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Using an electronic bulletin board for communication in a dispersed workgroup

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USING AN ELECTRONIC BULLETIN BOARD FOR COMMUNICATION IN A

DISPERSED WORKGROUP

A Thesis

Presented to

the Faculty of the Department of Psychology

San Jose State University

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

by

Lori L. Pulliam

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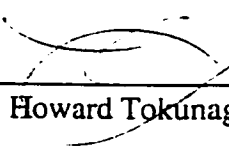
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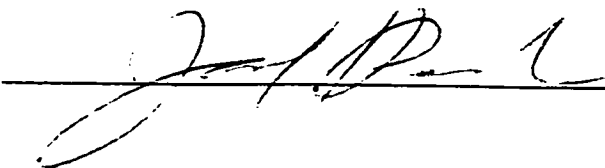
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ABSTRACT

USING AN ELECTRONIC BULLETIN BOARD FOR COMMUNICATION IN A

DISPERSED WORKGROUP

by Lori L. Pulliam

Since no existing research has compared different types of computer-mediated

communication media, this study compared user perceptions of email and electronic

bulletin boards in terms of satisfaction and effectiveness. In this longitudinal study, a

survey was administered twice to 127 users. Thirty-two users responded to surveys at

both Time 1 and Time 2. Although users were expected to find the bulletin board a more

satisfying and effective medium for communication tasks, users were more satisfied with

email and perceived it as a more effective communication medium. An exploration of

the impact of bulletin board use on group cohesion found no significant effect.

Discussion of the practical and theoretical implications of the research findings is

included.

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Abstract

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Using an Electronic Bulletin Board for Communication in a Dispersed Workgroup

Communication technology has changed the way we understand communication and its role in our lives. Authors of a popular communications media text define telecommunications as "communications at a distance" (Black, Bryant, & Thompson, 1998). The process of communicating has changed dramatically as telecommunication media such as cell phones, personal digital assistants, and wireless web devices have become commonplace, changing our view of personal connectivity in nearly every aspect of our lives.

Increasingly, communication research has focused on how we use communication media, and their role in both organizations and society (Black, et al., 1998). Communication researchers believe new media have enormous potential to enhance the effectiveness of organizational communication (Rogers & Allbritton, 1995). The purpose of this study is to track the introduction of an electronic bulletin board into the communications of a dispersed, functional workgroup in a large organization. The study compares user perceptions of the bulletin board versus an existing email system. Users are expected to find the electronic bulletin board a more effective and satisfying means of group communication. In addition, since researchers have speculated that use of communication media can enhance social relationships (e.g., Jones, 1997; Rheingold, 2000), this study also explores the relationship between use of the electronic bulletin board and participants' sense of connection with other workgroup members.

Communication as an Interactive Process

A communication model can help us to understand the communication process

and predict its outcomes. The simplest communication model describes communication

as a linear transfer of information (Black, et al., 1998). Although a linear model may be

useful in understanding the process of sending messages, it does not sufficiently describe

the process of communicating. Communication is interactive – it involves sharing

between communicators, and is responsive to feedback and situational cues (Black, et al.,

1998). An interactive model provides a more comprehensive view of communication:

one that accounts for the exchange of messages between communicators and for

situational factors that influence the process of communication (Black, et al., 1998).

In this study, the Emmert and Donaghy (1981) model of communication was used

as a basis for understanding the role of communication in organizations, and the potential

impact of communication media on an organization's processes. This model is an

interactive model that includes several components: communicators, relationships,

interfaces, feedback, the environment, and interference. *Communicators* are the people

participating in the communication process. *Relationships* between communicators, such

as status or power differences, may influence the outcome of the communication episode.

The term *interface* describes the means communicators use to exchange information.

Communication media may be classified as interfaces, since media enable or assist in the

exchange process. In the model, *feedback* describes responsive cues sent between

communicators. Situational conditions existing at the time of the interaction are

collectively called the *environment*. Finally, *interference* describes any factor in the

system that inhibits successful exchange of information (Emmert & Donaghy, 1981). This interactive model aids in understanding communication and its role within an organization.

Communication in Organizations

Communication is a universal human behavior – all humans engage in communication. As essential as communication may be between individuals, it is even more important in an organization. By definition, *organization* implies an integration or coordination of group effort toward a common vision or purpose (Morris, 1970). Communication is a fundamental means of coordinating and integrating group activity, and is essential to the very existence of organizations (Emmert & Donaghy, 1981).

Emmert and Donaghy (1981) contend organizational communication serves two essential functions: an instrumental function and a "consummatory" or social function. According to these authors, the instrumental function of communication in an organization is to drive its members to achieve goals. Instrumental communication includes any exchange of information intended to initiate, coordinate, facilitate, redirect, or otherwise impact the course of organizational activities. Some examples of instrumental communication include status reports, resource requests, or customer design specifications. Instrumental communication is clearly essential to the success of the organization. Successful instrumental communication provides essential information to organizational members and enhances group performance.

Emmert and Donaghy (1981) maintain the social function of organizational communication is to fulfill the social needs of the organization and its members. They

define social needs as the desire to interact with others and to form positive and fulfilling relationships with them. Any exchange of information intended to build positive, emotionally satisfying personal relationships between organizational members or between the organization and its customers is a social communication. Examples of social communication include words of encouragement or recognition, sharing war stories, or newsletters about company activities. Social communication helps to foster a positive and motivating climate within the organization (Emmert & Donaghy, 1981).

Defining Communication Media

As stated previously, Emmert and Donaghy (1981) use the term "interface" to describe any means that facilitates the flow of information between people. Communication media is a term more commonly used to describe communication interfaces. This term is very broad and includes any media that connects individuals with each other or with informational sources like databases or websites (Black, et al., 1998). Telephones, cellular phones, teleconferencing, email, Internet chat, and other computer-aided communication devices are examples of communication media (Black, et al., 1998).

Computer-mediated communication is a term commonly used by researchers to describe any communication that involves use of a computer terminal, either to interact with other people or to access information sources (e.g., Hiltz & Johnson, 1989; Latting, 1994; Hollingshead, McGrath, & O'Connor, 1993; Latane & Bourgeouis, 1996). E-mail systems, web-based mail systems, chat rooms, list servs, electronic bulletin boards and

meeting places, group decision systems, desktop conferencing, and instant messaging are all examples of computer-mediated communication media.

