Advances in Pedagogy:
Finding the Instructor in Post-Secondary Online Learning

Curtis J. Bonk, cjbonk@indiana.edu
Jamie Kirkley, jkirkley@indiana.edu
Noriko Hara, nhara@indiana.edu
Vanessa Dennen, vdennen@indiana.edu
Indiana University, School of Education

(Note: This is a draft; please ask permission before distributing widely or quoting.)

Bonk, C., Kirkley, J., Hara, N., & Dennen, V. (2000, April). *Advances in pedagogy: Finding the instructor in post-secondary online learning*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.

Send requests to (or see Web site below for downloadable copies):
Curtis J. Bonk, Associate Professor
Indiana University
School of Education: Room 4022
Dept of Counseling and Educational Psychology
201 N. Rose Avenue
Bloomington, IN 47405-1006
(812) 856-8353
(812) 856-8333 (fax)
http://php.indiana.edu/~cjbonk

Acknowledgments:
We would like to thank the people who helped in the development of the various courses mentioned here, including Robert Fischler, Charles Graham, Sun Myung Lee, and Karen Hallett. Jack Cummings is thanked for his guidance and feedback. We also are appreciative of the resource and financial support provided by both the School of Education as well as the Continuing Studies Department at Indiana University. It is a phenomenal place in which to work.

Advances in Pedagogy: Finding the Instructor in Post-Secondary Online Learning

Curtis J. Bonk, Jamie Kirkley, Noriko Hara, and Vanessa Dennen
Indiana University

Abstract:
The purpose of this paper is to discuss the pedagogical, social, managerial, and technological issues often encountered in teaching on the Web. Four college instructors teaching different courses on the Web detail their experiences in each of these key areas. Three of the courses are education courses (two graduate level and one undergraduate), while one is a technology course at a two-year college. Across these domains, recent advances in Web pedagogy are discussed and highlighted. Also mentioned are the steps to incorporate problem-based learning on the Web. Finally, common problems instructors face online are mentioned with potential solutions as well as ten benefits and implications of online environments.

Introduction:
Ron Owston (1997) argues that the Web is captivating the imaginations and interests of educators around the globe more than any other recent innovation. Web developments have converged to dramatically alter most conceptions of the teaching and learning process (Bonk & Cunningham, 1998; Harasim, Hiltz, Teles, & Turoff, 1995). As is apparent every day, the Internet has brought to our desktops an immense array of text, video, sound, and communication resources unthinkable even a decade ago. From every corner of one's instruction there lurk pedagogical opportunities to use the World Wide Web. New activities and learning partners await the online instructor. Unfortunately, there is minimal theoretical grounding for the use of such tools in teaching (Koschmann, 1994). And few scholars address the role of the instructor in such an environment. In response, this paper attempts to document the new pedagogical, social, managerial, and technological roles of the instructor across four courses in higher education.

In this new learning society, information and communication technology is having a profound impact on the way we learn. As learners begin to access virtual classrooms, online learning groups, peer networks, online libraries in a shared social space, and collaborative learning circles (Riel, 1993), such waves of technological change will enhance and expand the ways humans connect, communicate, and create communities. Because electronic networlds connect people all over the globe, it is vital to experiment with electronic learning situations wherein students share ideas and resources, access information about current events and historical archives, interact with experts, and use online databases. These events are changing the fabric of higher education (Rowley, Lujan, & Dolence, 1998). One important piece of the fabric is the instructor. What is the role of the online instructor?

But teaching on the Web is not a simple task for most instructors. Most typically lack important information about the impact of using various tools as well as design and pedagogical strategies. In response, in this article we discuss the pedagogical strategies and tools instructors can use to exploit the Web more fully for learning. We will also take from the lead of Ashton, Roberts, and Teles (1999) to document the social, managerial, and technological actions that instructors can use to enhance their online courses. By documenting these issues, we hope that other instructors can feel more confident and competent in their instruction.

It is important to point out that the advice provided here is based on a series of articles on online learning (Bonk & King, 1998). We have explored the forms of learning assistance and mentoring found in online learning environments (Bonk & Sugar, 1998; Kirkley, Savery, & Grabner-Hagen, 1998). Studies have been conducted with preservice teachers on online case creation and

mentoring since the spring of 1997 (Bonk, Malikowski, Angeli, & East, 1998; Bonk, Malikowski, Angeli, & Supplee, 1998). These studies indicate that certain forms of electronic assistance occur more frequently and foster greater dialog (e.g., questioning, praise, task structuring, general scaffolded advice, etc.) than other forms of instruction (e.g., direct instruction, modeling, and providing explanations and elaborations). A more recent summary of three years of asynchronous conferencing research with students from locations throughout the world outlines 12 different forms of electronic learning assistance and provides guidelines for instructors hoping to incorporate these into the Web or electronic conferencing in their instruction (Bonk, Daytner, Daytner, Dennen, & Malikowski, in review; Bonk, Hara, Dennen, Malikowski, & Supplee, 2000; Dennen & Bonk, in review).

While the stories below relate to individual courses, one of them is embedded in an entire online learning master's program. Hence, the goals and perspectives may be different. Additionally, the types of support provided will vary, as there will not be one set online learning courseware package or delivery vehicle. As a result, some of the courses may include examples of prior student work, student profiles, electronic discussions, online quizzes, lecture notes, synchronous chats, online handouts, Web links, cases, discussion groups, etc. Across these courses, however, there should be some common experiences in designing and teaching on the Web at the undergraduate level (Bonk, 1998; Cummings, 1998) as well as with professionals at the graduate level (Kirkley, unpublished manuscript). As the growth in this area of teaching explodes, it becomes important to understand various pedagogical strategies that can be used for online teaching, e.g., problem-based learning (Koschmann, 1996).

With the emergence of the Web, there are new decisions administrators face about what resources, activities, tools, partners, and markets are important to one's courses. Decisions in these areas can dramatically impact the effectiveness Web-based instruction. Often we become so enamored with new technology tools that we forget to think about the role of the instructor in using those tools. Often we become so immersed in distance education policy decisions that we forget about the important role of the instructor in teaching and coordinating such courses. Often we are so engrossed in reading about or signing new agreements for online learning partners that we fail to acknowledge that it is the students and instructors who make those contracts viable. Often we acquiring access to new electronic materials or courseware that we forget to ask for input from faculty on the usability or relevance of those new materials. It is the premise of this paper that before forging ahead with new markets, partners, resources, or activities, faculty and students needs must be consulted. Consequently, we will make salient the role of the instructor in this paper.

Where are the faculty in all these deliberations? Instructors need a voice in the online learning classroom. They need to help institutions decide the level of Web integration in particular courses. They need to take a lead role in the pedagogical strategies attempted in a course. Sure, the Web is an interesting and powerful new teaching and learning resource. However, those utilizing the Web in instruction are beginning to realize that by reflectively planning how to use the Web as a pedagogical device, student learning can be more relevant, exciting, and powerful.

The basic premise of this paper is that instead of spending all energies attempting to sort out policies, agreements, and new technology tools, we need to consider the faculty who will be teaching those courses. Without such efforts, we lose quality instructors and many opportunities for true innovation in the college classroom; albeit virtual. Faculty need to be informed about the ranges of uses of the Web in instruction. They need to see examples of how to use the Web to bring in online guests, hold chapter discussions from a distance, have students reflect on field experiences online with peers throughout the world, attend virtual conferences or virtual

fieldtrips, explore quality learning resources, share materials online with other faculty, prepare for exams, explore online glossaries, and collaborate with students from other countries (Bonk, 1998). As is clear, activities such as online peer mentoring programs, debates, and role play require significant planning and task structuring. Of course, most online learning courseware and systems lack such tools and activities. Even once these ideas are grasped and useful tools are created, institutions need to support the innovative faculty members in using these tools and sharing their experiences.

In addition to the above issues, faculty need useful frameworks for utilizing the Web in instruction. Bonk and Cummings recently described three important Web-based instruction frameworks. First of all, they linked a dozen guidelines for using the Web in instruction to the 14 learner-centered psychological principles from the American Psychological Association (Bonk & Cummings, 1998). These principles include giving students choice, instructor taking on the role of facilitator, providing prompt feedback, creating recursive tasks that build on each other, utilizing writing and reflection, and fostering interactivity and engagement. Each of their 12 guidelines was specifically linked to one or more of the APA principles.

Secondly and more recently, they provided a means to think about the types of interaction structures that the Web affords (Cummings, Bonk, & Jacobs, in review). Interactions among three key participants--instructors, students, and practitioners—should be investigated and made more explicit. Just how do the educational syllabi indicate the types of interactions between these participants? While this model opens up the discussion on the types of interactions and information exchanges that are important in learning, not surprisingly, there was minimal practitioner involvement in one's courses.

