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Teach to Learn—The Next Big Thing*

E-learning is at a crossroads.

Now that distance learning has lost its luster as a quick fix for shrinking budgets and faculty have settled in to minimalist uses of popular course management packages like BlackBoard and WebCT, it is difficult to see how e-learning is positioned to do anything revolutionary in higher education.

The E-Learning Time Barrier

There is a compelling reason why e-learning, as a tool for enhancing the depth and breadth of university curricula, has stalled in higher education. Time.

It has been estimated that teaching online requires anywhere from 20% to 250% more faculty time than teaching in a traditional face-to-face environment—with the more credible estimates approaching the higher end of the spectrum. There are a number of variables that impact such estimates. Course design, the instructor's familiarity with the course and the degree of instructor participation will obviously impact the relative drain on faculty time and energy. Obviously class size is also a critical variable. In this respect, it is noteworthy that the University of Phoenix's online programs cap their classes at ten students. Can you imagine a traditional public or private institution adopting such a cap on class size—particularly in an era of state budget cuts and depressed endowment income?

Blended or web-enhanced models that combine e-learning with the face-to-face classroom can significantly reduce the time sink of online learning, but this brings us into the murky territory of what we mean by the "web-enhanced classroom." Does this mean merely that papers are deposited in electronic drop boxes and students can take practice exams and see their grades online? If that qualifies as web enhancement, then, from a pedagogical standpoint, what's the big deal? If web-enhancement is understood more generously to include the participation of faculty and students in threaded discussions or chat interactions, there may be a meaningful pedagogical payoff, but only at the expense of increased faculty time.

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What is the source of this time drain? Some speculate that it is due to shortcomings of our course management systems (e.g., pages loading too slowly) and others place the onus on the upfront investment in course design, graphics and the like. It may also be that faculty do not accurately account for all of the time that they put into the production of a traditional face-to-face course, thereby exaggerating the perceived time requirements of online instruction. While all of these are contributing factors, breaking the e-learning time barrier will require us to confront the "dark side" of e-learning (which is also its signal strength)—the increased opportunities for meaningful participation by students.

It may seem crazy to think student participation has something that has a "good news/bad news" dimension to it. But take, for example, a traditional face-to-face class of thirty students. How long it would take to cover the material contained in a standard fifty-minute lecture if everyone in the class spent 2½ minutes commenting on the material and had the further option of asking the instructor a question? With the assumption that each of these student commentaries are 2½ minutes each, including the white space between them, if only one-third of the students elected to ask a question, and if we put a strict 2½ minute time limit on the professor's response to each of the 10 questions, our 50 minute class would balloon to 2½ hours. Fifty minutes to 2½ hours! That's the difference that real class participation makes—something that can be genuinely realized in an online environment, but not without a potentially large chunk of professorial time.

Somehow we must find a way to break the e-learning time barrier without compromising the opportunities for deep learning that collaborative Internet technologies make possible. It is difficult to envision how e-learning will be widely adopted throughout the hallowed halls of the academy if we cannot make progress on this front. Why should faculty voluntarily place precious time for research and writing at risk by departing from timeworn tools of the trade? This is a classic deal breaker! Indeed, it is telling that the most widely adopted uses of technology in education—the ubiquitous PowerPoint presentation and e-mail—allow faculty to do what they have always done (lectures and communicating with students outside of class) with greater efficiency and effectiveness.

The Holy Grail of Computer Simulations

Computer simulations that create immersive learning environments for students represent a creative way to facilitate deep learning without placing increased demands on faculty time. Roger Shank, Joel Foreman, and Clark Aldrich have each made compelling arguments for the worth of computer simulations and game-based pedagogies in higher education.[1]

Think of how much more engaging the process of learning would be if we had something like the equivalent of a Boeing 767 flight simulator for introductory courses in

[1] See Roger Shank, *Designing World-Class E-Learning* (McGraw-Hill, 2001); Joel Foreman, "Next-Generation Educational Technology Versus the Lecture" (*EDUCAUSE Review*, July/August 2003, pp. 12-22); and Clark Aldrich, *Simulations and the Future of Learning* (Pfeiffer, 2004).

biology or chemistry, or economics or psychology? Sure, we do have something like this in virtual chemistry or physics labs that are designed to simulate chemical reactions or illustrate the laws of physics, as well as some interesting simulation programs designed to enhance decision-making skills in business strategy and organizational development. But do these tools even come close to the sophistication and elegance of a genuine flight simulator (or, for that matter, Grand Theft Auto)? No. At least, not yet.