<u>Understanding Media Differences</u>

Obviously, communication media may differ from each other in a variety of ways. Three concepts are useful in understanding and explaining differences between communication media: social presence, media richness, and synchrony. These concepts help to describe the characteristics of different media and the capacity of a particular medium to convey information (Rice, 1993).

The extent to which a medium engenders awareness of others is referred to as a medium's social presence, and ranges from high to low (Short, et al., 1976). Human communication occurs via sensory input and output *channels*. Visual and auditory pathways are the most commonly used channels (Emmert & Donaghy, 1981). However, use of communication media may reduce the number of input/output channels available to communicators. For example, use of the telephone limits communicators to auditory channels. Social presence theory (Short, Williams, & Christie, 1976) suggests that when input/output channels are blocked, the communicators' are less aware of one another during the communication process.

Social presence theory implies that communicating via a medium low in social presence is less personal and conveys less of the communicator's emotions and personality than communicating via a medium high in social presence. According to social presence theory, face-to-face communication, which involves multiple channels (body language, facial expression, gestures, vocal intonation, touching, etc.), has the

highest social presence (Rice, 1993). By contrast, computer-mediated communication typically involves primarily textual interaction, and has much lower social presence. In group situations, this may lead to less ability to assess and understand the group and lengthen the time required to reach consensus (Daly, 1993).

Media richness is a related concept introduced by Daft and Lengel (1984). The premise of media richness theory is that media differ in their capacity to present information in a "rich" manner – that is, in a way that it can be quickly and easily understood. Media may be classified from high to low in terms of their "richness". Several factors influence a medium's richness, including its capacity to provide immediate feedback, the number and variety of channels used, and its capacity to convey meaning and emotion (Daft & Lengel, 1986). In the richness hierarchy, face-to-face meeting is the "richest" medium, followed by telephone, written addressed documents, and un-addressed documents like fliers or reports (Daft, Lengel, & Trevino, 1987). Since it is most commonly a text-based, written medium, computer-mediated communication is considered relatively "lean".

According to media richness theory (Daft & Lengel, 1984), richness is a factor people consider in determining whether a particular medium is appropriate for a given task. People prefer richer media when their communication tasks involve complex or ambiguous information. According to media richness theory, effective communicators are those who select media appropriate to the content of their messages – that is, they select rich media to convey complex or ambiguous information, and limit use of lean media to instances where information is clear and unambiguous (Daft, et al., 1987).

In addition to these two concepts, another concept important in understanding differences between communication media is synchrony (Metz, 1994). Synchrony is a term used to describe activity that occurs simultaneously or in parallel (Morris, 1970). Face-to-face meetings, phone conversations, video-conferencing, instant messaging, and live chats are generally considered *synchronous* communications because very little time elapses between the message and response to it. By contrast, e-mail, voice-mail, and electronic bulletin boards are generally considered *asynchronous* communications because considerable time may elapse between message and response.

Media richness theory (Daft, et al., 1987) suggests that synchronous media are richer, since synchrony allows more immediate feedback. Asynchronous media are also considered to have lower social presence than synchronous media. The time lapse between message and response tends to diminish communicators' awareness of each other during exchanges (Short, Williams, & Christie, 1976).

It is clear that a medium's characteristics influence its utility for group communication. If we accept Emmert and Donaghy's (1981) contention that organizational communication serves an instrumental and a socio-emotional role, then successful group communication should enhance group processes and positively impact the performance of tasks. Since media differ in their capacity to convey information, media choices can enhance or interfere with group communication and thus impact group performance. A brief review of research comparing communication media will help to clarify how media characteristics affect communication outcomes.

The Role of Media in Communication Outcomes

Studies comparing communication media have commonly used group effectiveness at tasks and satisfaction with the communication process to compare the group's performance (e.g.. Daly, 1993; Strauss & McGrath, 1994; Carey & Kacmar, 1997). Group effectiveness has been measured in a variety of ways, including time to complete a task (Carey & Kacmar. 1997), quantity of output (Strauss & McGrath. 1994), correct responses to a rule-based induction task (Daly, 1993), and participant reports regarding effectiveness (Hiltz & Johnson, 1989).

Satisfaction is usually measured using participant reports. Satisfaction is generally viewed as a multi-dimensional construct (e.g., Bailey & Pearson, 1983; Melone, 1990; Hiltz & Johnson, 1990; Garrity & Sanders, 1998). Satisfaction with a medium is influenced by characteristics of the medium, such as ease of use and type of interface, and situational factors, such as location of the communicators and urgency of the communication. For example, people often find email to be a satisfying way to communicate when their communication partners are in different locations (Sproull & Kiesler, 1991; Valacich. et al., 1993; Markus, 1994).

In general, media comparison studies have compared groups using computer-mediated communication to groups communicating face-to-face (e.g., Hiltz, Johnson. & Turoff, 1986; Daly, 1993; Hollingshead, et al., 1993). The results of such studies have been mixed. Some studies suggest use of electronic messaging systems like email or electronic brainstorming systems may enhance group performance on idea-generating tasks by increasing an individual's opportunity to contribute ideas (e.g., Hiltz. 1986;

Huber, 1990; Sproull & Kiesler, 1991; Daly, 1993; Straus & McGrath, 1994; Rogers & Allbritton, 1995). As noted previously, computer-mediated communication's low social presence may be an asset during these tasks. It may lessen the inhibitory effects of factors such as member status, personal characteristics, and social status and result in more equal participation by group members, (Turkle, 1995; Kahai, Sosik, & Avolio, 1997; Papacharissi & Rubin, 2000).

On more complex, problem-solving or decision-making tasks, research findings are less clear. Some researchers contend face-to-face groups outperform groups using computer-mediated communication on decision-making tasks (e.g., Daly, 1993; Carey & Kacmar, 1997). Other researchers have found face-to-face and computer-mediated groups *performed* equally well, but those using computer-mediated communication media were less satisfied with group process and took longer to reach consensus than members of face-to-face groups (e.g., Hiltz, et al., 1986; Straus & McGrath, 1994). In accordance with media richness theory (Daft & Lengel, 1984), researchers have attributed such findings to the complexity of problem-solving and decision-making tasks, given the leanness of computer-mediated communication (e.g., Hollingshead, et al., 1993; Strauss & McGrath, 1994; Carey & Kacmar, 1997).