A third model or framework highlights ten distinctive levels of Web integration commonly used (Bonk, Cummings, Hara, Fischler, & Lee, in press). They range from syllabus sharing to including materials from a course on the Web, to having online discussions, to placing an entire course on the Web, to coordinating an entire program on the Web. While the four courses discussed in this paper address mainly the higher levels of Web integration, there are many smaller scale and simpler applications of the Web in higher education instruction.

As is clear from the above, there are many ways to teach online courses. In this article, we document four stories from four different instructors who are teaching courses online. In this article, we point to the role of the instructor in online learning. We will discuss the administrative, pedagogical, social, and technological roles of online instructors. We will each include short vignettes of our online teaching and then explain how we coordinate assignments, discussion, interaction, and various technological issues. We will also describe our individual online course designs. By understanding how instructors can use the Web to design and enhance student social interaction, knowledge building, higher order thinking, and reflection, we can improve learning in all types of educational environments.

Situation #1: Teaching on the Smartweb (Curt Bonk, Instructor)

1. Pedagogical Actions

The first author has been teaching undergraduate educational psychology on the Web for the past three years. This course, titled the "Smartweb," is for preservice teachers. This content heavy educational psychology course is combined with both field observation as well as a laboratory experience. Porting this course over to the Web was not particularly easy. However, it was fortuitous to write a paper on instructional strategies for the Web prior to designing the course

(see Bonk & Reynolds, 1997). This paper served as a course planning document for creating the Smartweb course and embedded it with rich pedagogical activities (Bonk, 1998).

The Smartweb contains tools for Web link suggestions, student profiles, chapter activities, commenting on peer work, accumulating student work in an electronic portfolio, commenting on and rating peer Web link suggestions and profiles (see Figure 1). Because the range of activities and tools, it is important to establish clarity in the expected tasks. As a result of this need, there is a detailed online syllabus as well as two initial meetings to train students in the tools and provide an explanation of the rationale of the course.

The pedagogical considerations in the Smartweb are immense. First of all, a deliberate decision was made regarding feedback. Smartweb feedback comes in many flavors. For instance, at the beginning of the semester each student is matched up with an e-mail pal according to his or her confidence in the course. Those who feel highly confident are matched with those who do not. Since this Web site does not contain password protection, students provide feedback to each other using avatar names (see Figure 2). The e-mail pal provides weekly feedback on one's weekly chapter work that appears in students' online portfolios. They must post this feedback (i.e., peer mentoring) by Friday morning at 8 am. In addition, one's e-mail pal is available for advice and can provide reminders on upcoming tasks and due dates. In effect, e-mail pals provide a second level of task structuring support here.

This also is one way to reduce the workload on the instructor, thereby enabling him/her to focus attention on key individuals in need of help. The instructor provides feedback on student chapter work, weekly discussions, field reflections, and case scenarios. Typically the instructor strategically provides chapter feedback near the beginning in order to determine if any students are encountering difficulty with technology or the course material. More importantly, the students have e-mail pals or Web buddies who make weekly comments on student individual work in the Smartweb. The instructor posts weekly as well, but these are general comments in the online discussion with specific references to individual student posts.

There are many pedagogically and instructionally interesting in the Smartweb. For example, the Web offers a unique forum for classroom discussion, role play, case-based discussion, brainstorming, special guest appearances, collaborative learning, and article reactions. Some of the pedagogical structures are provided in Table 1. Whereas the Smartweb is an undergraduate course, Table 2 lists online instructional activities used in graduate courses. Activities mentioned here include ice breakers, scavenger hunts, debates, polling or voting, symposia, and online publication of student work. What is clear is that there are many pedagogical opportunities awaiting instructors on the Web. The planning and integration of such activities is perhaps the most important aspect of online teaching. Knowing what will work in what situations is key.

Table 1. Pedagogical Ideas within the Smartweb (see Bonk, 1998; Bonk & Reynolds, 1997)

1. Starter-Wrapper (Hara, Bonk, & Angeli, 2000) a. Starter reads ahead and starts discussion and others participate and wrapper summarizes what was discussed. b. Start-wrapper with roles--same as #1 but include roles for debate (optimist, pessimist, devil's advocate, coach, questioner, mediator, connector, commentator, bloodletter, etc.—the instructor has developed 28 online roles for students).
2. Peer Feedback Roles a. E-mail Pal or Web Buddies--everyone has a partner to comment on his or her work (privately perhaps) and is willing to also help each other out during the semester or to

provide peer feedback on assignments and general support. b. Critical Friends: Assign students a critical friend who while analyzing and critiquing ones work (privately perhaps), also points out the positives in one's work and provides additional support.
3.Jigsaw—divide up into groups and then chapters within groups (member #1 reads chapters 1 & 2; #2 reads 3 & 4, etc.) and discuss this in electronic conference and share what learned.
4. Reading reactions—students are given a set of articles and they post to 1-3 articles that intrigued them and react to the posts of 1-2 peers.
5. Field Observations reactions—students observe in field and reflect on how relate to current chapter material.
6. Structured controversy--assign two students a pro side and two students a con side and debate an issue electronically and then switch roles and come to compromise; later post a reflection on the compromise positions of 1-2 other groups.
7. Topical discussions a. List possible topics for discussion and have students vote on them and sign up to take the lead on one or more weeks. b. Have students brainstorm list of possible conferencing topics and then take responsibility to lead a week of discussion.
8. Cases a. Post case situations and have students respond in small groups. b. Have students generate 2-3 cases during semester based on field experiences or experience and respond to 6-8 peer cases. c. Put a set of cases up on the Web and link to a bulletin board system or conferencing tool for them to discuss. These cases can be used as collaborative quizzes that instructors and students from other universities can use. d. Cases-post 2-3 cases for each small group to discuss and answer (1 of which might be on their exam) and all groups must respond to the solutions of one other group.
9. Interactive Peer and Guest Commenting: a. Link Ratings: Have students not just suggest Web links for the class but rate or rank those suggested by their peers. b. Profile Commenting: Have students comment on what they have in common with their peers directly in their peer profiles and perhaps rate the degree of commonality.
10. Brainstorming: Have students brainstorm ideas on the Web and then rank and rate the ideas generated. Calculate average ratings and distribute or create a top ten list.

Table 2. Pedagogical Ideas Beyond the Smartweb (i.e., used in other online courses)

1. Ice Breaker: a. Eight Nouns Activity: Have students introduce themselves using eight nouns and then explain why they choose each noun. b. Coffee House Expectations: Have everyone post 2-3 of their expectations for the course in the online coffee house.
2. Scavenger Hunt: Send students on an online scavenger hunt--this is a way to acclimate them to using Web technologies.
3. Voting and Polling: Have students vote on issues before class and then pull out the minority views at the start of class before the dominant students dominate (tools like SiteScape Forum and eGroups have a polling and voting tool and so do many other tools).
4. Article discussions: a. Reading reactions with free choice: List all the articles in their reading packet within an online discussion tool. Then have students decide which articles they want to discuss and reply to.

b. Reading reactions in teams: Assign students to read and react to a particular set of articles that they are responsible for, and, near the end of that discussion, summarize the discussions of another group.
5. Debates a. Reading reactions as debates with free choice: Assign a set of articles to read, but their reactions and commentary on one or more of these must be in the form of a debate. b. Reading reactions in teams: Assign students to read a particular article or set of articles and also assign them to particular pro and con sides of a debate related to their reading(s).
6. Roundrobin activities: Have students start answering a question or topic and forward their partial answers to someone in their group who adds to it and passes it on till it circulates to everyone in the group. Share these solutions, case analyses, stories, etc., with either the entire group or class.
7. Publish Student Work: Post student work to the Web as a classroom legacy or archival record that displays course expectations to future students.
8. Symposia: Have an online panel(s) or symposium(s) of student experts (or practitioners or guests) at the end of the semester after students have gone deep into a topic.
9. Minute or muddiest point papers--have students send you 1-2 minute reflections via e-mail perhaps to recap a class or to summarize things that remain unclear.
10. Guest experts: Bring in a guest expert to discuss things electronically in a real time chat with preset questions or spontaneous discussion or in a weeklong asynchronous discussion.

Online discussion is a vital part of e-learning courses. Instructors can assume many roles here. Typically a conversational or informal role allows for more student participation and dialogue. Formal or directive statements indicate an authoritative model of instruction. Weedman (1999) showed that such environments foster informal and exploratory conversation that allows students and instructors to take risks and share knowledge. Similarly, in a study of 80 college undergraduates, Ahern, Peck, and Laycock (1992) also found that a conversational style of interaction from the instructor produced higher and more complex levels of student participation. When online instructors were more informal and spontaneous in their commenting, students were more interactive with each other, compared to conditions wherein the instructor simply posed formal topic-centered statements or questions. In effect, responding to teacher questions or statements online is simply an extension of the recitation method the more teacher-centered the environment; the less student exploration, engagement, and interaction. As Tharp and Gallimore (1988) demonstrated with their highly acclaimed “instructional conversation” method, students need to be invited into the discourse through many ways of instructor and peer assistance.

