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ABSTRACT

This descriptive study has two phases. The first phase describes the mechanism for online collaboration. The second phase quantifies collaborative interaction. The coding design was partially based on ProjectH, a research study from 1992-94 involving a large number of collaborators from several countries who worked together to study worldwide collaborations on the Internet. This study looks in depth at the interaction of ten graduate students, enrolled as Internet-based students in a course at Southwest Texas State University, who communicated through the German-based system, Basic Support for Collaborative Workstation (BSCW) during September, 1998. E-mail messages from Internet-based students were also coded. Specifically, the study focused on the following questions: (1) How many students from the Internet-based class participated in the BSCW system? (2) Do some students use the system more frequently than others in a one-month period? (3) What were the e-mail variations? (4) What were the basic problems students had related to the BSCW system? (5) Were students satisfied with the course? and (6) By the end of the course, what were the variations of participation in the BSCW system? Final observations were made regarding student interactions throughout the course. (Author/AEF)

A Qualitative and Quantitative Evaluation
Innovative Use of Internet Based Collaboration

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Abstract

The descriptive study has two phases. The first phase describes the mechanism for on-line collaboration. The second phase quantifies collaborative interaction. The coding design was partially based on ProjectH, a research study from 1992-1994 involving a large number of collaborators from several countries who worked together to study world wide collaborations on the net. Sheizaf Rafaeli, Hebrew University of Jerusalem, Israel and Fay Sudweeks, Key Centre of Design Computing, University of Sydney, Australia coordinated ProjectH. This current study looks in depth at the interaction of ten graduate students who communicated through the German based system, Basic Support for Collaborative Workstation, (BSCW) during one month, September, 1998. E-mail messages from Internet based students were also coded. Final observations were made regarding student interactions throughout the course.

Introduction

The German National Computer Research Centre provided the collaboration system used in this study as a public service. The system is called "Basic Support for Collaborative Work" (BSCW). Version 2 of the BSCW Shared Workspace System has won first prize in the European Software Innovation Prize 1996. The BSCW system enables collaboration by providing shared workspaces over the Internet. The BSCW supports document uploading, event notification, group management and much more. To access a workspace only a standard Web browser is needed. A shared workspace allows storage and retrieval of documents and sharing information within a group, which is defined by the user. This functionality is integrated with an event mechanism, as an e-mail web report or icon based link, to provide each user with an awareness of the activities of others within the workspace. On-going innovations continue to make this system highly supportive of educational collaboration. The BSCW developments have been partially funded by the European Union through the Coop WWW project and the CESAR project of the EU's Telematics Applications Programme. Partners of these projects contribute to the development of the system. BSCW is maintained and developed by the BSCW project group at German National Research Center for Information Technology (GMD) and the Institute for Applied Information Technology (FIT). FIT is a research unit of GMD, Germany's national research center for information technology and has a staff of about 70 researchers.

Evaluation Questions

The BSCW is complex and many different types of questions could be explored. This study focused on these six:

1. How many students from the Internet class participated in the BSCW system?
2. Do some students use the system more frequently than others do in a one-month period?
3. What were the e-mail variations?
4. What were the basic problems students had related to the BSCW system?
5. Were students satisfied with the course?
6. By the end of the course, what were the variations of participation in the BSCW system?

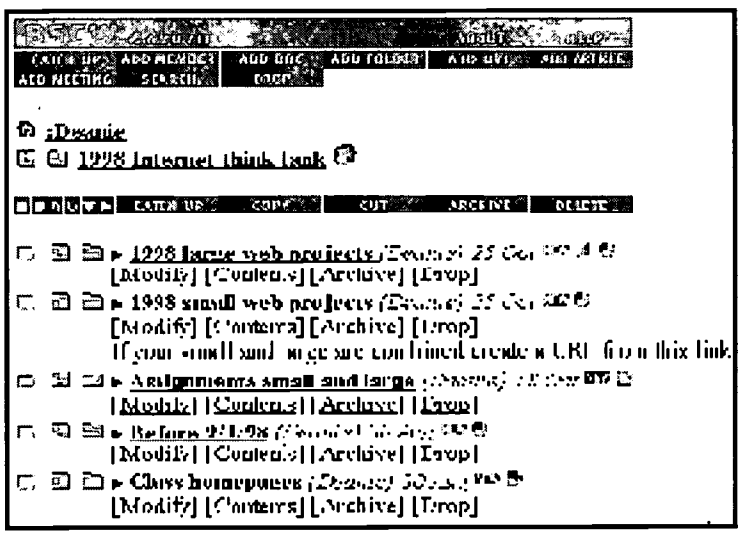
Data was analyzed according to five units of analysis: daily reports from the BSCW administrative system, individual e-mail messages, department student satisfaction ratings, a student survey and a focus group with the small San Antonio learning pod.