The financial and technical resources needed to create truly engaging and realistic simulation programs are immense, particularly when Sony's PlayStation or Microsoft's XBox—not BlackBoard or McGraw-Hill—set the standard for graphical realism. The touchstone for success in such simulations is enough complexity to assure a high probability of failure . . . and, most importantly, the ability to learn from failure.

A further problem with computer simulations concerns the teaching of higher order skills. It is one thing to design a simulation program to teach customer service personnel how to handle an irate customer, quite another to use it as a tool for teaching critical thinking. With sufficient creativity and funding, I believe the latter can also be done, but then there is always the problem of the revised edition: How do you ensure a sustainable revision cycle that keeps up the explosion of new knowledge and routinely incorporates new developments in technology, particularly as virtual reality technologies come into their own in the years ahead? Despite their complexity, commercial flight simulators are based on a relatively limited subset of cockpit designs and flight characteristics. Think of how this compares with the doubling-rate of knowledge. We really have no way to know what this rate is for sure, but it has been estimated to be in the vicinity of every five years or so. The problem of the next revision becomes all the more acute in light of the likelihood that the era of doing more with less is here to stay for colleges and universities.

Rethinking the Lecture

One basic fact of life cannot be escaped in grappling with pedagogical reform—our love affair with the lecture.

Now, I've never been a fan of the lecture format. It has always seemed like a necessary evil to me as I enjoy the give-and-take of classroom discussions. That said, I have my doubts about the willingness of educators to part company with the lecture format. The lecture, after all, is a highly efficient medium to convey information, despite common misgivings about its effectiveness. There is also some degree of professorial satisfaction associated with holding forth in the classroom—perhaps rooted in the vicarious parental satisfaction of telling the next generation "how it is" and actually being able to get away with it.

Yet, we all know that real learning does not take place by sitting within earshot of a mind dump and taking notes. Authentic and enduring learning requires a profound interaction with content, as James Zull emphasizes in his fascinating book, *The Art of Changing the Brain* (Stylus, 2002). Even professorial digressions—done successfully—help students to draw connections between one concept or knowledge domain and another, usually being more memorable than whatever happens to be on center stage in the lecture.

But there is an interesting anomaly associated with lectures. For those taking notes, lectures may be poorly suited to the task of learning, but not for the person giving the lecture. A tremendous amount of learning takes place in preparing for and giving a lecture. Most of us can affirm without reservation the truth that "you really don't know something until you have had the chance to teach it." Unfortunately, we know next to nothing about this from empirical studies, even though some have claimed that we retain 95% of what we teach, compared with 10% of what we read and 50% of what we see and hear. But if good data were available, they would likely confirm the immense learning payoff associated with teaching others.

The practice of teaching emphasizes four activities that extend our mastery of knowledge domain: (1) the organization of content; (2) the articulation of content; (3) reflection on that content through questions and digressions; and (4) the reorganization of the content to make it more accessible and relevant. It is not unlike the process used by students who prepare for tests by reorganizing and rewriting their lecture notes, except that teaching is a whole lot more satisfying. Indeed, one of the prime sources of satisfaction in teaching is the sense that one is doing something useful to help others and participating in an interactive process of knowledge building and empowerment.

The lecture is only an obstacle to real learning if we think of it as a shipping crate for information, with its value rooted in the expectation that some item contained therein may be on the exam. Within the context of collaborative, peer-to-peer software, the lecture can be a dynamic tool for learning and discovery. More importantly, it can serve as a springboard for developing the habit of formulating and articulating critical assessments within collaborative environments. I call this revaluation of the worth of the lecture in a digital age "teach to learn."

The Teach-to-Learn Model

To dub teach to learn as the "next big thing" may well be a case of irrational exuberance on my part, but I do believe that this is the next generation of e-learning.

I began to think about the teach-to-learn model while reading Howard Rheingold's captivating book, *Smart Mobs: The Next Solution Revolution* (Perseus, 2002). Rheingold recounts an experience in March of 2000 that got him to think that the world was about to undergo a fundamental change.

He calls that moment of insight his Shibuya Epiphany, after the Shibuya crossing in Tokyo, where 1500 people cross an intersection from eight directions every time the light turns green. What was this epiphany? Seeing hundreds of Japanese youth staring at their cell phones while they were weaving their way, with exquisite coordination, across this busy intersection, led him to wonder what strange social ritual was going on here? They were, of course, texting. This got him thinking about the long-term social impact of wireless technologies. And, as Rheingold soon discovered, Short Message Service (or SMS messaging) not only was being used to arrange dates but also possessed the power to topple political regimes—the most dramatic case being the overthrow of the legendarily corrupt, former president (and movie-star) of the Philippines, Joseph Estrada, on January 20, 2001.