Using this notion of instructional conversations and trying to be student-centered in the Smartweb, students sign up for the role of starter at least once during the semester. The starter summarizes the chapter and issues for a particular week (for examples, see Hara, Bonk, & Angeli, 2000). The starter also provides questions meant to jumpstart discussion. Smartweb students also must be a wrapper of discussion once during the semester. In this role, they reflect on issues and themes discussed as well as issues that remain open. The instructor responds in this discussion almost as a second wrapper who points out what topic and issues were accurately portrayed and what issues still need further discussion and clarification. He directly teaches content only when necessary. In effect, students are the teachers here. The main goal of the instructor is to weave the various points of discussion together. As Tables 1 and 2 indicate, there are a myriad of pedagogical strategies for the Web beyond the notion of the starter and wrapper.

In addition to pedagogical ideas, there are various social, managerial, and technological issues surrounding the Smartweb. These issues are pointed out below.

2. Social Actions

Like the pedagogical role, the social side of the Smartweb is an important indicator of success or failure. Social actions might include instructor empathy, interpersonal outreach (e.g., welcoming statements, invitations, and apologies), discussion of one's own online experiences, and humor. There are many examples of social activity in the Smartweb. In fact, the instructor opens the café in the online discussion with a greeting. Smartweb students are then asked to post a self-introduction in response to the opening greeting. During the initial live meeting, students also are asked to complete the information in the student profile section (e.g., name, hobbies, strengths and weaknesses, major, hometown, computer experience, etc.). Near the end of this session, a digital picture is taken and later loaded to the Web site with first name and initial of last name indicators. Such tools are meant to provide some shared history and semblance of a learning community.

There is also a heavy focus on student responsiveness and interactive commenting in the Smartweb. For example, students are encouraged to rate peer Web links and evaluate peer discussion or reflection comments. Web link ratings appear right next to the link suggestion. Students are also encouraged to comment on each other's profiles with a three level rating system (i.e., three stars indicating lots in common; two stars indicating at least one thing in common; one star indicating that one simply wanted to comment).

In addition to interactive commenting, humor is pervasive on the Smartweb. In fact, a student once suggested that "a sense of humor" be listed as a prerequisite for the course. The instructor makes attempts to insert extensive humor not only in his weekly discussion comments and weaving statements, but also in any e-mail messages to students. Not only is instructor humor important to Smartweb success, but so is student humor. A couple of years ago, in fact, there were two returning adult students who tried to outdo each other in the humor department. For instance, one of these two students once compared concepts within the information processing model to his former job of installing bathrooms. His descriptions of the necessary equipment and piping within the bathroom were hilarious.

In addition to humor, there are opportunities to agree with student perspectives. In fact, social acknowledgements are highly prevalent in the Smartweb (e.g., I agree with everything said so far..."; "Glad you could join us…"; "Wow, what a case…"). Many students begin messages with a social acknowledgement of someone's idea or point of view and then they take the discussion in a new direction (see Bonk, Daytner et al., in review). Some of the students rely on emoticons to express their feelings or positions on a situation. Role play and e-mail pal activity are helpful in getting students to stand in each other's shoes.

Certainly, the social climate is central to student online learning. Instructor empathy or concern for student work helps foster a student-centered climate. From this perspective, the instructor must be flexible is pressing situations and give some choice in assignments. Of course, the management style, to which we now turn, is also important.

3. Managerial Actions

While the pedagogical role relates to direct instructor involvement in class activities, the online managerial actions involve overseeing task and course structuring. Managerial actions include coordinating assignments (explaining assignments, coordinating receipt of assignments, assigning

partners and groups, setting due dates and extensions for assignments). In the Smartweb, there are many ways for students to find out about the assignment structure and associated due dates. First of all, the syllabus is provided both on the Web site as well as in a course packet of handouts. The syllabus is a ten page or so document that spells out all due dates and activities. Student chapter work (i.e., the individual side of the course) is due by Wednesday at 8 am and their chapter discussions and field reflections in the computer conferencing discussions (i.e., the social side of the course) are due Friday at 8 am. The syllabus is lengthy, in part, because the class includes both a lecture and a lab component, and, in part, because of the unusual nature of the assignments. Assignments include jigsaw presentations, concept mapping and personal glossary tasks, educational movie reviews, case generation and discussion on the Web, and service teaching (where students must teach something to someone during the semester and then electronically reflect on it). An initial class meeting or two with students helps spell out the requirements and expectations. Student e-mail pals also provide some assistance on when assignments are due. And, as indicated earlier, they also submit weekly feedback on each other's work. Posting prior student work to the Web also serves to model general task expectations and standards, while lowering student anxiety. Furthermore, this archiving of student work or classroom legacy instills pride in students whose work is posted.

The Smartweb system also helps coordinate student weekly activity. For instance, on the Smartweb homepage (see http://www.indiana.edu/~smartweb), there is a calendar-like interface. This calendar serves as a reminder of that work needs to be posted each week. It also reminds students what week they should be focused on. Once students post their work, it is stored in their own electronic portfolio under an avatar name. They select their avatar from the 40 or so provided as a means of making their work anonymous since the Smartweb, for the most part, does not utilize password protection. A blue dot at the top of their portfolio under a particular week indicates that they were successful in posting. Indicators of peer feedback are provided on the left-hand column. Both are hyperlinked to their the respective posting. Optionally, students can scroll through the entire portfolio to find a particular week.

A Web assignments posting chart indicates who has successfully posted his or her work as well as whether there is any peer feedback. Once again, there are dots to indicate postings are complete. This serves several purposes. First of all, it provides an overview for the instructor as well as students and guests regarding who has completed their weekly posting or feedback. The purple and orange dots are indicators of successful student postings and feedback on such postings, respectively. Instructors can readily determine who needs additional prompting and scaffolding in the course. Along these same lines, students can determine how well they are progressing in comparison to their peers.

Another means of task coordination is to post important assignment information in the "administrivia" discussion within the computer conferencing discussion. Here the instructor posts lists of e-mail pals, weekly discussion starters and wrappers and other roles, team members for small group work, and other relevant information. If students forget what week they need to lead, they can scan this section instead of sending an e-mail message to the instructor.

Managerial actions also are vital in online discussions (pointing students to other messages, commenting about posting length or format, defining the audience, noting on and off task participation, and directing students to different topics and folders for posting). The instructor is active in the weekly online course discussions in the Smartweb. He typically posts near the end of a weekly posting cycle in order to allow students some responsibility for teaching and learning. As indicated earlier, his posts are typically summary weaving types of posts. In these posts, he attempts to applaud and recognize student contributions, where appropriate, as well as pull out the

themes in the discussion. In effect, his role is both as a second wrapper to discussion and as an online guide. Sometimes, the instructor must remind someone that he or she is supposed to start the discussion. Other times, he may throw out questions at this time as well as push students to explore further. He may explain or clarify key points when required or encourage students to elaborate on their thinking. Such forms of learning assistance are common here (Bonk & Kim, 1998). He will also point out where discussion has gone astray as well as when students may have exhibited some misconceptions about a key concept or set of concepts. Since off task behaviors are fairly rare, and those that do occur seem to motivate students to read the Smartweb discussions (see Bonk, Hansen, Graber-Hagen, Lazar, & Mirabelli, 1998), he often will try to spur off task activities. Clearly, the instructor is vital to the online discussion.

At the same time, if students post their chapter work on time, their e-mail pal can provide immediate feedback. In addition, if they post their chapter discussions and field reflections in a timely fashion, they will receive feedback from the instructor in his weekly weaving together of the discussions and reflections. If a student is late in posting, the instructor typically refuses to respond to the post. Not only does this policy help nurture student timely participation, it also provides some useful borders for instructor participation. Without such borders, instructor obligations and feelings of guilt about missing feedback may never end.

At a general level, managerial actions also involve coordinating the course (organizing meeting times and places, office hours, defining grade distributions, explaining the relevance of the course, correcting course materials, and discussing potential course revisions). Electronic mail is the choice tool here. In fact, after the initial two live meetings, most course task structuring involves e-mail. E-mail can inform students of interesting activity in the Smartweb, detail student grade distributions on an exam, remind students of upcoming events, and reflect on overall progress to date. It is also used to coordinate live group meetings and luncheon discussions. E-mail might also be used to announce technology problems that are students currently encountering and times in which the system may be functional again (e.g., when a server suddenly goes down or is under scheduled maintenance). The use of e-mail by the instructor is a common event, perhaps occurring 3-4 times per week on a whole group basis and 15-20 times per week on an individual basis. The group e-mails are usually quite long and numbered by key points in order to assist in student comprehension.

4. Technological Actions

Technical actions relate to helping with user or system technology issues. The technology required for the Smartweb is fairly basic—a computer with a modem and an Internet connection and appropriate browser. While only basic technologies are needed, the technology support at Indiana University (IU) is excellent. IU is often ranked among the top technology supported public universities by Yahoo and other ranking systems. The technology resources and support staff make teaching on the Web fairly easy from a technology support perspective. Students have excellent access to the Web from their dorms and building computer clusters. The Smartweb also benefits from the fact that students have more advanced computing skills today just a few years ago.