Description of the BSCW system

Figure 1. illustrates a collaborative workstation composed of folders that are the actual work areas of the system. There is a "Catch Up" button to find out what was missed since the last visit. The "Add Member" button allows you to invite others to your workspace. Documents of many different types can be added to the system. i.e. Word, Excel, Power Point, HTML and others. The "folder button" allows new workspace. "Add Article" allows exchange of information as a bulletin board system. The faces link to all the members of the workspace. While in the member's section, it is possible to send group e-mail to everyone or selected individuals in the group.

Each individual has a workstation identified by personal name at the top. Shared folders, containing information, become the collaborative "workstation" for the group. This group chose the name, "1998 Internet Think Tank". There are many sub folders within the group. The first folder contains articles as bulletin board threads, which were provided by the professor. Threads included: Confused...please help; Have an idea; Disappointments and Frustrations; Want an answer; and Did you really like something? These phrases triggered varied responses from the students. Archived information was provided in a separate folder for students to use as background information.

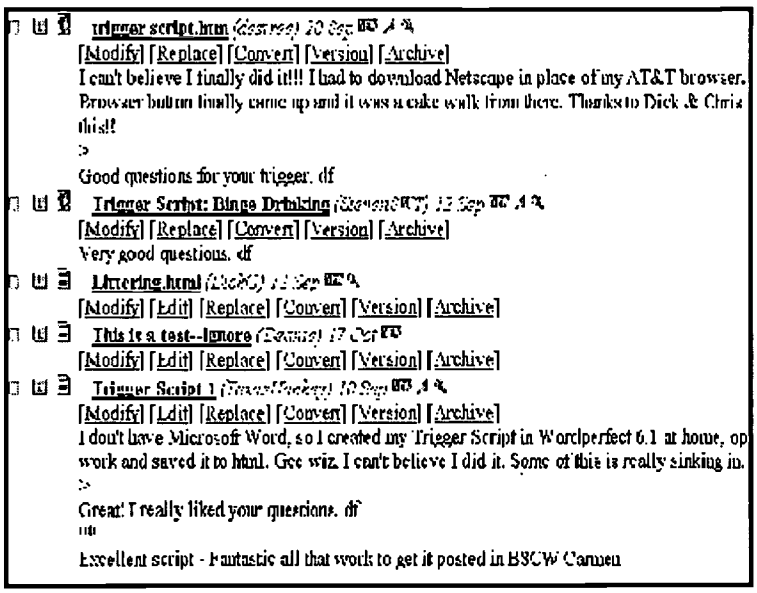
Figure 1. A Collaborative Workstation



Not all information has to be within the BSCW system, URL links can provide different types of information for access. The professor and students can add an unlimited number of links to related sites. The emphasis at the beginning of the course was to provide personal connections among students; therefore, students used a simplistic program for homepage development. Two basic sites, were used for developing these easy home pages: Free Yellow (http://freeyellow.com) and "The Express Page" (http://www.expage.com/). The media web site is the basic course manager for students. It includes fourteen different information sites including links to the course syllabus, course due dates, grading information, directions for getting on the BSCW, and tutorials. Any information stored in the BSCW is password protected and only members can access the information. However, the Web page with all related course information can be publicly accessed. (http://WWW.SWT.Edu/~df12/media/media.htm)

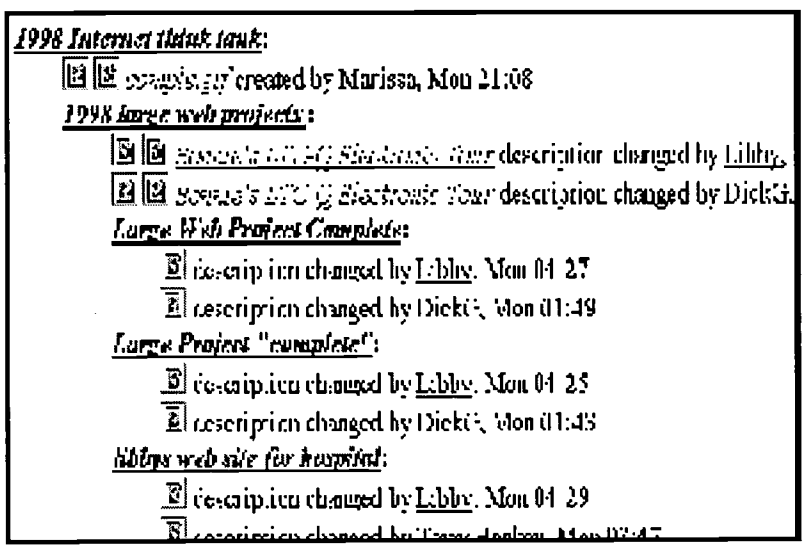
The students and the professor can all view the same documents at different times from their personal computer and see the remarks provided by different individuals. These comments provide feedback to the individual student, as well as, help other students with ideas and suggestions to improve their own work. The products are criterion referenced with acceptance or non-acceptance according to pre-stated criteria, so there is no grade competition for this portion of the course.