We have become accustomed to thinking about online events within a "trading documents" paradigm that emphasizes media richness and ease of navigation over more intimate and unstructured experiences of interactivity and connectivity. Both the blog (short for "web log") and the instant message represent more powerful and profound tools for interactivity, emphasizing the values of immediacy and intimacy. Indeed, the stunning success of blogs within Howard Dean's campaign, as well as the high utilization of IM among teenagers, points to this fundamental human desire for connection.

The teach-to-learn model is built around four core propositions:

- Discovery and discernment are critical learning activities.
- Collaborative learning flourishes on problem-based pedagogies that focus on studied ambiguity and degrees of difficulty—not divisions of labor.
- Every presentation/lecture should have at least one informed respondent.
- The ability to distinguish among levels of competency (through rubric-based assessment) is a principal learning outcome.

First, experiences of discovery are invitations to deep learning. Whether such experiences take the form of invention, insight, seeing new landscapes (e.g., recognizing new found abilities, perceiving connections) or seeing familiar landscapes in new ways (e.g., playful reflection), their impact on the learner is to open new horizons and to develop the habit of curiosity. But discovery without discernment (i.e., assessing the significance and the relevance/applicability of new insights) is of limited value. Therefore both should be taken together.

Second, collaborative learning thrives on problem-based curricula that require students to grapple with ambiguous and difficult dilemmas. Too often the value of collaboration is thought in terms of a division of labor, instead of leveraging diverse expertise and perspectives to cope with difficult challenges. Professors play a key role in defining for students which problems or issues are of low, moderate or high difficulty with respect to a particular knowledge domain and curricular level. Most online courses, unlike video games, do not have more than one level of difficulty—and that level is usually achieved with modest effort on the part of the learner. Imagine how successful a video game would be if a novice player could reach "level 10" in the first one or two tries!

Third, informed respondents are key educational resources. Presenters and respondents have an equally important role within the teach-to-learn model. Student presentations that are given without the benefit of an appointed respondent deprive students of meaningful opportunities to model critical thinking. The core strength of a peer-to-peer (P2P) architecture in this regard is the ability to create "massively parallel" mini-classrooms, in which presenters or participants in one group can sit in on the presentations of other groups—either to serve as respondents for that group or to prepare for a respondent role for their own group. In this manner, students have ample opportunity to hone their skills in critical thinking and dialogue—not only by comparing the performance of other groups with their own, but also by gaining practice in offering tactful and constructive criticism.

Fourth, the teach-to-learn model relies strongly upon the use of rubric-based assessment to distinguish among levels of competency. Rubrics are criteria by which students can judge their own work and the work of others—a way to operationalize levels of competency[2]. The great value of rubrics is that these assessment criteria are public and provide a helpful way to reinforce expectations for student performance and to benchmark one's own progress on skill development.

Critical Scenarios and Climbing Expeditions

In the computer world, there is perhaps no other human being who has given more thought to online collaboration than Ray Ozzie. Beginning with his work on Plato Group Notes in the late 1970s to the introduction of Lotus Notes in 1989 to the release of Groove in 2001, Ozzie has been offering creative and productive answers to the question: How can we effectively collaborate in online environments?

When Groove Networks was founded in late 1997, Ozzie envisioned a new genre of software, which he called "pairware," that would allow people to collaborate with one or two other individuals on an ad hoc and effortless basis. After working for over three years in stealth mode, the product that Ozzie envisioned was released as Groove (www.groove.net). According to a review in *InfoWorld* (February 14, 2003), "What the Groove Workspace has delivered . . . is a seamless and comprehensive environment for collaboration. It defines what Microsoft and Apple will be lucky to achieve by 2006." It is not insignificant that the U.S. military is using Groove to help coordinate the humanitarian efforts of relief and development agencies within the austere environment of post-war Iraq.

Groove is a P2P application that links individual computers without the bottleneck of a central server (a relay server is involved to transfer information when one or more parties to a Groove workspace are offline). Students can see who else is online, create workspaces, co-edit documents, present PowerPoint presentations, and facilitate online conferences (using voice or text)—all without the assistance of technical staff (or professors). Inviting others to a Groove workspace is as simple as double-clicking on an e-mail attachment or sending an invitation through the Groove Network. And security within Groove is rock solid—192-bit security with always-on encryption (admittedly overkill for most academic applications). There are no server-related costs associated with Groove (as they supply the relay server), and the academic price of the professional edition of Groove (which normally sells for $149) is the cost of a modestly priced textbook ($59), and considerably lower institutional rates are available. Furthermore, the P2P structure of Groove offers schools the opportunity to "relocate" their current client-server course management systems within a profoundly collaborative framework (e.g., integrating BlackBoard or WebCT within the Groove workspace). The Naval Postgraduate School in California is currently implementing such a hybrid framework.