With regards to social functions, face-to-face communication is generally believed to be the most effective medium for building interpersonal relationships. However, face-to-face communication in organizations is not always possible. Members of the group may be geographically dispersed and unable to physically meet in a single location. Research suggests use of electronic discussion systems like Internet chat or

electronic bulletin boards can enhance social relationships among dispersed groups, allowing them to build support networks and develop a sense of community (e.g., Jones, 1997; Haynes & Holmevik, 1998; Jones, 1998; Rheingold, 2000). Rheingold (2000) suggested that members of on-line discussion groups behave much like members of physical communities, developing friendships despite the fact that their contact may occur solely via computer communication. As noted previously, computer-mediated communication can provide a uniquely liberating environment that fosters highly democratic and equalized social interaction (Turkle, 1995; Baym, 1998; Danet, 1998; Papacharissi & Rubin, 2000).

Obviously, studies comparing face-to-face communication to computer-mediated communication compare two very different media. Even though such studies may provide some insight into communication, Griffith and Northcraft (1994) suggest that differences between the two media obscure meaningful analysis of research findings. To date, little if any research has directly compared computer-mediated communication media, although Metz (1994) suggests this is a promising area of research. In response to the need for research comparing similar media, this project compares two computer-mediated communication media – an electronic bulletin board and email.

A Comparison of Email and Electronic Bulletin Boards

Email is a computer-mediated communication medium that involves typing and sending messages to communication partners. The user types messages on a computer keyboard, using email software. The software allows the user to send messages to a discrete list of partners by designating the list of recipients for each message. When the

sender presses "Send" the message is transmitted to all designated recipients, who may read and respond to the message via their own email software. Email is generally considered a lean medium, with low social presence. Usually email involves asynchronous communication, but when communication partners happen to be logged into their email software at the same time, the communication flow can approximate synchrony.

An electronic bulletin board is also a computer-mediated communication system that involves typing and sending messages to communication partners. The user types a message on a computer keyboard. Bulletin boards are usually located on a website, using the bulletin board software. The software allows users to post messages to the bulletin board for public view. Any user who has access to the site can view the messages, introduce new topics, or post replies to a topic submitted by other users. Replies are also posted for public view. When the user presses "Submit" the new topic or reply is posted to the board. Users do not receive individual copies of bulletin board messages, but they may subscribe to a topic to receive an email notification and link to messages that have been posted to the topic of interest. Like email, an electronic bulletin board is generally considered a lean medium, with low social presence. Electronic bulletin boards are typically asynchronous communication. However, occasionally a synchronous exchange can occur when communicators happen to visit the site at the same time.

Electronic bulletin boards and email are similar in many ways, as are most computer-mediated communication media. Both are asynchronous media with low social presence. Both are lean media, relative to face-to-face conversation. As noted above,

both media offer similar speed of transmission, and the user interface is also similar (i.e.. users type messages into the system using computer keyboards). Both tools are considered *broadcast media* – that is, they may transmit messages not only from one person to another, but from one person to many people, or many people to many other people (Rafaeli & LaRose, 1993).

However, while the two media are fairly similar at a surface level they have several features that could influence how users perceive the tools. The first of these is the handling of message transmission. As noted previously, email transmits the text of the message to each designated user, while the bulletin board serves as a message repository which users visit to view messages. This results in significant differences in how users experience a communication exchange.

When used for *interactive* communication, email conversations generally involve sending and receiving multiple messages across a span of time. As noted earlier, asynchronous communication is less rich (Daft & Lengel, 1984) and can lead to miscommunication due to elapsed time. This is particularly true when the conversation involves multiple participants, because time-phased sequencing of multiple responses may interrupt the logical flow of the conversation (Whittaker & Sidner, 1996). To compensate for the problems created by asynchrony, email users frequently make extensive use of the *reply with history* feature, a feature which copies the previous message(s) into the body of the reply. This practice can help to maintain the continuity of the conversation. However, use of the *reply with history* feature is not without problems. When the feature is used for an extended exchange, the message rapidly

becomes excessively long and unwieldy. The length of the message can obscure its content. On the other hand, if the *reply with history* feature is not used, the context of the previous messages is lost and participants may easily lose track of the conversation thread.

By contrast, an electronic bulletin board does not operate by sending messages between individuals. Instead users post messages to the board, linking their responses to the appropriate topic. Any user who visits the bulletin board can clearly see the entire context of the conversation. Replies are sequentially displayed to provide the full context of the conversation in logical order including a hierarchy displaying response to the topic, response to response, etc. With regards to transmission, users who opt to subscribe to the topic will receive a link via email notifying them whenever a new message is posted to the topic. The user opens the link to view the new post and, if desired, post a reply. In a sense, although conversation via both media is asynchronous, the bulletin board is a richer media because its transmission methodology re-synchronizes the conversation by taking the user back to the original context with each posting.

Another difference between the tools involves organization of messages. Email systems do not automatically organize messages by topic (Whittaker & Sidner, 1996). Users must manually organize email messages by creating "folders" to store related messages together according to the organizational scheme they desire. Since the messages are not linked to each other, the user must individually determine how to organize their messages. Users may also use a variety of *sorting options* to organize messages by date, sender, or subject. However, to review an entire email conversation,

the user must locate each email message in the conversation sequence (Whittaker & Sidner, 1996). It can be a frustrating and time-consuming process to locate a specific email message, particularly if the user is not diligent and methodical about message organization, or if the user has inadvertently deleted the desired message.

Some email software has a *reply* feature that will programmatically link a group of messages into a topical thread. When the user responds to a message by clicking *reply*, the two documents are linked as parent-child documents. This feature allows the program to display a series of messages as a *thread*, a term used to describe the linked series of messages. However, a thread may only be used to link sequential messages and is broken when a user does not use the *reply* feature to respond to a message or deletes a message from the thread.

By contrast, the electronic bulletin board presents messages in a visually organized hierarchy. Users do not have to organize messages, although they must provide an initial topic category when posting new topics to the board. Once new topics are categorized, responses are automatically linked to the main topic and presented sequentially under the original topic. This feature greatly enhances organization of the messages, and assists in maintaining continuity within a conversation topic. Messages posted to an electronic bulletin board may also be sorted to display by date, sender, or topic. This versatility enables users to easily locate a particular message when desired. In addition, since the messages are linked to each other in a topical thread, users may access the entire thread by opening a single document link within the thread (Stenmark, 1998). Because the bulletin board provides a more complete context for each message,

continuity is enhanced and messages are more easily understood. For this reason, the bulletin board can be considered a richer medium than email.

