computer-mediated communication, discourse, learning communities

Introduction

Large classes (over 100 students) are fairly common today, and if predictions of rising student enrollments are an indicator, large classes will become even more common in the future. Large classes have many drawbacks. They are almost always lecture based, and they tend toward a knowledge-transmission model of learning. With so many students, it is rare that students get a chance to voice a perspective in the class, let alone get thoughtful responses, and even more rarely, get instruction tuned to their individual needs.

Online discussions have the potential to give students a voice and perhaps even support a broad variety of learning activities that allow active group participation across the board. However, it is unlikely that the majority of individual exchanges in such large classes would involve teachers (or even teaching assistants). Instead, peer interaction may be our best opportunity to build a learning environment that entails students expressing their knowledge, getting feedback and constructing knowledge.

The use of online discussion spaces to support large groups of students is not uncommon (e.g., Hoadley 1998; Taylor 1996). However, most of these discussions have occurred in structured collaboration spaces – e.g., *threaded* discussion spaces – where the order and relationship between notes is constrained, and the interface is structured around these threads. We were interested in using an unstructured collaboration space, namely a CoWeb (Guzdial et al. 1999), to give students a greater sense of control over their class activities and to give teachers more flexibility in the kinds of activities they can administer. We feel that flexibility is critically important when teaching a complex and unstructured domain, in our case *design*.

In this paper we look at how a CoWeb was used to support a 170-student college design class that met twice a week for introductory lectures on design-related issues and methods. Although the CoWeb was used for several purposes, we focus specifically on how the CoWeb was used to support class discussions. We start with why we feel CoWeb discussions, and more generally online peer interaction, may be useful in light of our pedagogical goals. We then analyze the structure of the discussions and how students perceived them, and discuss how the online environment may have influenced behavior. The questions we are exploring are: whether students are expressing

their knowledge, whether they are responding to others (and thus giving others feedback), what factors are influencing the development of good peer interaction, and how the unstructured nature of the tool influenced peer interaction.

The CoWeb Collaboration Space

A CoWeb is a *collaborative website* (Guzdial et al. 1999). A CoWeb is like any other website on the Internet, except that pages on the site can be created and edited by anyone, using only a standard web browser. Each page contains an "Edit" button, which retrieves an editable version of the current page. If modifications are made, the "Save" button can be used to update the page instantly on the website. CoWeb pages generally contain plain ascii text but authors may optionally include images, simple formatting commands (for making links, lists, headings, etc.) and HTML tags. They may also use a simple notation for creating and linking to other pages in the CoWeb. By virtue of their simple and flexible design, CoWebs have successfully supported authors with a wide range of web authoring skills.

CoWebs have been used in a wide variety of classes for an equally wide variety of purposes. In some cases, CoWebs have replaced existing tools (e.g. conventional websites, newsgroups) or supported existing classroom practices (e.g. handing in assignments, getting feedback). In other cases, educators have developed new activities that rely on CoWebs in more fundamental ways. Some examples include collaboratively annotating and interpreting a poem in an English class, exchanging data and analyses between seniors and sophomores in chemical engineering, and hosting an online design review for remote critics in an architecture class.

Why Peer Interaction and Why Online?

A primary goal of the class was to introduce design students to issues common to ill-defined design problems – problems of the sort typically encountered in architecture, industrial design and building construction. Ill-defined problems are characterized as problems for which solutions will have more consequences than those planned, usually because solutions exist as part of an extended social system (Rittel & Webber 1973). Thus issues common to ill-defined problems will themselves be open ended.

To help students learn how to deal with open-ended issues in design, a number of class discussions on design-related issues were planned by the instructors. The discussions were meant to help students explore different perspectives on each issue, as well as to teach them how to explore open-ended issues in general through self-criticism, empathy and research. Peer interaction is particularly suited to this kind of teaching since peers often offer a broad range of perspectives. Peer interaction can also help students test ideas and explore implications not initially considered (Roschelle 1992).

Additional benefits come from putting the discussions online. The most obvious argument for online interaction, especially asynchronous interaction, is that more people can participate at one time (Hiltz 1992). A second argument is that there is no need to wait while others contribute their thoughts; hence there should be less "production blocking," where progress in the learning activity is impeded by a requirement of turn-taking (particularly challenging in large classes) (Reinig 1997).

There are, of course, plenty of potential problems with online discussions. For one thing, the social context is different than in face-to-face discussions. This new context may lead to more inhibition or less (Sproull & Keisler 1991), and problematically, its influence on participation may be hard to predict and manage.

The simple and flexible design of CoWebs was instrumental in helping us deal with these uncertainties. Specifically, it allowed us to experiment with and tune the environment as it was being used. It also gave students leeway in structuring their own use, allowing styles of interaction we had not anticipated.

CoWeb Strategy

The CoWeb (1) was introduced early in the class as a means for supporting both required and voluntary activities. In addition to class discussions, required activities included a team research project and individual weekly assignments. Everything posted on the CoWeb was available to everyone and students were encouraged to look at what others posted. Students were also strongly encouraged to experiment with the site and to create new areas as needed.