Figure 2. Peer and professor feedback



As soon as students create a new document and upload it to the BSCW, other students and the professor can simultaneously assess it for review. Individuals are sent an e-mail report for all the new events which have occurred during the last 24-hour period. Figure 3, depicts how the professor and students all know when and where new hyperlinked activity can be found.

Figure 3. Daily Report from the BSCW system



Reliability

Reliability standards were based on ProjectH methodology. Reliability assesses the degree to which variations in data represent real phenomena rather than variations in the measurement process. Two raters for the same data helped establish reproducibility of the results. Independence among coders was maintained. To ensure autonomy, coders were discouraged from discussing coding problems with each other. There was agreement of ratings between

the coders for BSCW activity. However, there was wide variability in the coding of e-mail categories; thus the experienced senior ProjectH researcher did the final coding of the e-mail. Difficulty in coding e-mail messages was due to the complexity and length of messages.

Group Process

This Internet section evolved as a request from six San Antonio students who wanted to take the traditional San Marcos classroom HHR 5332 Media course as an Internet based course. The group evolved from students who were enrolled in a traditional class with Dr. French in San Antonio, which was augmented with self-directed Internet based features. Two students who were not part of this original class became a part of the San Antonio group through word of mouth. Later other students from San Marcos and Austin heard about the course and asked to join. The guidelines for being in the first graduate Internet based media class included: 1.) Having had Dr. French as a professor in another class, which provided self, directed learning skills and mastering on-line modules concepts, 2.) Willingness to work collaboratively, 3.) Commitment to make the process work or 4.) Permission of the professor.

The San Antonio learning pod met as a group with the professor once before the class started in San Antonio. It appeared that the group would have sufficient skills within the pod to help each other meet class goals. As the semester progressed, one student, who was to act as a key leader dropped the course due to work and personal responsibilities. Two students worked primarily independently. One of these students who worked independently helped other students through telephone calls. Three students who I will refer to as the small pod (SP) became The remaining students who were not part of the SP group worked though the BSCW, e-mail, attended optional class lectures, and participated in optional open labs. This class expanded into a total of ten students.

Use of the BSCW System

During the first month of September, 80% of the students were participating. After the class was over, a focus evaluation session was held, and the SP group revealed that they had found a "backdoor" (using a URL to by-pass the sign-in section) to the BSCW system and tended to view the information as a group rather than log-on as three separate individuals. It is impossible to determine their activity in the BSCW. Their final projects were submitted as hard copy or on disk; thus, the SP group found a way to avoid the BSCW for about 75% of the course. Two of the SP group had major computer problems, which affected their early attempts and attitudes toward integration with the system.

Frequency of Use by Individual Student

Eighty percent of the students participated in different types of events such as reading, creating, deleting, renaming, replacing and changing descriptions. The range of "events read" was 18-59, with a mean of 25. Seventy percent of the students participated in the system by "creating events". The range was 2-15 with a mean of 6. Four percent "deleted items" from the system. The range was 2-10 with a mean of 6. Ten percent "renamed documents" with a range of 1-2. Thirty percent "replaced documents" with a range of 2-4 and a mean of 3. Forty percent "changed descriptions" of the documents by entering comments, which related to a document in the system as a form of peer review and support. The range was 1-9 with a mean of 5. Twenty percent of the students were recorded as not contributing or participating in the BSCW.

Analysis of e-mails sent to the professor in September.

All but one student sent e-mail to the professor the first month. A total of sixty-three messages were received. The number of messages received from individuals ranged from 1 to 20. Eighteen messages indicated confusion or frustration. Most of the messages were a mixture of questions and sharing of information. Two students had the professor in a different course at the same time and tended to share information in person. One student had a complex problem related to the BSCW and posted a question to the BSCW listserv. A range of professionals responded in two days and the problem was solved with this outside assistance. One response was from Rice University while the others were mostly from Germany.