The final difference between these two media involves access to archived messages. Email users must either archive or delete messages periodically. Email archives are generally accessible only to the individual user, making it difficult for other users to benefit from information exchanges in which they did not originally participate. Even if email archives are located on a shared server that can be accessed by all users, the documents are not usually linked together in a logical fashion, making access to a topical thread problematic.

With electronic bulletin boards, all messages are located at a centralized site and are accessible by all system users, including users who have not actually participated in the original discussion thread (Stenmark, 1998). While inactive topics may be archived, the archives are accessible to all users from the main site via a link to archived documents. In addition, users who have subscribed to a topic may delete the email links they receive without disrupting access to the messages – the message thread remains on the board, accessible during any visit to the website.

Based upon these differences, users are expected to prefer the electronic bulletin board as a means of communicating with the workgroup. Media richness theory (Daft & Lengel, 1984) suggests that people prefer richer media. By displaying messages within the context of a communication topic, the board provides a richer, more synchronized thread of conversation, yet it retains the beneficial aspects of email. In addition, Rafaeli and LaRose (1993) have suggested that access can influence whether or not users accept

a computer-mediated communication tool. Since the bulletin board provides enhanced access to information through organization and archiving capabilities, it is expected that users will quickly adopt the board as a communication tool.

Purpose of Study and Research Hypotheses

As stated previously, the purpose of this study is to compare user perceptions of the bulletin board versus the existing email system. Users are expected to find the electronic bulletin board a more effective and satisfying means of group communication. In addition, the study explores the relationship between use of the electronic bulletin board and participants' sense of connection with other workgroup members.

As noted earlier, both satisfaction with the medium and effectiveness have been used to assess user acceptance of computer-mediated communication tools (Shaw, 1998; Hiltz & Johnson, 1990; Rao, 1994). A positive relationship between level of use and satisfaction with the medium is predicted. Specifically, heavy users of the bulletin board will tend to be more satisfied with it, and will become less satisfied with email as a group communication tool. Therefore, with regards to satisfaction, the specific research hypotheses are as follows:

H_1: Participants will be more satisfied with the electronic bulletin board tool than with email.

H_{1A}: Use level will be positively correlated with satisfaction with the bulletin board.

H_{1B}: Heavy users of the bulletin board will be less satisfied with email at Time 2 than they were at Time 1. For those who use the bulletin board less, satisfaction with email will not change.

With regards to effectiveness, in accordance with the practice of other researchers (e.g., Hiltz & Johnson, 1989; Daly, 1993; Strauss & McGrath, 1994; Carey & Kacmar,

1997), participants' perceptions regarding the tools' effectiveness will be used to measure effectiveness. Again, it is predicted there will be a positive relationship between usage level and perceived effectiveness of the medium. Specifically, heavy users of the bulletin board will tend to rate the board as more effective, and over time will come to view email as less effective for group communication. Therefore, the research hypotheses related to effectiveness are:

H_2: Participants will find the bulletin board tool more effective than email.

H_{2A}: Usage level will be positively correlated with perceptions that the bulletin board is effective.

H_{2B}: Heavy users of the board will rate email as less effective at Time 2 than at Time 1. Those who use the bulletin board less will rate email the same at Time 2 as Time 1.

With regard to socio-emotional outcomes, researchers have made no distinctions between email and electronic bulletin boards in terms of their ability to connect dispersed groups. However, within organizational contexts, users are generally not encouraged to use email in purely social ways. Many organizations discourage mass distribution of messages of a social nature to prevent overloading employees with too many email messages. As a result, although email may be effective in facilitating social relationships between users, the restrictions commonly placed on email within organizations may inhibit this function.

By contrast, the electronic bulletin board may provide members of the organization a social outlet, encouraging discussion of a variety of general interest topics and increasing opportunities for the workgroup to interact with each other despite lack of physical contact. As a result, it may increase social connections within the group

(Haynes & Holmevik, 1998; Jones, 1998; Rheingold, 2000). To explore this possibility, this project includes a measure of participants' perceived connection with the workgroup. If participants' use of electronic bulletin board affect their feelings of connection with the workgroup, then a positive relationship will be observed between level of tool use and perceived connection to the group. Thus the research hypothesis regarding cohesion is:

H_3: Cohesion scores for heavy users of the board will increase from Time 1 to Time 2. Cohesion scores for those who use the bulletin board less will not change from Time 1 to Time 2.

Method

Participants

Participants for this study were recruited from Human Resources professionals in an organization that manufactures and maintains semiconductor equipment. The Human Resources team consists of approximately 325 adult individuals working in a variety of locations. This group was selected for convenience and also because the workgroup is physically dispersed and uses email as a primary means of communication. All members of the Human Resources team were invited to participate in the project. About 40% (127 individuals) participated in the first survey. About 21% (68 individuals) participated in the second survey.

Materials

Data were collected using a 40-item questionnaire created for use of this project (see Appendix B). The questionnaire included items to measure various demographic variables, satisfaction with the two communication media, perceptions regarding the effectiveness of the two media, and group cohesion.

Demographic characteristics. The questionnaire also included items collecting demographic information regarding age, gender, work location, education, tenure with the company, job role, functional role, and proficiency with computers. Age, education, and proficiency with computers have been related to user satisfaction with computers and information systems (e.g., Bailey & Pearson, 1983; Hiltz & Johnson, 1990). Information about tenure, work location, job role, and functional role were included to determine if user perceptions of communication media in the organization vary with regards to these characteristics. Demographic information was collected with items 27-34.

Media satisfaction and effectiveness. Satisfaction with communication is commonly measured using user self-report (Hecht, 1978; Bailey & Pearson, 1983; Hiltz & Johnson, 1990; Melone, 1990). Although measures have been created to assess user satisfaction with various types of management information systems (e.g., Bailey & Pearson, 1983; Doll & Torkzadeh, 1988; Garrity & Sanders, 1998), less attention has been paid to the development of measures that assess user satisfaction with computer-mediated communication media.

Satisfaction with computer-mediated communication is often described as a multi-dimensional construct that includes satisfaction with the interface, satisfaction with the communication process, and satisfaction with outcome (e.g., Shaw, 1998; Hiltz & Johnson, 1990; Rao, 1994). Since communication plays a highly instrumental role in organizations (Emmert & Donaghy, 1981), it is likely that user satisfaction with *outcomes* (i.e., satisfaction with the effectiveness of the communication process) is of particular importance in determining user satisfaction with *media*.