However, because the Smartweb was built using specialized tools, it is vital to train students on how to use various features. Training takes place the first two Saturdays of the semester in two-hour blocks. This training is useful in walking students through the various features of the system and lowering anxiety about their computer skills. The first week students learn about the course requirements and explore aspects of the Smartweb system including posting a self-introduction in the café as well as in the student profile tool. During the ensuing week, students complete their chapter activities, chapter discussions, and field reflections. Additionally, they are instructed to

provide peer feedback in the student profiles section. Students are asked to report technological problems to the instructor when they encounter them or wait until the second training session. Since some students fail to complete this work in a timely fashion, completion of the first three weeks of Smartweb work is worth 30 points. By assigning some point value early in the semester is a way to force most students to test out the technology that they have available at home and in school. Often students in remote locations will discover that they are not properly linked to the Internet or that they need to upgrade their equipment.

Of course, problems are encountered when browsers and other tools are upgraded. During the first year or two of Smartweb activity, student posts would take between fifteen minutes and an hour to appear in student portfolios. Some students would get nervous that their work did not post and would submit it a second or third time, thereby causing their portfolios to bulge and requiring someone to manually delete the extra posts. In the early years, it also was not unusual for student work to post to the wrong week or location in a portfolio. This was due to the custom nature of the software and was quickly fixed. Other problems have included the conferencing system or Web site server going down for hours or days. When this happens, the instructor is usually barraged with 5-10 immediate student e-mail notifications from panicking students. This past semester, students become nervous when a Web server went down (i.e., the INSITE Web site from Houghton Mifflin Company that supports the textbook used for the course). The problem was that power to an entire portion of Boston was out due to a human error, thereby affecting the corporate Web server—someone in a manhole cut a power line. Students were upset about the lack of access, but there was little the instructors could do here but extend due dates.

Technology issues are diverse. One student in the Smartweb lost two hours of effort on the Smartweb quiz since he was working in the education library late at night and it closed on him. Another student had his apartment burglarized during spring break including his computer. More typical is the student whose computer simply dies during a key moment in the semester. Of course, many of these are unverifiable stories (though the burglary was in the local paper). What is helpful is to have the initial training sessions and to have some electronic assignment or task due early in the semester so as to test the system.

Smartweb Summary

Given the complexity of the Smartweb, the instructor is vital to any success. The instructor must decide on when and where students will complete their work, interact with peers, link to outside resources, extend the course in new directions, etc. Just what degree of student choice and responsibility for his or her learning will be allowed? Of course, these are not insignificant issues. The instructor definitely cannot hide in a Smartweb course. A continual discussion of such topics is provided in the next three sections.

Situation #2: Online Problem Based Learning: Scaffolding the Ill Structured Problem Solving Experience (Jamie Kirkley, Instructor)

Introduction

For the past four years, a graduate course has been taught online graduate class titled "*F500: Teaching with the Internet Across the Curriculum*." (See http://www.indiana.edu/~f500.) Because the majority of students in this class are teachers and technology coordinators working full time and taking courses part time, it was critical that the course address real world problems as part of the learning process.

In order to meet the needs of learners, who are taking the course for reasons of professional development as well as theoretical development, the instructor for this course has used a problem based learning (PBL) approach to design and teach the course. She has studied the problem based learning method and used it in face-to-face classes for over five years. But using problem-based learning in an online environment presents some unique challenges. Some of the challenges are similar to those found in face-to-face PBL, and some are unique to the online learning anytime anywhere environment.

In this paper, the instructor will discuss some of the teaching methods and support strategies she has used to support problem-based learning as well as share ideas that could be used in any type of online learning environment.

Background

As the number of online distance education courses and programs expands rapidly, institutions are designing and implementing new types of distance learning environments (Institute for Higher Education, 1999). These learning environments often promote student engagement using inquiry and collaborative problem solving.

Problem-based learning is a "curriculum development and instructional system that simultaneously develops both problem solving strategies and disciplinary knowledge bases and skills by placing students in the active role of problem solvers confronted with an ill-structured problem that mirrors real-world problems" (Finkle & Torp, 1995, p. 1). PBL is used in a variety of educational environments including medical education (Barrows, 1985), business administration (Stinson & Milter, 1996), schools of education (Bridges and Hallinger, 1992), undergraduate education (University of Delaware, 1999), and high schools (Barrows & Myers, 1993).

Whereas PBL has existed for almost a couple of decades now, Web based learning environments are new, and principles for the design of teaching in this environment are just emerging (Duffy, Dueber, & Hawley, 1999; Kirkley, in preparation). Since the natural tendency is often to think of Web instruction from an information transmission perspective, what is required is a shift in thinking from presentation of information to a focus on the tasks in which students are engaged. Yet designing and facilitating this sort of learning environment can present many challenges given limited knowledge of this type of teaching and learning methodology in an online environment as well as limitations of tools available to support the learning process.

Therefore, the purpose of this paper is to provide information on the teaching and learning strategies used by one instructor as well as implications for course design and tool use.

Design of the Course
The design of the F500 course followed a problem based problem-based learning framework. The primary proposition is that cognitive conflict is the stimulus for learning, which also determines the organization of what is learned in context of the situation in which it is learned (Savery & Duffy, 1995).

One way to foster cognitive conflict is to use a PBL format. Hence, the design of the course follows the PBL structure as outlined by Barrows (1985) but with some adaptations made for the online environment. Traditional face-to-face PBL process consists of the following process: Introduce the Problem, students analyze the problem and brainstorm further ideas to research, research the problem, and collaborate in small groups to construct a solution. Later in this paper, we will document the steps for online PBL.

Technological Issues
Because distance education relies heavily upon technological tools, it is critical to understand the role of these tools in the online PBL environment. The technological tools available to support problem-based learning are at this time quite limited. While there are many asynchronous conferencing tools available, few have features that efficiently support the problem based learning process, including the process of brainstorming, investigation of problems, analysis and convergence of ideas, debates, collaborative writing tools, and the team production process.

For this course, the instructor used two tools: the Web and an asynchronous conferencing tool called ACT (Duffy, Dueber, & Hawley, 1998). First, the Web was used to set up the problem itself (see Figure 3). The instructor used a case study approach to set up the problem. The problem was a case study of a school district dealing with a myriad of issues related to adopting the use of the Internet in schools. The learning goal for the students was to gain a better understanding of these issues and write a report to the superintendent, advising him on how to deal with various issues such as acceptable use policies, teacher professional development, and student rights and responsibilities.

To make the PBL process more concrete, the instructor set up the conferences that visually matched the PBL learning process. For example, the first conference was set up so students could brainstorm and define the problem. Fortunately, the branching structure of asynchronous conferencing supports student brainstorming. While that is a definite strength, it is often difficult for students to get convergence or vote on issues. Therefore, the instructor set up a separate conference called “Convergence” intended to help students come to an agreed upon process. Work conferences were also set up for each small group to use for researching the problem. A group work area and final report conference completed the set up.

A major issue students faced here when using a conferencing tool was the delayed aspect of asynchronous communication. When groups had to make decisions, it often took 3-4 days before an agreement could be reached. That is a large amount of time in a project that lasts only two weeks. Since such procedures were extremely frustrating to students, they recommended that the addition of a chat tool would have made the work process flow more smoothly.

To make the problem more visual and help students understand passage of time, a calendar was created to help students understand a set of events occurring at the school district over a two-week time span. Such a tool and perspective was part of the early design of “Time Revealed Scenarios”™ (WisdomTools, Inc, 1998). (See Figure 4 for an example of the problem scenario.) The goal of Time Revealed Scenarios is to provide a tool to support online problem based learning.

The goal was for students to experience two weeks "in the life of a school district superintendent dealing with a lot of issues related to Internet rights and responsibilities." Some examples are students accessing the Anarchist's Cookbook, letters from parents who are upset about their child's name being published on the Internet, an unflattering newspaper article about a principal, and computer log files of students in a biology class who are surfing heavy metal band sites. Each piece of information provided a piece of the whole issue or problem that the superintendent, Mr. Smith, was dealing with and in which he needed assistance. (See Figure 5 and 6 for examples of various Internet issues.)

Students responded that they liked the authentic nature of the problem as well as they visual layout. In an environment such as the Web with limited screen space and unlimited information to present, it's important that we conceptualize how to display large amounts of on screen information so the learner is not overwhelmed.

Where is the Instructor in an Online PBL Environment?

Just as with face-to-face PBL, the instructor in an online PBL environment acts as both a tutor and coach. In both situations, the instructor has to be careful not to dominate the conversation and learn how to balance coaching, guidance, and fading into the background when appropriate.

Table 3 details some specific strategies the instructor used to support the PBL process online.