Figures 1 and 2 show examples of two knowledge rooms (or mini-classrooms) configured as a Groove workspace—the Situation Room and Expedition Hall, respectively.

[2] See Mary Huba and Jann Freed, *Learner-Centered Assessment on College Campuses* (Allyn and Bacon, 2000).

The Situation Room is configured for an unfolding scenario that has two or more phases that are unveiled according to an established timetable. Three or four students are required to develop a "solution" collaboratively for each phase of the scenario and to offer a PowerPoint presentation (or text-based presentation) that is critiqued by students from other groups, who are working on the same phase of the scenario (see Figure 3). One interesting feature of the Situation Room is a hotline component (see Figure 4) that would allow instructors to prepackage web-based content and allows the group to explore these web sites together (using either voice or text-based chat for commentary).

The Expedition Hall is designed to supplement in-class lectures and course readings by having students conduct an in-depth exploration of a disciplinary problem, the cross-disciplinary application of knowledge in one field or domain to another, or the overall social and ethical relevance of disciplinary insights to the world at large. Each student is assigned to a climbing expedition (i.e., a topic for in-depth exploration), with the degree of difficulty suited to the challenge of the summit. Assuming the use of multiple expedition halls per course, students would have the opportunity to rotate among less difficult and more difficult assignments throughout the course, and provision for climbing (or peer) assists in tackling the more difficult summits.

In this example, the summit choices range in difficulty from Rainier to Denali to Everest. Each base camp (see Figure 5) specifies the topic to be researched and is equipped with a "laptop" with satellite connectivity (a web browser), and an expedition journal for a text-based presentation or hosting a PowerPoint presentation (see Figure 6). These presentations would be given to members of the group and also to outside guests who are preparing to serve as respondents for their home groups. In this way, a respondent in one's home group is required to sit in on a presentation in another group to be better informed about the topic and to be able to note helpful comparisons between the two presentations and their respective research strategies.

What role do instructors play in the teach-to-learn model? Due to the logistics of providing the first presenter with a respondent, the professor would need to serve as a respondent for at least one group. From there, instructors could participate on a highly selective basis, perhaps focusing on groups that do not seem to be performing as well, as indicated by the assessment rubrics and the content of asynchronous text-based presentations or PowerPoint slides.

The potential of the teach-to-learn model in building learning communities and extending skills in knowledge management is immense. It may be that the ultimate contribution of e-learning will be to democratize the teaching concept, emphasizing themes of empowerment and opening up new horizons for profoundly collaborative and collegial learning. The greatest honor that we can bestow upon our students is to let them know that they have something to teach us. It would be difficult to conceive of a more important message for contemporary higher education.