The questionnaire used in this project was designed to measure both satisfaction with the two media and perceptions of how effective the two media were for a variety of tasks. Questionnaire items 1-4 ($a = .74$) and items 16-18 ($a = .83$) assessed participants' satisfaction with the electronic bulletin board and email respectively. Items 5-11 ($a = .87$) and items 19-25 ($a = .85$) assessed participants' perceptions of the effectiveness of the two media. Items 12-14 and 35-37 were used to determine the usage level of each medium.

Group cohesion. This project also evaluated the relationship between use of computer-mediated communication and group connection. Interpersonal cohesiveness has been described as group members attraction to or liking for their workgroup (Craig & Kelly, 1999). For the purposes of this project, interpersonal cohesion was viewed as an acceptable measure of connection with the workgroup. Items 38-40 on the questionnaire were used to assess interpersonal cohesion ($a = .91$). These three items were adapted from similar items used in the substitutes for leadership scale to measure group cohesion (Podsakoff, Niehoff, MacKenzie, & Williams, 1993). One of these items specifically asks if the respondent feels connected to the workgroup.

Procedures

Survey administration. Just prior to introduction of the electronic bulletin board, an email containing an invitation to participate in the study was sent to all members of the Human Resources workgroup in the organization. This email included a link to the initial survey, so that group members could access the survey and submit their responses immediately to participate in the survey. To avoid confusion since members of this

workgroup did not have access to the electronic bulletin board, items 1-15 were withheld from the survey during the initial administration. The response rate for Survey 1 was about 40% (127 individuals).

The electronic bulletin board was introduced shortly after the initial survey administration. The board was introduced along with a website designed to provide information about the organization's human resource processes to members of the Human Resources team. Subsequently, announcements and marketing information were provided to the group to encourage awareness of the electronic bulletin board tool and promote its use by the group. Despite marketing efforts, the workgroup made very limited use of the bulletin board during the course of the project. Use of the tool was slowly beginning to rise at the time of the second survey's administration, eight weeks after introducing the board. Two open-ended questions about use of the board were added to the questionnaire prior to its second administration to obtain information about why participants did not make use of the bulletin board. Thirty-five percent of the participants in the Total Group had never read posts on the board, and 84% had never posted a message to the board. Due to the low volume of use, no high level users could be identified. As a result, the usage level measure for the bulletin board was dichotomized as those who had used the board (read or posted messages) and those who had not.

An invitation to participate in the second survey and a link to the complete form, including all questions, was mailed electronically to members of the Human Resources workgroup eight weeks after the electronic bulletin board was introduced. The response

rate for Survey 2 was about 21% (68 individuals). Thirteen Time 2 surveys were omitted from further analysis due to large amounts of missing data. The remaining 55 participants who responded to the second survey were included in all statistical tests that did not involve longitudinal data analysis. This participant group (hereafter referred to as the Total Group) consisted of 35 women and 18 men (two participants declined to provide information about gender).

A total of 32 participants responded to both the Time 1 and Time 2 surveys (hereafter this group is referred to as the Match Group). Longitudinal data for the Match Group was used to test hypotheses involving changes in participant responses over time. The Match Group consisted of 24 women, and 8 men. The Match Group did not differ significantly from the Total Group with regards to distributions for any of the demographic variables.

Scoring. Items were summed to provide group cohesions scores as well as satisfaction, effectiveness, and usage level scores for each medium. Numerical value was assigned to response categories so that summed scores could be calculated. Values were assigned so that higher values would indicate positive responses (i.e., strongly disagree was valued as 1, disagree as 2, neutral as 3, agree as 4, and strongly agree as 5). Using data from the second survey administration (Time 2) questionnaire, bulletin board satisfaction items (1-4) were summed to create a Time 2 satisfaction score for the electronic bulletin board, and bulletin board effectiveness items (5-11) were summed to create its effectiveness score. Items 15-18 were summed to create a Time 2 satisfaction score for e-mail. Items 19-25 were summed to create its Time 2 effectiveness score.

Usage level scores for each medium were calculated in a similar manner. Numerical values were assigned to response categories, and a total score was obtained by summing the values for items 12-14 to create the usage level score for the bulletin board, and by summing the values for items 35-37 to create the usage level for email.

Finally, a similar method was used to produce a cohesion score. Responses to the interpersonal cohesion items (38-40) were summed to create the score. The cohesion score was calculated for both Time 1 and Time 2 in order to determine if cohesion scores for the participants would change differentially over the course of the project based upon usage level for the bulletin board tool.

Results

Descriptive Statistics

About 25% of the participants were under age 25, 31% were between 25 and 34 years old, 9% were between 35 and 44 years old, 25% were between 45 and 54 years old, and 3% were over 55 years of age. Sixty-two percent of the Total Group were located in the San Francisco Bay Area, near the organization's main headquarters. About 25% were located in other areas of the U.S., and 13% were located outside the U.S. Most participants had been with the organization for some time. Only about 5 % had been with the company for less than a year. The largest group of participants (40%) had been with the organization more than five years. Thirty-one percent had been with the organization for 1-2 years, 20% for 2-3 years, and about 2% for 3-5 years.

Participants were asked about their level of education and proficiency with computers. Most of the participants in the Total Group (93%) had at least some college

education. Approximately 64% had a college degree, and approximately 18% of the participants had an advanced degree. With regards to computer proficiency, most participants described themselves as highly competent with computers (55%). About 33% described themselves as generally competent, 9% described themselves as expert, and about 2% described themselves as beginners.

To determine if functional role or job role made any difference in use of communication tools, participants were asked about their job role and functional role in the organization. Twenty-six percent of participants described their job role as generalist, 18% as specialist, 28% as manager, and 12% as administrative. Fifty-one percent of the participants described their functional assignment as a corporate assignment, and 46% as a line assignment.

In general, email was viewed in a positive way by the workgroup. The majority of participants agreed or strongly agreed that email was effective for most job-related tasks: gathering information (82%), requesting information (91%), providing information (93%), sharing reports (96%), and discussing issues with colleagues (73%). Participants were also satisfied with email. About 87% agreed or strongly agreed that email was easy to use. About 87% agreed or strongly agreed they were able to organize their email messages, and about 82% agreed or strongly agreed they could easily locate specific messages. Fewer participants (75%) agreed or strongly agreed that they enjoyed using email.