Teaching Strategies

Table 3. Setting up the PBL Problem Solving Process

Activity	Teaching Strategy
Introduce the problem	Post a message explaining how the PBL process works, how the conferences will be arranged, and a document detailing expectations on how to communicate and collaborate, and a grading rubric.
Analyze the Problem	Post messages only when students are getting off track or needed further guidance. Ask students to summarize or reflect.
Brainstorm Solutions	Support brainstorming by posting a message with multiple perspectives or a resource that presents a different point of view Ask students questions that further their thinking or get them to think more deeply (i.e., cognitive coaching) When issues become repetitive, asked students to summarize and converge their opinions.
Research the Problem	Monitor discussions to make sure students were on track Intervene only when students are off track
Work in Small Groups to Develop Solution	Monitor group process to see who was

	participating Intervene only when students were off track or not participating
Reflect on the Learning Experience	Ask students to post a reflection at the end of each stage of the PBL process (they reflect on both process and product)

To provide motivation, the instructor posted messages weekly to reassure and encourage students that they were on track (if they were). She also assured them that this was an important issue for many others. Ideally, it would have been great to work with another class or some real teachers actually dealing with a similar problem. She also asked an outside expert to join in on the online conversations and serve as a consultant. This was extremely motivating for students since they could discuss their issues with an expert.

Creating Community

To create community, the instructor used several strategies:

- Created an open environment where multiple perspectives were valued (e.g., asked students what they thought and posed different viewpoints)
- Created a conference in ACT just for casual conversation (the instructor also posted there)
- Provided a supportive environment where student input is highly valued
- Made suggestions for students to work together on various projects
- Made sure missed ideas were addressed
- Invited visitors to join our discussions

Feedback

The online environment can be one that has a feeling of uneasiness at times. Students needs lots of reassurance (personal and as a group) as well as feedback on their performance. Following are strategies the instructor used with F500 students:

- Sent weekly e-mail feedback to each student on his or her participation and performance in online discussions
- Posted weekly messages with feedback for the class as a whole
- Asked for weekly feedback from students on my performance
- Asked for feedback on design of class assignments

One of the most important aspects of feedback was the rubrics and evaluation instruments created. The rubrics for each assignment were posted to the class Web site during the first week of class so expectations would be made clear.

An important part of the feedback process was making sure the instructor made her expectations clear. The instructor found that the more she taught this class, the more she recorded information about her teaching style, student expectations, and theoretical commitments. Also, the weekly e-mails were perhaps the most powerful form of feedback since students most often responded more quickly to those.

Classroom Management

Managing the class was not particularly easy the first time. However, after teaching the PBL unit online several times, the instructor said it became much easier. She said she standardized many

of the e-mails sent, created a FAQ page to make her expectations and teaching style more explicit (also incorporated recurring student questions into the FAQ), and improved the design of the assignment and supporting materials to enhance and improve student learning.

Teams were also manageable. By using self and peer evaluation, students said they felt more pressure to contribute and perform well. Also, having rubrics was very important part of the class since it is critical that expectations be made clear.

Conclusions

In conclusion, PBL can be taught successfully online. Students are willing to collaborate and work together regardless of distance, and the instructor's role remains one of facilitator and coach. The role of the instructor is to set up the problem, coach and facilitate, motivate and reassure, and support student reflection and problem solving.

Online problem based learning can sometimes be frustrating for students who wish to have more structure, especially in the online environment where there is a lack of face to face contact. It can also be frustrating because there currently are few tools to support the PBL learning process. When tools become available to support the learning process, it will be less frustrating and a more rewarding experience.

Overall, the implications regarding how we design courses and tools has a huge impact on the potential success of these types of learning environments. We need to not only continue sharing our pedagogical ideas and decisions as well as research the impact of various approaches and strategies in the online learning environment.

Situation #3: Computer Information Systems Courses (Noriko Hara, Instructor)

The third author has been teaching technology-related courses in the Computer Information Systems program (CIS). These courses are not online courses, but incorporate Web-based technology to facilitate learning. In this section, two specific courses will be described: one is an introductory level course called *Introduction to Microcomputers*, the other is a more advanced course called *Create an Internet/World Wide Web Site*. The former course used a commercial Web-based courseware, e-education, and the latter used a Web site developed by the instructor.

1. Pedagogical Actions

The *Introduction to Microcomputers* course was a required course for the students in the CIS program as well as the business major students. As a result, the computer literacy level of the students varied. Some students had just taken a keyboard typing class, and some students had more extensive experience with computers. Therefore, finding the middle ground for these students was one of the difficult pedagogical issues. The instructor used one third of the time as a lab and asked the advanced students to help other students. The course covered how to use Windows 95, Microsoft Word, Excel, and Access.

This course used a commercial Web-based courseware, e-education (http://www.e-education.com), to post the syllabus online, provide online tests, and to manage gradebook online (see Figure 7). The online tests were convenient for the instructor because the system automatically transferred the students' grades to the online gradebook. However, the students were not favorable to the online tests, partially because most of the students were not comfortable with using computers. They felt stressed when they had to learn new technology tools to take a test (see the Managerial Actions section for detail).

The *Create an Internet/World Wide Web Site* course was an elective course in the CIS program. Consequently, the students chose to take this course and were motivated to learn the content of the course. More than half of the students had had programming experience before taking this course. The course was structured by small projects. As a result, students gradually built up their competencies in terms of Web design and development. For example, first assignment was to create their own resume in HTML, the second one was to create a splash page of their personal Web sites, and the third assignment was to develop a personal Web site that includes both assignments #1 and #2. Accordingly, the students could easily reach the level of the assignment #3 because the tasks were broken down into smaller assignments #1 and #2, and they could obtain the instructor's feedback for each step. During this course, student learned basic HTML coding, JavaScript, Cascading Style, Dreamweaver, basic visual design principles, and usability testing.

This course used a Web site developed by the instructor (see http://php.indiana.edu/~nhara/courses/cis252.html) (see Figure 8). The Web site contains general information about the course and the instructor, syllabus, handouts from the class, detailed assignments descriptions, study resources, and student work. It was mainly used as a communication tool between the instructor and the students. In fact, this usage of the Web is Level 4 of the Ten Level Web Integration (Bonk, Cummings et al., in press). In particular, the students found it useful to have the weekly handouts available on the Web. Also, the instructor's expectations of the assignments were explicitly communicated via the Web site. Furthermore, posting students' work motivated the students and also allowed them to give each other feedback. A student in this class commented that he was also able to learn some techniques by looking at other students' work.

2. Social Actions

The *Introduction to Microcomputers* course used e-education that provided *profiles* page in which individual students could put their personal information. This page could have worked as a tool to help create a sense of community among the students if the students had taken advantage of this page. In effect, some students placed their information and enjoyed doing it, while others ignored it. One of the technology savvy students took a picture of herself with digital camera and uploaded the picture on the profile page. However, because the profiles page was voluntary and some students were not comfortable to play with it, only a few students posted their profiles. If the instructor made the profiles page as a part of the assignments, the students would have used more to get to know each other better.

Since both courses were traditional face-to-face courses that used technologies, a part of the class time, e.g., lab time, was used to make students comfortable to ask questions to the instructor and each other. As Walther (1996) indicated, it might be possible to reach the same comfort level by face-to-face and computer-mediated communication. However, the face-to-face communication is much quicker to become comfortable with each other. Thus, combination of face-to-face classroom and online tools would work better than just using online tools to develop bond among the students. It is also questionable whether these kinds of technical courses are transferable to online courses. From informal observation, it appeared to be necessary for the students to have hands-on practice in the class and to be able to ask questions whenever they have problems. In this way, either the instructor or other students can provide help immediately. On the other hand, if these courses were provided via online, the students could not get immediate solutions and might feel overly frustrated (see e.g., Hara & Kling, in press).

3. Managerial Actions

As mentioned earlier, the *Introduction to Microcomputers* course used course management tools provided by e-education from JonesKnowledge.com. In terms of online tests, it was easy to create an online test by using this courseware. However, there were some problems. Because some of the students were not very familiar with computers, when the instructor used an online test for the first time, they did not load the questions appropriately. Therefore, they were confused and lost some time to work on the test. It is recommended that not only the instructor should be familiar with the online tests, but also the students. Thus, non-graded online test can be offered before the actual tests. One of the main advantages of using the courseware was that it includes online gradebook. It allowed the students to view their current scores online. The online gradebook could have great potential. However, the disadvantage of using the online gradebook was that it was not as flexible as the traditional gradebook or spreadsheet software. If this function is improved, it could reduce some of the instructors' burden.

The Web site for the *Create an Internet/World Wide Web Site* course provided a reference point for the students to manage assignments by themselves. In addition to the course syllabus, there was an assignment page where the students had access to the description of each assignment, and the due dates were included. Thus, the students in this course constantly checked the assignment page. Also, the instructor pointed out the page when she explained the assignments. In addition, the course Web site provided online resources that were primarily collected by the instructor. However, when the students e-mailed the instructor about other Web resources, she included them in the course Web site.