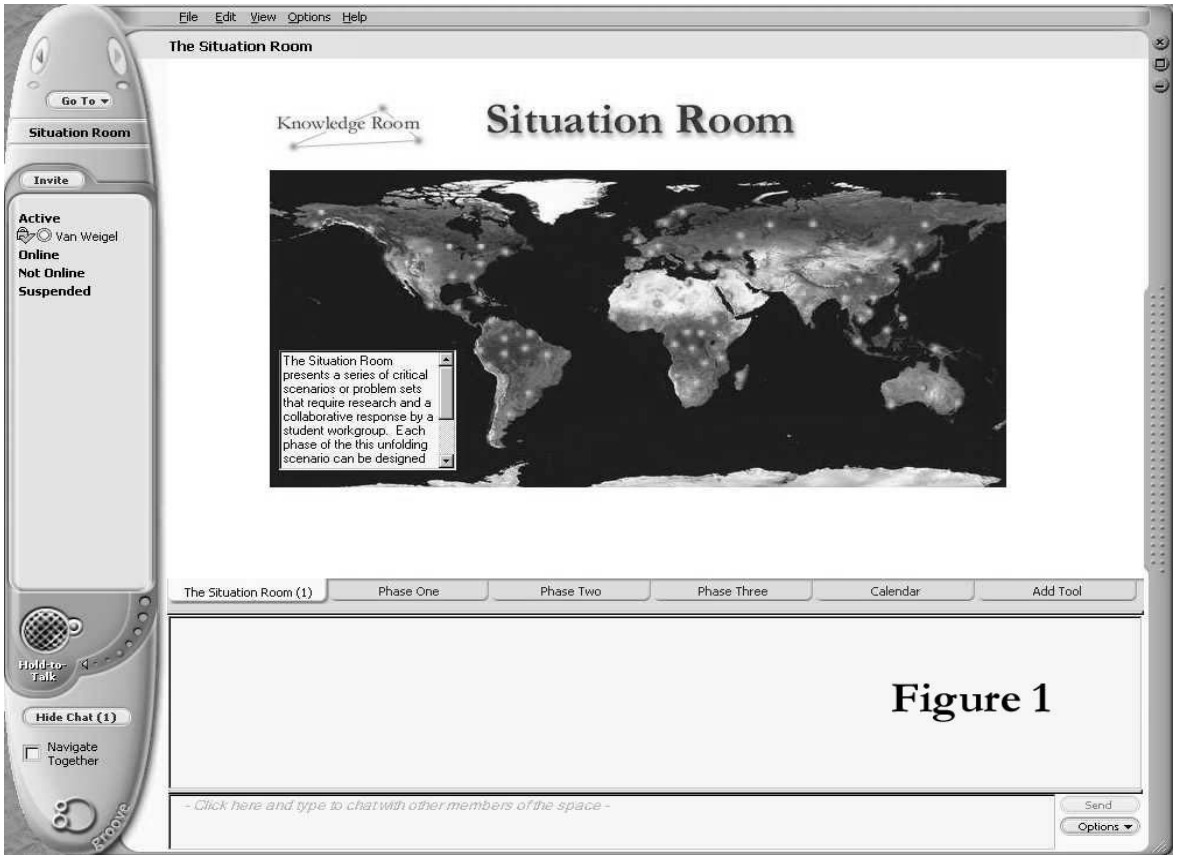


Figure 1