Peer student survey

One student became frustrated with small problems related to the BSCW and conducted an on-line survey of the Internet students. He identified several problems and solutions, three of which are as follows:

1. The Netscape Navigator is the only browser that worked consistently within the BSCW workspaces. Other brands of browsers such as Microsoft's Explorer did not function well within the BSCW spaces, and in many cases would not allow access to all of the system's capabilities. Problems were also encountered with older versions of Netscape; therefore he recommend downloading the most current version from the Netscape home pages. The student's finding could be confounded by use of an older version of Explorer. There is no difference in performance between latest level versions of each browser.

2. Microsoft Office 97 or Microsoft Word and Microsoft PowerPoint are recommended to insure compatibility .

3. Some of the students did not have adequate hardware (CPU, storage, RAM) to access the BSCW and upload documents. He recommended discouraging students from signing up for Internet courses unless they have adequate equipment or frequent access to equipment resources. Current minimum equipment recommendations are: a Pentium 100 MHZ CPU , 32 megabytes RAM, and a 33.3 baud modem.

4. Students were confused about exact Internet specifications. For maximum effectiveness it is recommended that each student have access to the Internet through his or her own Internet Service Provider or SWT's Internet services.

Course Satisfaction

The Department of Health Service and Research anonymous student rating system was utilized. This tool consists of a three section 24 sentence instrument with agreement levels of 1-5. Each section is broken into an "overall" agreement statement. Course satisfaction was high as indicated by the following ratings:

1. Quality of Instruction (1.5),
2. Instructor method of measuring progress (2.5), and
3. Interaction with students (1.3).

Focus Group

The concept of collaborating over the Internet is new to most students and requires guidance and nurturing of students' attempts to interact with the system. By the end of the course, five students regularly wrote supportive statements to each other and interacted freely with each other. Two of the students contributed to the system but did not interact directly on the system other than as required. They did not write supportive statements to each other nor participate in the discussion groups. The three students in the small learning pod in San Antonio became a very close team and were highly successful in completing projects. However, they tended to avoid the BSCW for a variety of reasons. The group was lead by a student who was a lawyer and liked to solve her own problems even if this meant "driving to Canada for what is available in Mexico." One of these students told me that they knew that they would eventually get to right spot. This group was very reluctant to use other peers or the professor for support. They felt they had "used up" their amount of the professor time in the first part of the course. All three students held professional positions outside the course and liked to finish student projects into the early morning hours.

The process described by the SP group is supported by previous research findings. French (1995) has found that students can change their manner of learning. Qualitative and quantitative data for these behaviors have been collected over several years. In the fall of 1991, a t-test was employed to test paired differences on pre- and post-test scores for a group of 17 upper level undergraduates enrolled in a training class. The instrument used a Likert-type scale to measure beliefs about self-directed learning versus traditional learning. Significant differences were found in pre and post beliefs about self-directed learning (alpha .001). These results indicate that while most students enter university classes with primarily linearly based backgrounds, they can master new behaviors to facilitate restructured learning. On-going qualitative analysis with graduate focus groups has revealed that difficulties related to mastering new patterns of learning revolves around four key barriers:

1. Asking peers for help. Former educational programming implies that asking for help may be a form of "cheating." The SP group wasted many hours by not seeking more support.

2. Changing learning style. After a course is completed, most of my students have indicated they enjoyed self-directed learning and looked forward to other courses which used this style of teaching. However, other students have felt that teachers are "paid to teach" and thus, the teacher should be in front of class "teaching" the students. While the SP group liked the self-directed learning process because it allowed the three of them not to have to drive to San Marcos, they could have expedited their learning by not repeating the same mistakes.

3. Developing failing resilience. Some students become very frustrated with enduring temporary lack of success in mastering new skills, particularly high technology skills. Just the opposite seemed true for the SP group. One member of the SP group said that she had learned when to "quit;" while the others kept going and going. It is very rare for students to endure repeated failure. Having a lawyer in the group may or may not have affected this group's process.

4. Personal reward for success rather than the teacher's reward of the student. Many students have difficulty identifying and accepting intrinsic recognition apart from external rewards from the faculty or other outside influences. Basically, it appears that many students use the standard of "what is on the test" to determine what is most important to learn. The opposite was true for the SP group as they were rewarded by the joy of learning.

Conclusion

Both teachers and learners have to adapt to new styles of teaching and learning to meet future learning needs. Dr. Steve Bett (1994) has noted that colleges need to help students cope with the new learning environments and emerging conditions in a productive manner. He stresses that there needs to be more emphasis on process, how to learn, retool, update, communicate, and less on content. Bett noted that teaching can be content rich but the emphasis should be on process. He further points out that "it is no longer cost effective to focus just on the 'facts' which are true today but may take on new meanings tomorrow." (p.1)

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