4. Technological Actions

Comparing the technologies used by these two courses (one used a commercial courseware and the other used a self-developed Web site), both had advantages and disadvantages. The advantage of using a commercial courseware is that it reduces the development time of a Web site. The tools are ready to use for instructors. This is especially beneficial for those who do not have much technical skills or access to technical support. Moreover, if all the instructors in the same department or university used the same courseware, then their students do not have to keep learning new tools. However, the downside of using a commercial courseware is that it may be costly and it is not easy to be customized to fulfill the individual course's needs. It also can limit instructor and student creativity.

On the other hand, using a Web site developed by the instructor of the course has some advantages. The main benefit is that it is created just for a particular course, so that all the tools are custom built it. Also, it is easy to modify and update because the instructor has all the control. However, the disadvantage of using this kind of Web site is that it may take a long time to develop a course Web site. Furthermore, the available functions of the course Web site depend on the course instructor's technical skills. It is also possible that the instructor will spend extensive time developing the Web site leaving less time for teaching the course content.

In the end, instructors should evaluate pros and cons about different commercial courseware and also self-developed Web site before they start preparing courses. There are some resources available to help make these decisions (e.g., Bonk & Dennen, 1999). Institutions must help locate such resources for the instructors and help facilitate instructor sharing of their pedagogical ideas (e.g., see CourseShare.com or the World Lecture Hall for examples of such sharing).

Situation #4: Teaching a self-paced instructional media and technology applications course in an interactive manner (Vanessa Dennen, Instructor)

Slightly more than a year ago, the fourth author inherited an online course following a fairly traditional correspondence model. The course, which focuses on instructional media applications and is targeted at masters-level students, was originally designed with a course Web site, providing assignments and resources for students. Students were required to read the textbook, complete the assignments, and submit them to the instructor for feedback via electronic or regular mail. Often students would choose the regular mail option rather than struggle with how to attach a file or scan a graphic.

Ideally, students were supposed to finish the course requirements within one semester; in practice this was not always the case. The instructor needed to keep close watch over who was falling behind, and conducted a great deal of private communication with individual students regarding their progress. Students did not feel they were part of a group or cohort, and thus did not feel much pressure to catch up when they were behind. Attempts had been made at using a class listserv or a basic Web-based bulletin board to encourage interaction between students, but these efforts generally fell apart by the third week of the course.

It seemed that while the course was well designed in terms of readings and assignments, it did not have much value-added from being on the Web. A student could print out all of the Web pages on the first day of class and never need to use the Internet again. Determined to make the Web course a worthwhile experience and to increase the interactivity, the instructor began to make some changes to the course. Today it remains a self-paced course and the course Web site still provides assignment information, but it also makes significant use of a Web-based conferencing tool and requires both student discussion and peer feedback activities.

Pedagogical Actions
In terms of pedagogy, three major changes occurred in the course. These changes increased the interactivity of the course and created an online community of learners.

1. Orientation Time
Time is now allowed at the beginning of the course for students to get used to the discussion tool and meet each other. Upon entering the course, students find an introduction discussion topic that encourages them to share a bit about themselves and reply to some other student. This task accomplishes two goals: (1) the students get to know each other, and (2) they learn how to send a message and a reply. Other orienting tasks in the discussion forum include sharing a favorite Web link --an activity that promotes community building--and a discussion about online course concerns and survival tactics.

By providing these orientation activities during the first week of the course, all students can participate regardless of whether or not they have received the textbook. Furthermore, students are able to get used to communicating online and begin to develop relationships with their classmates and instructor without worrying about unfamiliar course content.

2. Bi-weekly Discussions
Every other week a new discussion is started in the online forum. Each time students have two different discussion topics to choose from, and are encouraged to participate in both instances. The discussion topics are tied to general themes covered in the course, but do not require reading of any particular part of the book. Most topics ask students to draw upon their own experiences

and interests in their response. This flexibility makes it possible for all students to contribute to the discussion regardless of their background or what assignment they are working on at the time.

Not only are discussion questions carefully crafted to allow each student to share a unique response, but they are also designed with directions for responding to classmates. Early experimentation in the discussion area showed that many students were at a loss for what to say to their classmates; they tended to simply respond to the instructor. Now students receive recommendations for how to interact in a particular discussion. Sample directions may include finding a Web resource for someone else, playing devil's advocate, providing alternate solutions to a problem, linking concepts between different peer responses, and asking probing questions.

3. Student Portfolios and Peer Feedback

Although students may be working on different projects at different times, there is still value to seeing each other's work and receiving feedback from someone other than the instructor. Originally, students submitted course work directly and privately to the instructor; now students post their assignments to a public portfolio area on the course discussion forum. Students are encouraged to review portfolios other than their own and provide peer feedback. Instructor feedback is e-mailed privately to students.

Having public portfolios has increased the quality of student work and has contributed to a sense of community in the class. Students view the assignments as a way to share ideas with the class as well as a form of assessment. They have been encouraged to try new things by seeing what others have done. For example, a Fall 1999 student who was a bit timid of computers taught herself how to use Hyperstudio; upon posting her assignment, she attributed her new confidence and skills to the motivation she had received and examples she had seen from classmates. Additionally, the portfolios can serve as examples of work for students who simply don't know where to begin.

Social Actions

This course has a social element that runs throughout the semester and is encouraged highly and modeled by the instructor. The orientation activities set the tone for socialization, which is deemed an important part of building an online community. At the same time, students are encouraged to fill out their user profile, a pre-formatted Web page that allows uploaded photos, links to Web sites, and space for other pertinent information. Throughout the semester the instructor and students share what is going on in their lives, often as an aside to discussions. For example, a message sent to the students from the instructor might include comments about the local weather and recent happenings in her life. If she is busy, tired, sick, or going on vacation, she shares that information with the students because it helps add a more human element to the electronic medium.

The course does not have a specific socialization area, based on the instructor's belief and prior experience that many students who will participate in social behavior will not spend time visiting an explicitly social area of the course. Allowing socialization is important to these students, who do not have break times during which they can chat and who do not run into each other on campus. One student even sent a private message to the instructor at the end of the course thanking her for allowing students to "talk" freely in the conference; she had been taking another online course in which social discussion of any nature was deemed "off-topic" and highly discouraged.

Managerial Actions
The structural changes in the course have also assisted class management. The student portfolios prevent the instructor from getting an overloaded e-mail inbox and from accidentally deleting or losing student assignments. The portfolios also make it easy to see at a glance how the students are doing. The development of online community and discussion has lessened the amount of private e-mail between students and the instructor, and often students will answer each other's questions.

The Web-conferencing tool used by this course, SiteScape Forum (SSF) (see Figures 9 and 10), is not a course management tool and thus does not offer support for tests or a gradebook. However, it does have a few built-in features that are useful to instructors and students alike. The *List Unseen* and *E-mail Notification* features of SSF make it easy for both the instructor and students to track new course activity. Everyone can receive e-mail updates about new postings to the forum on a regular schedule — once per day was the schedule used for this course — providing a regular reminder to check in and participate. Upon logging in, there is a "list unseen" button that, when clicked, will provide a listing of all unread messages. Additionally, the instructor can modify, move, or delete any messages as needed, and track recent user logins.

Technological Actions
The technology for this course is pretty easily learned by the students. All that is required is a computer with an Internet connection, Web browser, and e-mail account. The SSF software is accessed via the World Wide Web and no extra plug-ins are required.

Not all students come to the course with a great deal of computer experience. The orientation activities give students a chance to become familiar with the technology and the basic skills needed in the course, such as sending messages, replies, links, and files. Early in the semester, the class group decides on a preferred format for sharing word processed documents and develops guidelines and instructions for the less technologically experienced students to follow. There are opportunities for students to learn and use additional technology, such as Web authoring tools, but this is not required for successful course completion. Many students find that their technology confidence builds throughout the course; they often try new computer-based tools for their course assignments, particularly as the end of the semester nears.

Conclusions
Self-paced, Web-based courses need not be isolating experiences. As seen in this case, online interaction between students in a self-paced course can have many benefits, including but not limited to (a) improved quality of student work; (b) improved course completion rate; and (c) development of a community of learners. Careful development of discussion questions and guidelines, opportunities for sharing assignments, and adequate time to learn the technology are important factors to successful online interaction

Final Comments:
As is clear from the discussion above, the framework from Ashton et al. provides a useful look at the structure and functioning of online learning and the role of the instructor. Ashton et al. suggest that future research explore the pedagogical, social, managerial, and technologies roles of the instructor from the start to end of an online course as well as across instructors, across offerings of the same course, and across different courses. Additionally, one might wish to investigate how different technologies and pedagogical strategies change the instructional interaction patterns and help promote community building.

Across the courses above, there are many interesting themes and trends. Just when to intervene, how much structure to provide in online assignments, how much responsibility students might enjoy are among the important reflection areas for the online instructor. As indicated, the courses reviewed here are an attempt to explicate the role of the instructor in online environments. Have we found the instructor? Have we provided the means to identify and clarify what an instructor might decide to do to be successful in such venues? We certainly hope that this paper will help others locate the critical roles of the instructor in online learning. We also hope that the range of pedagogically strategies available for online learning is now more apparent.