The bulletin board received limited use during the project. 35% of the participants had never read posts on the bulletin board, and 84% had never posted a

message to the board. As a result, for each question about the bulletin board about 50% of the responses were neutral. Otherwise, participants were generally satisfied with the board – about 42% agreed or strongly agreed the bulletin board was easy to use, about 38% agreed or strongly agreed that it was well organized. about 36% agreed or strongly agreed that messages were easy to locate. However, participants did not seem to find the bulletin board enjoyable to use – only about 15% agreed or strongly agreed, while 67% were neutral and 14% disagreed or strongly disagreed the board was enjoyable to use.

In comparison to email, fewer participants agreed or strongly agreed that the board was effective for job-related tasks: gathering information (13%), requesting information (25%), providing information (27%), and sharing reports (38%). Only 6% of participants felt the bulletin board was effective for discussing issues with colleagues. Electronic bulletin boards may be a highly effective tool for discussing issues with colleagues when group members adopt the practice of checking the board and a cadre of members routinely engage in active exchanges using the medium. Lack of regular and interactive exchange on the board led this group to find the tool less useful and satisfying.

With regards to connection with the workgroup, 37% of participants expressed agreement with the statement that they have opportunities to interact with colleagues outside their immediate workgroup. 58% of participants viewed their colleagues as supportive, and about 47% agreed they felt connected to the larger workgroup.

Correlations

Table 1 contains a correlations matrix displaying the observed relationships between the research variables. The effectiveness measures for each tool were positively

Table 1. Research Variables Correlation Matrix

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Board Effectiveness	1.00														
2. Board Satisfaction	.47**	1.00													
3. Board Use Level	.13	.35*	1.00												
4. Email Effectiveness	-.11	.23	.17	1.00											
5. Email Satisfaction	.11	.30*	.23	.30*	1.00										
6. Email Use Level	-.10	-.34*	-.12	-.30*	-.07	1.00									
7. Cohesion	.06	.26	.16	.10	.41**	-.07	1.00								
8. Age	-.18	-.27	-.27	-.27	-.08	.18	-.04	1.00							
9. Education Level	-.21	-.10	.23	-.08	-.14	.26	-.26	.02	1.00						
10. Gender	.29	.11	.02	-.20	.25	.18	.03	-.05	.03	1.00					
11. Computer Proficiency	.08	-.02	.23	.11	.23	.04	.07	-.29*	-.04	-.05	1.00				
12. Job Function	.21	-.05	-.19	.00	-.11	.25	-.26	-.20	-.00	.25	.10	1.00			
13. Job Role	.15	-.02	.03	-.08	.21	.07	-.04	.45**	-.18	-.04	.08	-.22	1.00		
14. Work Location	-.05	.01	.08	-.12	-.19	.10	-.15	.04	.15	.07	-.05	-.28*	.09	1.00	
15. Tenure	-.04	-.17	-.26	-.18	-.06	.16	.08	.47**	.10	.02	-.04	-.04	.17	.02	1.00
Number of cases	47	44	45	45	46	47	45	43	46	45	47	45	44	47	46

* $p < .05$, ** $p < .01$

correlated with satisfaction measures for the same tool ($r = .47$, $p < .01$, for the bulletin board, and $r = .30$, $p < .05$, for email); that is, as perceived effectiveness increased, satisfaction increased. This result was expected, as these two measures are generally viewed as dimensions of the same construct. Perceptions about the effectiveness of the electronic bulletin board were not related to bulletin board usage level or any of the email measures. Satisfaction with the bulletin board tool was positively correlated with usage level of the tool – those who had read or posted more messages on the board, tended to be more satisfied with it ($r = .35$, $p < .05$).

For email, effectiveness was negatively correlated with usage level ($r = -.30$, $p < .05$); that is, those who reported higher volume of emails sent and received, tended to view email as less effective. No statistically significant relationship was observed between satisfaction with email and usage level of email. Taken together, these two findings suggest that users are generally satisfied with email, but a large volume of email may overload the user. This result is consistent with the findings of other researchers who have investigated email overload (e.g., Whittaker & Sidner, 1996).

There was a positive relationship between satisfaction with the bulletin board and satisfaction with email ($r = .30$, $p < .05$). This result is not surprising since the two media offer a similar interface for users, and involve a similar means of interacting with peers. Interestingly, there was a negative relationship between satisfaction with the bulletin board and usage level for email ($r = -.34$, $p < .05$). That is, those who sent and received more email tended to express less satisfaction with the bulletin board. This is the exact opposite of the expected relationship between the two variables.

There was a positive relationship observed between cohesion and satisfaction with email ($r = .41$, $p < .01$). Those who were more satisfied with email tended also to express a greater sense of connection with the workgroup. No other relationships were observed between cohesion and the other research variables (media effectiveness, satisfaction with the bulletin board, or demographic characteristics).

As can be seen in Table 1, none of the demographic variables (e.g., gender, age, education) were related to any of the measured variables. Since the demographic characteristics did not seem to influence the dependent variables, demographic variables were excluded from further analyses.

Hypothesis Testing

To test Hypothesis 1 that users would be more satisfied with the electronic bulletin board than they were with email, mean satisfaction scores for the electronic bulletin board and email at Time 2 were compared using a t-test comparison of means. Since this comparison involved only Time 2 scores, the Total Group was used for the comparison. Comparison of means showed significant differences between users' satisfaction with the two tools, $t(49) = -7.75$, $p < .01$. However, Hypothesis 1 was not supported; users were more satisfied with email ($M = 15.68$, $SD = 2.34$) than they were with the bulletin board ($M = 12.84$, $SD = 2.21$). As mentioned previously, this result was anticipated due to extremely low volume use of the bulletin board and users' lack of familiarity with it. This analysis should be repeated once use of the bulletin board has become more integrated within the workgroup.

Hypothesis 1A was supported. Bulletin board usage level was positively correlated with satisfaction with the bulletin board (r = .35, p < .05). Although limited use of the bulletin board tool made it highly unlikely that Hypothesis 1B would be supported, a 2 (user level: no use vs. use) X 2 (time) ANOVA was used to test the hypothesis that participants who used the bulletin board more would be less satisfied with email at Time 2 than they were at Time 1. (The Match Group was used for this comparison.) Table 2 displays descriptive statistics and an ANOVA summary table for this analysis. The results of the analysis did not support the hypothesis. Time and usage level did not interact to differentially impact satisfaction with email, $F(1,27) = .06$, MSE = 2.59, $p > .05$. Participants' satisfaction with email did not change significantly over time, $F(1,27) = .54$, MSE = 2.59, $p > .05$. However, a significant main effect was observed for usage level, $F(1,27) = 37.72$, MSE = 2.71, $p < .01$. Regardless of time, those who had used the electronic bulletin board were more satisfied with email than those who had not.