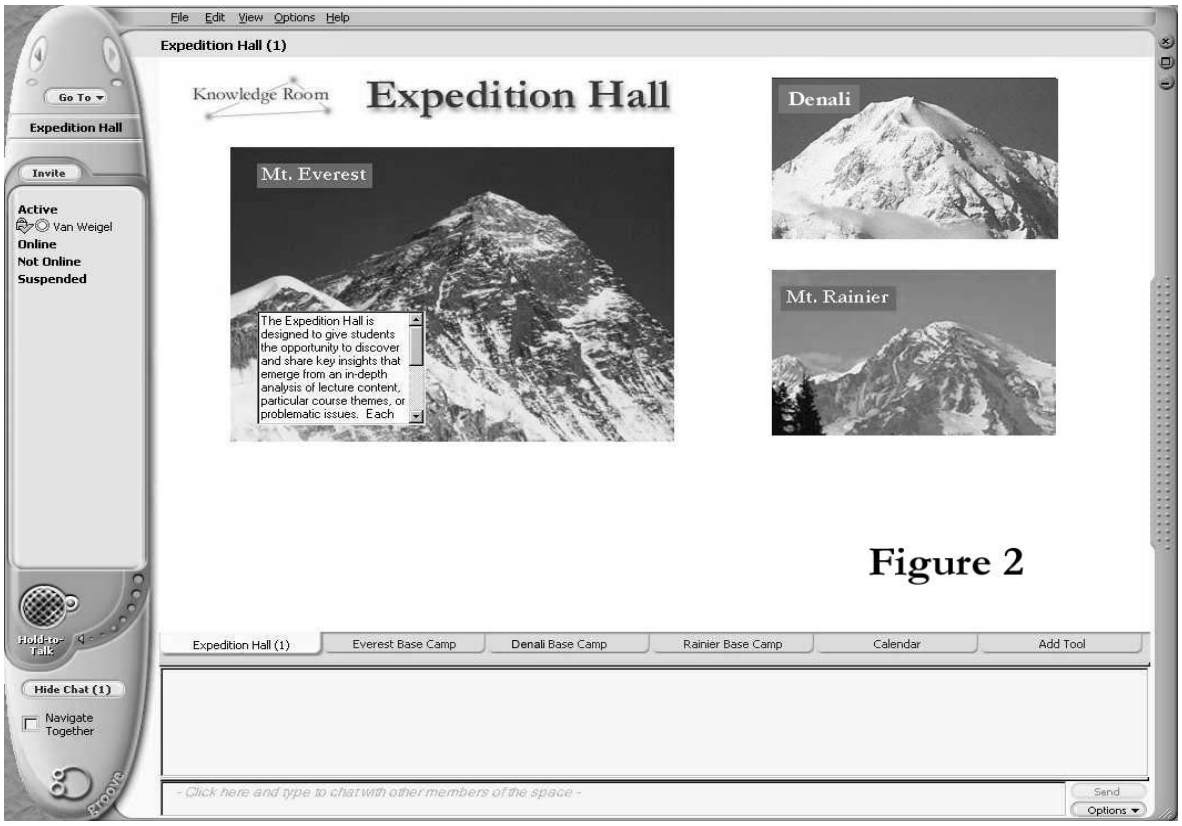
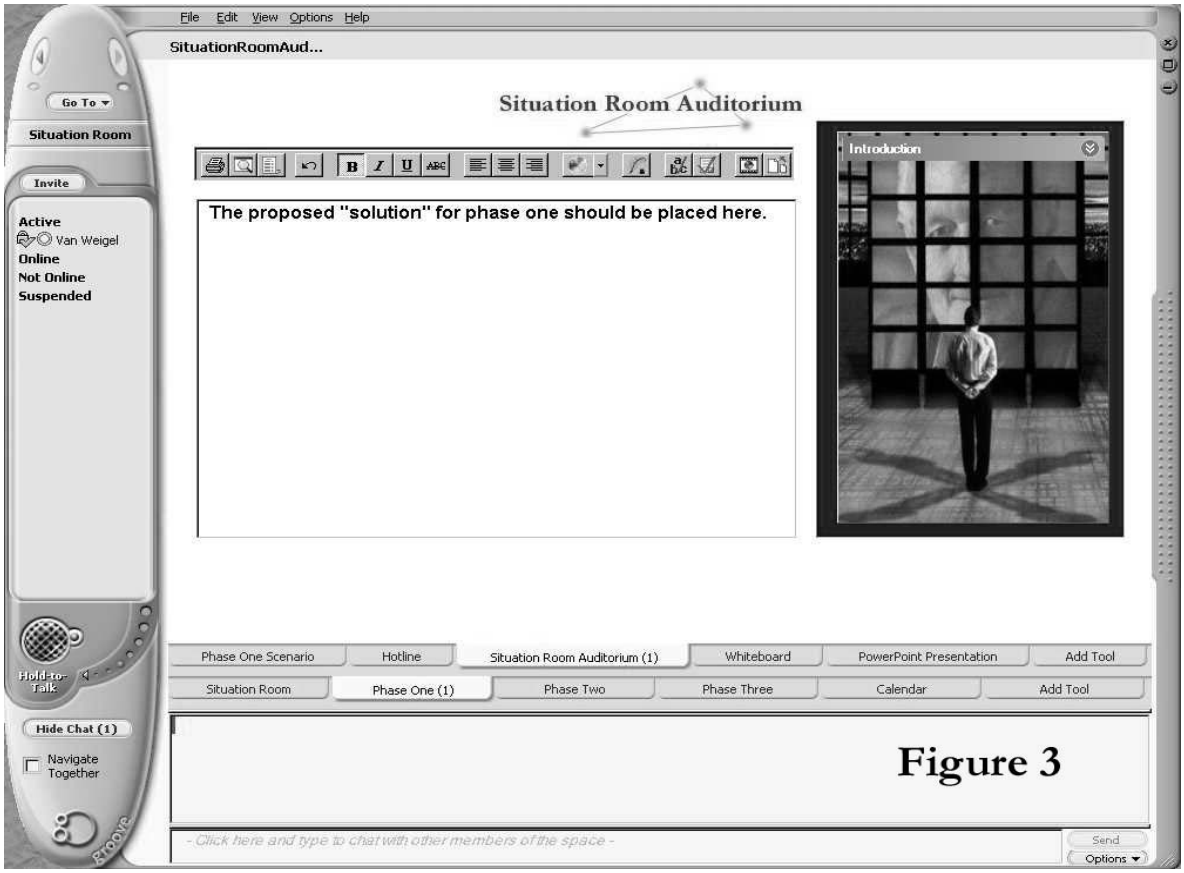