The courses reviewed here are intended to not only "find the instructor" but provide pointers to successful online classroom management and interaction. Given the relative newcomer role of Web-based instruction, it is vital to point out some of the benefits and implications as well as problems and potential solutions with online learning (see Tables 4 and 5). Of course, as with any new teaching technique, there are many interesting stories in the online learning field and many left to be told. We hope that you find our discussions of online instruction across our four settings beneficial in a wide variety of teaching and training settings.

Table 4. Benefits and Implications of Online Learning (Bonk & King, 1998)

Benefits:	**Implications:**
1. Low participants and shy students sometimes open up.	Use computer conferencing for course discussions in traditionally taught classes.
2. There are minimal off-task behaviors.	While this is typically a good sign in terms of student learning, and perhaps unexpected for an environments wherein we expect students to be lost in cyberspace, students are often so task oriented that they fail to form an online learning community. There may be times when the instructor needs to create socially oriented tasks and opportunities to share personal stories.
3. Delayed collaboration is more extensive and rich than real time.	Utilize asynchronous collaboration for article discussions, reactions, and debates, while synchronous should be used for online experts and assignment assistance.
4. Students can generate tons of information or case situations on the Web.	Structure student content generation activities; perhaps limiting the amount and type of postings. Force reflection and integration on comments as well as interactive questioning as a way to focus students on the content.
5. Minimal student disruptions and dominance.	There may be times when the instructor needs to foster critical commentary and debate as well as help students take sides on issues.
6. Students are excited to publish work.	When students produce something of extremely high quality, ask permission to post it to the Web as examples for current and future students. Publishing student work helps form a classroom legacy and archive of successful products.
7. Lots of online advice available. In our work	Find experts, practitioners, colleagues, and

with students posting online case situation, students averaged 4-7 pieces of feedback per post.	peers who might offer your students online advice and mentoring. Look at the Web as an opportunity to move students down the road to expertise.
8. With the permanence of the postings one can print out discussions and perform retrospective analyses and other reflection activities.	Find ways to foster reflection and metacognitive on student posts. Perhaps instructors might have students discuss concepts embedded in their posts for a particular discussion thread or week. Also, one might have students pull out the key issues, questions, or themes in a discussion.
9. Discussion extends across the semester and creates opportunities to share perspectives beyond your classroom.	Find colleagues in other universities and countries teaching similar topics who want to collaborate and get involved in online mentoring. Have students reflect on the cultural differences in their posts. Perhaps arrange a day wherein students can meet in a live videoconferencing or online chat situation.
10. It encourages instructors to coach and guide learning.	Reflect on the online activities employed as an instructor and try to incorporate some of them in a traditional class. Print out one's online posts and analyze them for the type of interaction or form of learning assistance embedded in the post (e.g., questioning, feedback, pushing students to explore, explanations, task structuring, etc.).

Table 5. Problems and Solutions of Online Learning (Bonk & King, 1998; Murray, 2000):

Problems:	**Solutions:**
1. Online learning tasks can quickly overwhelm students who lack experience in this area	Have an initial training day for students. Plan and streamline the course discussions and activities so that students have a clear sense of what is due when. Require something due early in the course so that the students have an opportunity to test both their equipment and the courseware system. Check to see if all students are experiencing the same technological problem that 1-2 students might be experiencing.
2. Even experienced students can become confused and lost on Web.	Students need some structure and guidance; e.g., conferencing and online discussion as well as any other online task must have explicit expectations and perhaps some samples of prior student work on the Web. Specific times and dates when postings are due does help. Suffice to say that effective online instruction requires extensive planning and forethought.
3. Students are too nice to one another on the	Develop controversies and conflict; assign

Web, perhaps because they have minimal face-to-face interactions and prior shared histories.	students to particular roles such as devil's advocate, bloodletter, pessimist, idea squelcher, and watchdog so as to spur discussion. At the same time, instruct them in how to appropriately debate or discuss ideas without directly criticizing or insulting the person. Instructors must guide such interactions and help students take on different roles in an online debate. Also, one might build ways to form shared histories and a safe environment to take risks online.
4. Students' comments often lack justification and seldom connect their online comments to specific course concepts or they simply tell stories unrelated to the class. While off-task behavior is rare online, students still may not realize that they are supposed to justify their reasoning.	Train students how to back up their claims and link concepts from their discussion postings to pages and ideas from their textbook or other course materials. Posting prior student work might serve as examples. The instructor might also model the types of answers and argument support expected by citing theories, studies, or concepts. Frame questions and prompts in terms of concepts for a particular unit. In addition, international collaboration projects and cross-cultural feedback provide incentives for students to look competent to their foreign peers.
5. Tough to electronically teach and not preach. There is often some verticality in expert mentoring (i.e., "You need to remember to do…" or "The concept that is key here is); there are few horizontal or collegial interactions.	Find ways to encourage students to take the lead role where appropriate and perhaps require students to take turns starting or summarizing discussion.
6. Peer online mentoring is not as thoughtful as instructor feedback.	Provide students with tip sheets and guides on how to provide peer feedback; provide lists of sample responses that assist in the learning process instead of directly teaching information.
7. Communities of learners are difficult to form, in part, because students are extremely task, not discussion, oriented, and, in part, this is due to limited social cues and trust building activities. Sometime even peer camaraderie is lacking.	Encourage social and informal types of interactions such as in cafes, coffee houses, and quotes of the week. Create forums for students to hang out as well as to post personal introductions. One might assign online buddies to help respond to pressing needs. Also, find key initial events or postings wherein students get to know each other early in the course. Have a more open-ended environment wherein students might come back from time-to-time. For example, have students post a set number of times/semester instead of per week.
8. Too much data, too much information to read and respond to all of it.	Have set times and dates each week in which to enter the online discussion. Assign classmates as e-mail pals, Web buddies, and critical

	friends to give weekly feedback on one's work. The instructor can be more selective in feedback strategies. Also, have students underline concepts from the text in their posts prior to turning them in.
9. Also, it is time consuming to grade student online discussions.	Assign some points simply for task completion and timeliness. Assign points for interacting concisely with others and for depth of thought, rather than simply the quantity of posts. Also, specific key criteria or dimensions or scoring rubrics prior to grading. If class size exceeds 25 or 30 students, ask for some departmental support in terms of grading.
10. Technology changes or is too slow. In addition, computers crash and programs malfunction. Finally, software bugs or glitches can frustrate students who want to complete their work.	Keep your students informed about latest technology agreements with your university. Avoid trying more than 1-2 ideas out simply because they are new or at the cutting edge; instead, stay within a reasonable range of activities which have worked in the past.

Authors:
Curt Bonk is an associate professor in the Learning, Cognition, and Instruction Program within the Department of Counseling and Educational Psychology at Indiana University (IU). Currently, he is a Faculty Fellow for Research at the Center for Excellence in Education, as well as a core member of the Center for Research on Learning and Technology located in the IU School of Education. He received the Burton Gorman Teaching Award in 1999 and was the first recipient of the Wilbert Hites Mentoring Award from IU. As a former corporate controller and CPA, Curt is interested in enhancing college and K-12 pedagogy with technological supports, scaffolded instruction, and alternative instructional strategies that he seldom observed in business school. His other professional interests include nontraditional learning, distance education, thinking in a social context, collaborative writing technologies, and teleapprenticing preservice teachers. He recently edited: "Electronic Collaborators: Learner-Centered Technologies for Literacy, Apprenticeship, and Discourse" published by Erlbaum and was technology contributor for the 9th edition of Houghton Mifflin's educational psychology textbook, Psychology Applied to Teaching by Jack Snowman and Robert Biehler. Curt holds a Ph.D. and M.S. in educational psychology from the University of Wisconsin-Madison, and a B.A. in accounting from the University of Wisconsin-Whitewater. E-mail: cjbonk@indiana.edu; Web page: http://php.indiana.edu/~cjbonk

Jamie Reaves Kirkley, a research assistant for the Center for Research on Learning and Technology, is also a doctoral student in instructional systems technology and language education at Indiana University. Her research interests include asynchronous conferencing systems, online problem based learning, instructional strategies for teaching Web-based courses, and the impact of technology on workplace literacy. Kirkley was part of the early Web-based initiative at IU's School of Education. She has designed two Web-based courses and has taught online for over two years. She holds an MS in Instructional Systems Technology from Indiana University. E-mail: jkirkley@indiana.edu; Web page: http://php.indiana.edu/~jkirkley

Noriko Hara has recently completed her dissertation on professional communities-of-practice in the Instructional Systems Technology at Indiana University and will soon to be a postdoctoral

fellow in the School of Information and Library Science at the University of North Carolina, Chapel Hill. Her research agenda includes organizational learning, communities-of-practice, and online learning within social informatics. Additionally she designs and develops information architecture for educational Web sites. Her recent publications concern the use of information technologies to support learning environments. Noriko holds a Ph.D. and MS in Instructional Systems Technology from Indiana University. E-mail: nhara@indiana.edu; Web page: http://php.indiana.edu/~nhara

Vanessa Dennen is a Ph.D. candidate in Instructional Systems Technology at Indiana University and a visiting assistant professor at the State University of New York at Buffalo. She teaches both traditional and distance education courses, with extensive use of Web-based conferencing in both formats. Her research interests include computer-mediated communication patterns and the design of Web-based learning environments. In addition, Vanessa is the Director of the Radio-Television-Film Division of the National High School Institute at Northwestern University. She holds an MA in Educational Psychology from Indiana University and an MS in Instructional Design, Development and Evaluation from Syracuse University. E-mail: vdennen@indiana.edu; Web page: http://php.indiana.edu/~vdennen.