To test Hypothesis 2 that participants would find the bulletin board more effective than email, Time 2 mean effectiveness scores for the electronic bulletin board and email were compared using a t-test comparison of means. The comparison of means for the Total Group showed significant differences between effectiveness scores for the two tools, $t(44) = -12.02$, $p < .01$. However, Hypothesis 2 was rejected because the results were in the opposite direction of the stated expectations. Participants considered email (M = 24.76, SD = 2.86) more effective than the electronic bulletin board (M = 15.22, SD = 4.17). This comparison should be repeated once use of the bulletin board is

established in the group to determine if user perceptions of the board's effectiveness increase over time.

Hypothesis 2A was not supported. There was no correlation between usage level of the board and perceptions regarding the board's effectiveness ($r = .13$, $p > .05$). A 2 (usage level) x 2 (time) ANOVA analysis was used to test Hypothesis 2B that participants who used the bulletin board more would view email as less effective at Time 2 than they did at Time 1. Table 3 displays the descriptive statistics and an ANOVA summary table for this analysis. The results of the analysis did not support the hypothesis. No interaction effect was observed. Across time, usage level did not have a differential influence on perceived effectiveness of email, $F(1,22) = .67$, $MSE = 1.98$, $p > .05$. However, a main effect was observed for time – participants viewed email as more effective at Time 2 than they did at Time 1, $F(1,22) = 7.12$, $MSE = 1.98$, $p < .05$. In addition, a significant main effect was observed for usage level of the electronic bulletin board, $F(1,22) = 11.02$, $MSE = 12.71$, $p < .01$. These two effects are in the opposite direction of the expected effect. Those who had used the board viewed email as more effective than those who had not used the board, and participants viewed email as more effective at Time 2 than they had at Time 1.

With regards to connection with the workgroup, a 2 (usage level) x 2 (time) ANOVA analysis was used to test Hypothesis 3 that over time participants who used the bulletin board more would feel greater connection with the workgroup (cohesion). Table 4 displays the descriptive statistics and ANOVA summary table for the cohesion analysis.

Table 3. Descriptive Statistics and ANOVA, Effectiveness by Board Use and Time

Table of Means: Effectiveness Scores of Email by Board Use Level at Time 1 and Time 2

	Time 1	Time 2	Average
No Board Use	23.85	25.15	24.50
Board Use	24.82	25.64	25.22
Average	24.29	25.38	

ANOVA Summary Table

Source	SS	df	MS	F
Board Use Level	140.09	1	140.09	11.02**
Error (Between)	279.58	22	12.71	
Time	14.09	1	14.09	7.12*
Use x Time	1.32	1	1.32	.67
Error (Within)	43.59	22	1.98	
Total	478.67	47		

* $p < .05$, ** $p < .01$

Table 4. Descriptive Statistics and ANOVA, Cohesion by Board Use and Time

Table of Means: Cohesion Scores by Board Use Level at Time 1 and Time 2

	Time 1	Time 2	Average
No Board Use	10.06	9.94	10.00
Board Use	10.00	10.64	10.32
Average	10.03	10.26	

ANOVA Summary Table

Source	SS	df	MS	F
Board Use Level	16.02	1	16.02	1.32
Error (Between)	340.13	28	12.15	
Time	.82	1	.82	.37
Use x Time	2.01	1	2.01	.89
Error (Within)	62.67	28	2.24	
Total	421.65	59		

The results of the analysis did not support Hypothesis 3. No significant interaction effect was observed. Across time, sense of connection with the workgroup did not differ based on usage level group, $F(1,28) = .89$, $MSE = 2.24$, $p > .05$. No main effect for time was observed: participants' sense of connection with the workgroup did not change from Time 1 to Time 2, $F(1,28) = .82$, $MSE = 2.24$, $p > .05$. In addition, the two usage level groups did not differ significantly in their expressed sense of connection with the workgroup, $F(1,28) = 1.32$, $MSE = 12.15$, $p > .05$.

Discussion

This project involved a comparison of two computer-mediated communication media, email and an electronic bulletin board. Based upon differences in the features of the media, participants were expected to find the electronic bulletin board both more satisfying and more effective than email. In addition, since previous research has indicated that use of internet discussion media may lead to feelings of connection with other users, an exploratory assessment the bulletin board was expected to discover that higher level users would feel more connected to the workgroup.

With regards to satisfaction with the media and perceived effectiveness of the media, the research hypotheses were not supported. Participants were less satisfied with the electronic bulletin board than they were with their existing email system, and found the electronic bulletin board less effective for every work-related task. This result may be attributed in part to the fact that use of the electronic bulletin board was very low. Responses to the survey indicated that participants who send and receive a larger volume of emails may feel somewhat overloaded. It is possible this group viewed the bulletin

board negatively as a source of additional messages. This interpretation is supported by numerous comments from participants stating that they did not have time to read or post messages to the bulletin board.

In this workgroup, very few topics were posted to the board and the topics that were posted did not generate much discussion among the workgroup. Some participants commented that there were too few topics, or no discussion threads of interest to them on the board. Although the participants were free to create new topics, very few participants choose to do so. The board moderators posted most topics to the board in an attempt to generate discussion among the participants. These initial posts to the board were very serious and business-oriented. Instead of generating interaction and commentary, the posts firmly set the tone of the board as highly serious and utilitarian. Subsequent efforts to lighten the tone of the board by requesting work-related stories or humorous anecdotes were met with more success, but group members still did not generate new topics for themselves, or interact spontaneously with each other.

When asked about why they had not used the tool, participants mentioned three main reasons: they did not have enough time to interact with coworkers on the board, they were not aware of the tool or the benefits it could provide, and they found other ways of communicating to be more effective for their immediate needs. Several users also felt the tool was difficult to access (access to the board was password protected). While this result may be attributed in part to very limited use of the electronic bulletin board, it seems likely members of the workgroup will continue to prefer email for communication within the group.