Figure 2



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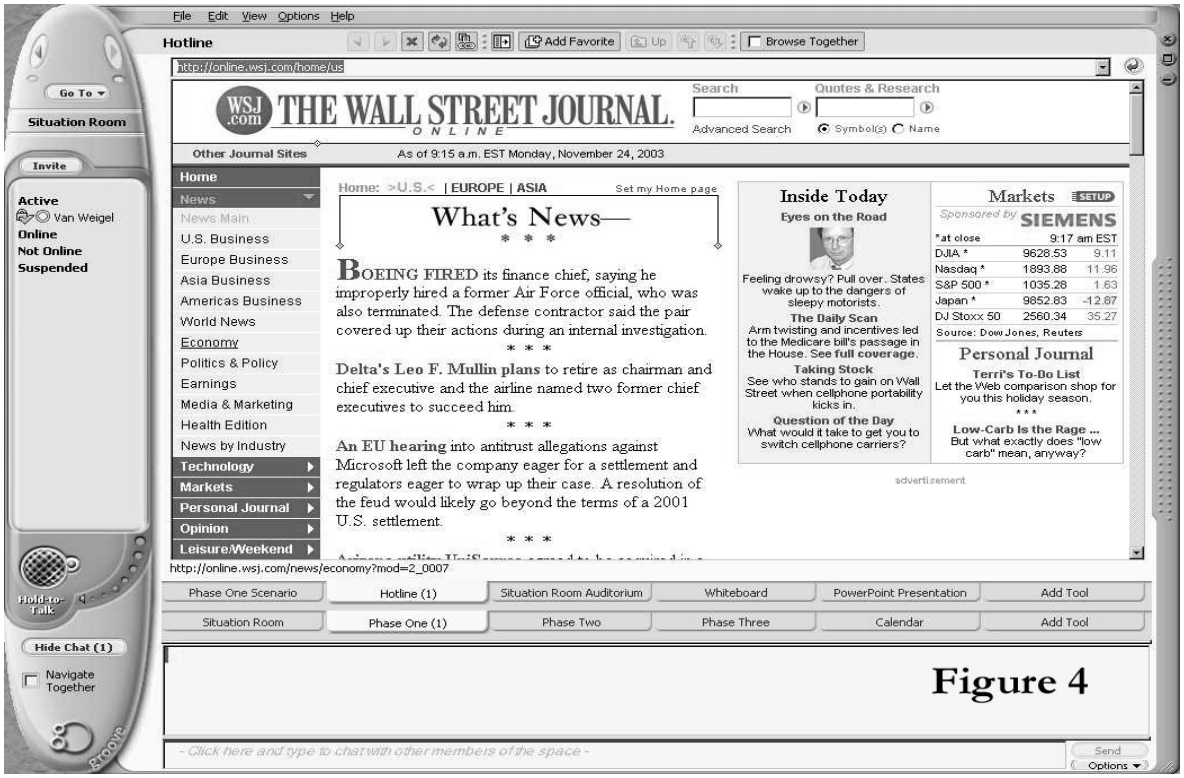