Getting Started

Several activities were scheduled towards the beginning of the semester to introduce students to large-scale CoWeb interaction and to acclimate them to the online context. As their first activity, students were instructed to create *Personal Pages*. These pages often contained information about themselves, their hobbies, interests, families, and friends (Figure 1). They often explicitly introduced themselves ("Hi, I'm John...") and addressed the reader directly ("You might be wondering..."). Many also contained explicit invitations for interaction ("Send me email", "Feel free to add to this page"). Although little explicit interaction was detected, students may have contacted each other via other means or simply erased the exchanges before we were able to see them. Informal interaction was, however, detected in the form of playful competition in the use of graphics on personal pages. In one special case, a student discussed her online assignments with her remotely situated parents.



Figure 1. A student's personal page.

A second introductory activity required students to make a contribution to the *Movie* or *Restaurant Review* pages. Through this activity, we wanted students to gain some experience in interacting with what others had written both conceptually (in building a shared resource) and literally (in editing a shared page). Initially, some students had trouble with the idea of a shared editing space, but all students successfully completed the introductory activities.

The Discussions

At the start of the third week, the class was invited to engage in thematic discussions on the CoWeb (see Figure 2). An instructor introduced each discussion by creating a page and posting the topic and useful links at the top of it. Introductions typically included specific questions, several pro and con arguments, and links to additional sources of information related to the topic. Following the introduction, students were invited to add their thoughts by editing the page and placing comments wherever they saw fit. Students were also encouraged to *sign* their contributions with links to their personal CoWeb homepages both to encourage responsibility and to help others find coherence between posts. Signing also facilitated the subsequent grading of discussion contributions. In terms of content, students were explicitly instructed to focus on the quality rather than the quantity of their contributions and to make an attempt to engage other students in the space. Discussion topics included: the commercialization of public space, the nature of creativity, what constitutes plagiarism in design, and public funding of controversial art exhibits.

In an effort to characterize student participation and interaction, we examined seven discussions midway through the semester. These results are supplemented with the results from a survey conducted in the 8th week of the semester, which was completed by 133 students (2).



Figure 2. The start of an online discussion.

Participation in the Discussions

As a first analysis, we examined the level and distribution of participation in the discussions

- *The discussions were initially successful in allowing many students to participate:* Each discussion contained an average of 66 posts and was contributed to by an average of 53 students. In the survey, only 8% of students reported not participating in any discussions, while the majority (84%) reported participated in 2 or more discussions. Given that students' grades depend in part on participation, the level of participation was not particularly surprising. However, we were pleased that the CoWeb technology was successful in supporting this level of participation.
- *Participation patterns by individuals were typical of online discussion environments:* An average of 1.2 posts were made per person in each discussion. Most students, however, only posted only once per discussion, with a small group of very active posters posting more than once. Guzdial (1997) has documented this pattern of participation in several other online discussion environments.

Patterns of Interaction in the Discussions

To get a better feel for interaction in the discussions, we looked at patterns of clear (explicit or near-explicit) referencing between posts. Clear referencing between posts was used primarily because it was the most visible and easily captured aspect of peer interaction in the discussions. Patterns of clear reference do not perfectly reflect peer interaction. Some clear referencing is likely done only to meet class requirements. Conversely, there are likely many posts that build on and implicitly respond to others but fail to make clear references. Despite these problems, we theorize that clear referencing is nonetheless significant because of how it both affects and is affected by the overall perception of interaction. Specifically, we assume that while clear references do not necessarily mark instances of peer learning, they may play a role in tying together the debate, making it appear more coherent and, as such, helping participants see a place for themselves more clearly.

- *Clear referencing of other posts was somewhat common and students developed several strategies for referencing:* 37% of posts included a clear reference to at least one other post. Most often, the post referred to another author by name ("As Jenny said..." or "Matthew K. makes a good point"), but occasionally students referred to them spatially ("the comment above") or temporally ("the previous post"). Referring to a post by the author's name is the most unambiguous way to identify another post, which could be why the majority of students used this method.

- *Agreeing references were more common than disagreeing references, but disagreement made further references more likely:* The majority of references (69%) were in agreement with the post to which they referred. However, posts that explicitly disagreed with other posts were more likely to be subsequently referenced (27%) than posts that agreed with other posts (22%).
- *Although no students dominated the discussions in terms of percentage of posts, students who posted multiple times were influential in the direction of the discussions:* Posts of students who participate multiple times in a discussion were more likely to be referenced than other posts (37% of multi-poster posts compared to 25% of single-poster posts). The fact that they are more likely to be referenced suggests that these students had some influence over the direction of the discussions – not because of their number of posts, but because their posts compelled other students to respond to them. This could be because they were more familiar with the discussion topics and hence knew how to raise critical issues, that they followed the discussions more closely and knew what others were interested in, or that they actually became recognized as authority figures in the discussions.
- *The spatial organization of the discussion was often at odds with the organization implicit in the references between posts:* Although clusters and chains of references between posts litter the discussions (see Figure 3), many posts appear physically adjacent to a stream of related notes but abruptly go off topic. Typically, students added their post at the end of the discussion page, often disregarding notes directly above their own. In many cases, new posts immediately follow and counter inflammatory posts without seeming to notice them at all. This is likely because most students, as reported in the survey, tend to only skim preceding posts (60%). Also, students sometimes reference posts much earlier in the discussion without making an effort to place their responses physically nearby.