References:

Ahern, T. C., Peck, K., & Laycock, M. (1992). The effects of teacher discourse in computer-mediated discussion. *Journal of Educational Computing Research*, *8*(3), 291-309.

Ashton, S., Roberts, T., & Teles, L. (1999). *Investigation the role of the instructor in collaborative online environments*. Poster session presented at the CSCL '99 Conference, Stanford University, CA.

Barrows, H. (1985). *How to design a problem based learning curriculum for the preclinical years.* New York: Springer Publishing Company.

Barrows, H., & Myers, A. (1993). *Problem based learning in secondary schools.* Unpublished monograph. Springfield, IL: Problem based Learning Institute.

Bonk, C. J. (1998, April). *Pedagogical activities on the "Smartweb": Electronically mentoring undergraduate educational psychology students*. Paper to be presented at the American Educational Research Association Annual convention, San Diego, CA.

Bonk, C. J., & Cummings, J. A. (1998). A dozen recommendations for placing the student at the centre of Web-based learning. *Educational Media International*, *35*(2), 82-89.

Bonk, C. J., Cummings, J. A., Hara, N., Fischler, R., Lee, S. M. (In press). A ten level Web integration continuum for higher education. To appear in B. Abbey (Ed.), *Instructional and cognitive impacts of Web-based education*. Hershey, PA: Idea Group Publishing.

Bonk, C. J., & Cunningham, D. J. (1998). Searching for learner-centered, constructivist, and sociocultural components of collaborative educational learning tools. In C. J. Bonk, & K. S. King (Eds.), *Electronic collaborators: Learner-centered technologies for literacy, apprenticeship, and discourse* (pp. 25-50). Mahwah, NJ: Erlbaum.

Bonk, C. J., Daytner, K., Daytner, G., Dennen, V., & Malikowski, S. (in review). Using Web-based cases to enhance, extend, and transform preservice teacher training: Two years in review. Submitted to: *Computers in the Schools (Special Issue: The World Wide Web in Higher Education Instruction)*.

Bonk, C. J., & Dennen, V. (1999). Teaching on the Web: With a little help from my pedagogical friends. *Journal of Computing in Higher Education*, *11* (1), 3-28.

Bonk, C. J., Hansen, E. J., Grabner, M. M., Lazar, S., & Mirabelli, C. (1998). Time to "Connect": Synchronous and asynchronous case-based dialogue among preservice teachers. In C. J. Bonk, & K. S. King (Eds.), *Electronic collaborators: Learner-centered technologies for literacy, apprenticeship, and discourse* (pp. 289-314). Mahwah, NJ: Erlbaum.

Bonk, C. J., Hara, H., Dennen, V., Malikowski, S., & Supplee (2000). We're in TITLE to dream: Envisioning a community of practice, The Intraplanetary Teacher Learning Exchange. *CyberPsychology and Behavior*, *3*(1), 25-39.

Bonk, C. J., & Kim, K. A. (1998). Extending sociocultural theory to adult learning. In M. C. Smith & T. Pourchot (Ed.), *Adult learning and development: Perspectives from educational psychology* (pp. 67-88). Lawrence Erlbaum Associates.

Bonk, C. J., & King, K. S. (Eds.). (1998). *Electronic collaborators: Learner-centered technologies for literacy, apprenticeship, and discourse*. Mahwah, NJ: Erlbaum.

Bonk, C. J., Malikowski, S., Angeli, C., & East, J. (1998). Case-based conferencing for preservice teacher education: Electronic discourse from the field. *Journal of Educational Computing Research, 19*(3), 269-306.

Bonk, C. J., Malikowski, S., Angeli, C., & Supplee, L. (1998, April). *Holy COW: Scaffolding case-based "Conferencing on the Web" with preservice teachers*. Paper presented at the American Educational Research Association (AERA) annual convention, San Diego, CA.

Bonk, C. J., & Reynolds, T. H. (1997). Learner-centered web instruction for higher-order thinking, teamwork, and apprenticeship. In B. H. Khan (Ed.), *Web-based instruction* (pp. 167-178). Educational Technology Publications.

Bonk, C. J., & Sugar, W. A. (1998). Student role play in the World Forum: Analyses of an Arctic learning apprenticeship. *Interactive Learning Environments, 6*(1-2), 1-29.

Bridges, E., & Hallinger, P. (1992*). Problem based learning for administrators.* ERIC Clearinghouse on Educational Management.

Cummings, J. A. (1998, April). *Promoting academic discourse with the web*. Paper to be presented at the American Educational Research Association Annual convention, San Diego, CA.

Cummings, J. A., Bonk, C. J., & Jacobs, F. R. (in review). Twenty-first century syllabi: Dynamic tools for promoting interactivity. Submitted to: *Educational Researcher.*

Dennen, V., & Bonk, C. J. (in review). *Cases, conferencing, and communities of practice: A qualitative study of online mentoring for preservice teachers.*

Duffy, T. M., Dueber, W., and Hawley, C. (1998) Conferencing on the Web: Supporting collaborative problem solving. To appear in C.J. Bonk and K. King (eds.) *Electronic collaborators: Researching the discourse of learner-centered technologies* (pp. 51-78). Englewood, NJ: Lawrence Erlbaum Associates.

Finkle, S. & Torp, L. (1995). Introductory documents. (Available from the Center for Problem-Based Learning, Illinois Math and Science Academy, 1500 West Sullivan Road, Aurora, IL 60506-1000.)

Hara, N., Bonk, C. J., & Angeli, C., (2000). Content analyses of on-line discussion in an applied educational psychology course. *Instructional Science, 28*(2), 115-152.

Hara, N. & Kling, R. (in press). Students' distress with a web-based distance education course. Information, Communication & Society.

Harasim, L., Hiltz, S. R., Teles, L., & Turoff, M. (1995). *Learning networks: A field guide to teaching and learning online*. Cambridge, MA: MIT Press.

Kirkley, J. R. (1999). *Supporting professionals at the graduate level*. Unpublished manuscript. Bloomington, IN: Indiana University.

Kirkley, J. (in preparation). Guidelines for problem based learning in a distance education. Bloomington, IN: Indiana University.

Kirkley, S. E., Savery, J. R., & Grabner-Hagen, M. M. (1998). Electronic teaching: Extending classroom dialogue and assistance through email communication. In C. J. Bonk, & K. S. King (Eds.), *Electronic collaborators: Learner-centered technologies for literacy, apprenticeship, and discourse* (pp. 209-232). Mahwah, NJ: Erlbaum.

Koschmann, T. D. (1994). Toward a theory of computer support for collaborative learning. *Journal of the Learning Sciences*, *3*(3), 219-225.

Koschmann, T. (1996). *CSCL : Theory and practice of an emerging paradigm*. Mahwah, N.J.: Lawrence Erlbaum Associates.

Murray, B. (2000, April). Reinventing class discussion online. *Monitor on Psychology*, *31*(4), 54-56.

Owston, R. D. (1997). The World Wide Web: A technology to enhance teaching and learning? *Educational Researcher*, *26*(2), 27-33.

Riel, M. (1993). Global Education through learning circles. In L. Harasim, (Ed.). *Global Networks*. Cambridge, MA: MIT Press.

Rowley, D. J., Lujan, H. D., & Dolence, M. G. (1998). *Strategic choices for the academy: How demand for lifelong learning will re-create higher education.* San Francisco: Jossey Bass.

Tharp, R., & Gallimore, R. (1988). *Rousing minds to life: Teaching, learning, and schooling in a social context*. Cambridge, MA: Cambridge University Press.

University of Delaware (1999). URL: http://www.udel.edu/pbl/

Walther, J. (1996). Computer-mediated communication: Impersonal, interpersonal, and hyper-personal interaction. *Communication Research*, *23*(1), 3-43.

Weedman, J. (1999). Conversation and community: The potential of electronic conferences for creating intellectual proximity in distributed learning environments. *Journal of the American Society for Information Science*, *50* (10), 907-928.

WisdomTools, Inc. (1998). Time Revealed Scenarios. http://wisdomtools.com.