Figure 4

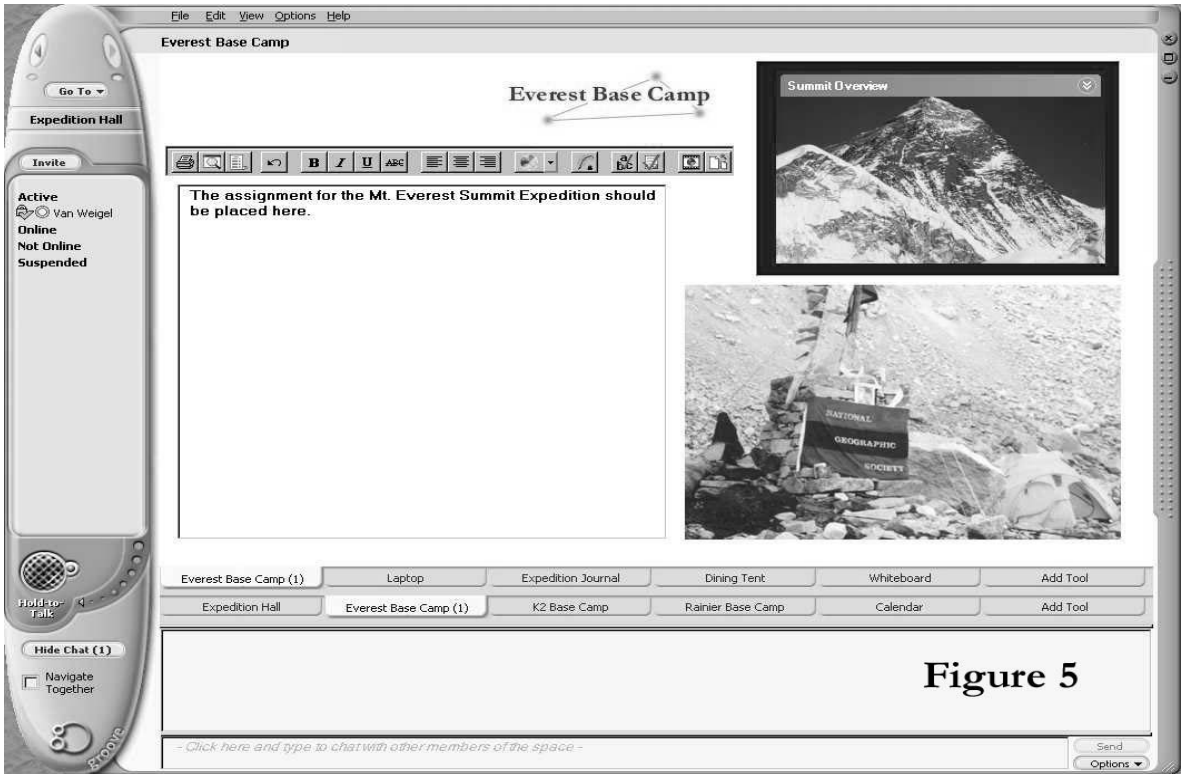

Figure 5

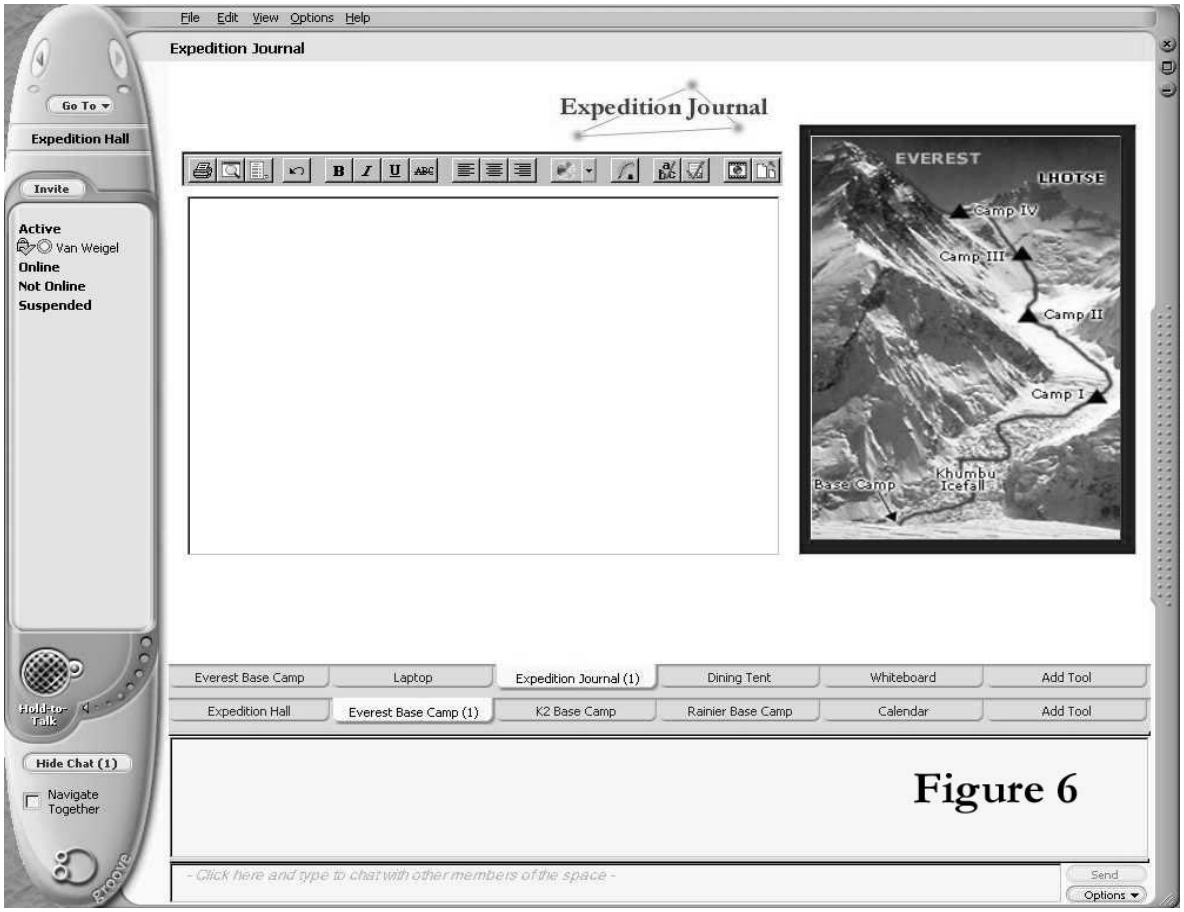

Figure 6