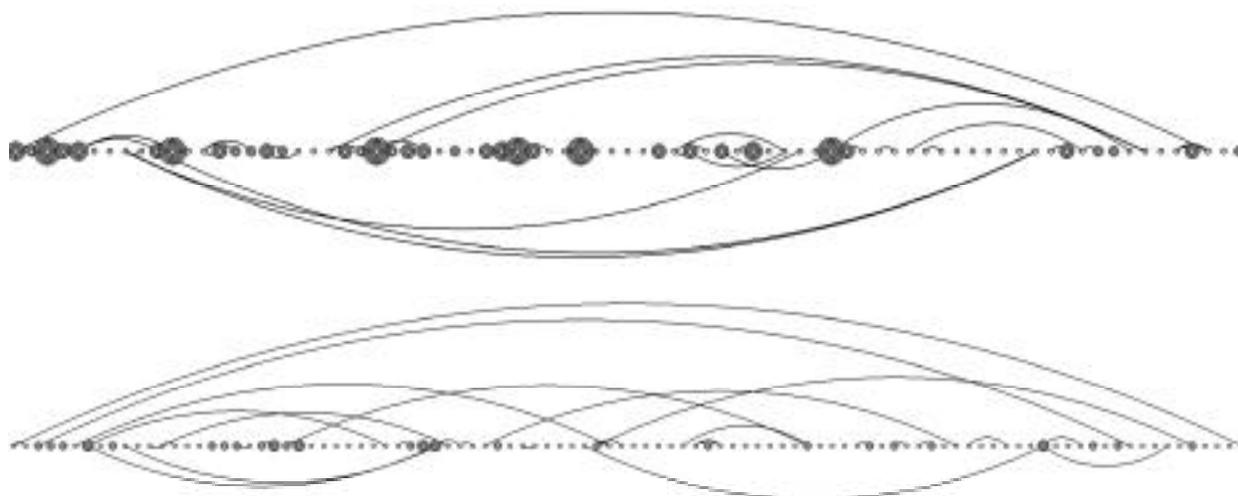


Figure 3. Interaction graphs depicting references between posts in two discussions, one on offensive art (top) and one on the nature of creativity (bottom). Nodes represent posts, with additional circles representing the number of times that author posted overall. Arcs represent clear references, with those on top indicating agreement and those on bottom indicating disagreement. The sequence of nodes reflects the sequence in which posts appear on the discussion pages, the node on the far left being the first one to appear.

Online Discussion Norms

One potential problem with CoWeb discussions is that students may fail to map basic conversational norms into the online space. At least one student, for example, reported in the survey that it was not important to read what others had posted and that generally there was nothing wrong with posting opinions independent from one another. This student felt that posting opinions as such still constituted a contribution to the discussions.

Fortunately a majority of students did not seem to have difficulty mapping traditional conversational norms into the online space. Although most reported in the survey that they usually skimmed posts rather than reading them completely (60%), most also reported occasionally returning to see whether others responded to their

comments (76%). Most also said that while the discussions did not change their opinion, they did increase their understanding of the topics (71%), further suggesting that participation was consistent with the mutually interactive nature of an offline discussion.

Discussion of the Results and Implications for Future Development

As observed in other asynchronous educational environments, unthreaded discussions, such as those supported by CoWebs, may help overcome problems common to constrained threaded interaction, specifically problems like divergence, isolation and conversational drift (Hewitt 1997). As we have observed, however, the size of an unthreaded discussion may begin to overwhelm the freedom it initially affords if it fails to cohere. Simply providing mechanisms that support referencing between posts may not help since coherence will depend, at least given the scale of the class we observed, on global rather than local structure.

We are currently exploring means for providing authors some structuring ability within the CoWeb. For example, we have added an in-line editing box that can be used to encourage contributions to different parts of the page. In this way, we support physically structuring the page without losing the benefits of an unstructured space. The in-line editing box may also serve to reduce inhibitions associated with directly engaging one's peers. It might, that is, be perceived as an explicit invitation from one student to another to submit a response.

Overall participation in the class CoWeb, of which the discussions were only a small part, far exceeded expectations. A sizable portion of the class developed and maintained elaborate personal pages, and several created spin-off pages for related personal interests. Students actively participated in the discussions, and despite a lack of overall coherence, many sub-discussions were spontaneously pursued. In a subsequent class, which involved the same students and the same online environment, discussions even emerged where they were neither requested nor expected. Although CoWeb discussions are not ideal, they do appear to support peer interaction effectively and to provide some benefits for large classes with limited instructional resources.

Endnotes

- (1) The site is called "2CoOL" (Collaborative OnLine Studio, Version 2) - <http://herring.cc.gatech.edu:8080/2cool/>
- (2) Complete survey results are available from: <http://herring.cc.gatech.edu:8080/2cool/MidtermSurvey>

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