For an electronic bulletin board to be useful to a workgroup, the exchange of information must be very active. If users are not checking the board, and contributing to the discussion, there will be nothing on the board to draw people to it. Based upon the observed relationship between use of the electronic bulletin board and satisfaction with email, it seems likely that participants who were satisfied with email were more likely to try the board and to use it more frequently. Since use of the electronic bulletin board was still not fully established by the end of this project, it would be interesting to determine if this effect diminishes as the board is more fully integrated into work routines. As more participants adopt the practice of using the board to communicate with peers, the relationship between use of the board and satisfaction with email should diminish.

With regards to group cohesion, the research hypothesis was also not supported. This finding should not be interpreted to mean that use of the electronic bulletin board does not influence group cohesion. The general lack of participation on the bulletin board made it improbable that a main effect would be found for use of the board. It should be noted, however, that a statistically significant relationship was observed between satisfaction with email and group cohesion. This finding tends to support the notion that use of computer-mediated communication may somehow influence connection to the group. Future research could help to define the nature and importance of this relationship.

Theoretical Implications

Despite the lack of significant findings, this project has contributed to our understanding of user responses to computer-mediated communication in several ways.

First, the project clearly demonstrated the relationship between adding value and user acceptance of new media. Critical mass theory (Markus, 1987) suggests that a new technology must be adopted by a certain minimum number of users to reach a state of "universal access" (universal participation). Once the technology is accepted by this "critical mass" of users, the rate of adoption increases exponentially, and the technology rapidly proliferates and becomes self-sustaining. The potential for achieving universal access is related to the resource expenditure required of users in terms of skills, effort, or cost (Rafaeli & LaRose, 1993) and the anticipated benefits of the technology.

Uses and gratification theory suggests people prefer media they find gratifying and beneficial to use (e.g., Rubin, Perse, & Barbato, 1988; Perse & Courtright, 1993; Papacharissi & Rubin, 2000). The idea that people use media with an expectation of receiving some benefit and satisfaction from it is an underlying assumption of many user acceptance studies (e.g., Hiltz & Johnson, 1989; Rafaeli & LaRose, 1993; Latting, 1994; James, Wotring, & Forrest, 1995). As noted earlier, the value provided by an electronic bulletin board is dependent on content and to a large extent the content is dependent on the participation of users (Rafaeli & LaRose, 1993; Powazek, 2001). If the medium fails to meet expectations of adding value for the user, users will not readily accepted it.

When the electronic bulletin board was introduced as part of this project, members of the organization felt they were too busy to spend time learning to use the new medium, or even to interact regularly with their colleagues. Under such conditions, it is not surprising that the board was perceived as an additional burden, and users were reluctant to use the medium. Since the bulletin board is relatively easy to use.

participants' resistance to the new medium might have been overcome but the board's low volume of use created a vicious cycle. As noted earlier, the value of a bulletin board is determined primarily by the richness and diversity of its content (Rafaeli & LaRose, 1993). Since content diversity is dependent on contributions, low volume of use limited the value the board could provide to its users.

Second, the project further highlights the importance of synchrony and richness and confirms their role in user satisfaction with media. While asynchronous media are often assumed to be beneficial for dispersed workgroups (e.g., Sproull & Keisler, 1991; Rheingold, 2000) this project clearly demonstrates the importance of timely feedback. Participants were less satisfied with the bulletin board because they believed they could obtain information faster by identifying a resource person and contacting them directly. They were unwilling to submit general requests for information to the board and wait for responses, particularly since the responses might be slow to come given the board's volume of use. When working with communication media, it is important to remember that communication is an interactive process. The primary problem with the bulletin board was not the low volume of use, but the rate of information exchange. It is highly probable that if there had been active exchanges going on the board, it would have drawn other users to participate and initiate exchanges themselves.

Finally, although the project provided no definitive support for the idea that electronic discussion systems can enhance the sense of connection between members of dispersed groups, it did suggest a relationship between satisfaction with communication media and cohesion. As noted in the Results section, there was a significant positive

relationship between satisfaction with email and sense of connection with the workgroup. Since this workgroup communicates regularly via email, it is not surprising that those who found email a satisfying way to communicate were also likely to feel more connected with the workgroup. Further exploration of the relationship between satisfaction with computer-mediated communication and cohesion within the workgroup is an interesting area for future research.

Practical Implications

Electronic bulletin boards are tools of community – that is, they are generally intended to bring together dispersed people who have common interests. The tools allow the dispersed group to share information, ideas, or personal experiences about their area of interest. Within the context of a workplace, this researcher believes bulletin boards may be very useful tools for groups that need to share work-related information or groups that need to interact regularly with each other to coordinate their work activities. However, to be useful the workgroup members must view the board as a forum for sharing information with the larger group, and use it for this purpose.

Although the only research hypothesis that was supported was the relationship between bulletin board use and satisfaction with the board, the project did provide useful information about the two communication tools. It seems clear that participants particularly value timely responses to their posts. Due to the low volume of exchange on the bulletin board and the universal use of email within the workgroup, email was likely to yield a faster response from the group than posting to the board.

The enhanced capability of the bulletin board to organize messages did not lead to more satisfaction with the communication medium as expected. Although a large percentage of the participants indicated they receive a high volume of emails and did not enjoy using the email program, they stated they were able to organize messages effectively and locate messages easily. As a result, the message organization features of the bulletin board were not as influential in determining participants' satisfaction with the bulletin board.

These findings should be carefully considered given the limited use of the electronic bulletin board during the project. It would be interesting to compare the two tools again at a later date, or to study a workgroup that has successfully incorporated use of both tools into their communication processes to determine if users have clear preferences between the two tools with regards to specific tasks. Given the variety of communication tools available and the widespread use of communication technology in organizations, the comparison of communication tools in general is an interesting area for future research. In addition, more information about the communication features users find most important would add to our knowledge of communication preferences and enhance the design of future communication technologies.

Marketing of a new communication tool is also vitally important. Critical mass theory (Markus, 1987) suggests that for a technology to be universally accepted and reach its peak use, a critical number of users must adopt the technology. Once this critical mass is reached, the technology catches on and develops a self-sustaining level of user interest. Despite marketing efforts to increase participants' awareness and use of the bulletin

board, members of the workgroup were still not fully aware of the tool and its benefits at the end of the project. The tool was not used consistently by enough workgroup members for its content to become relevant and of value to the larger group.

The findings of this project bring to light several issues that should be considered when introducing computer-mediated communication tools. The first is the issue of public versus private communication. The electronic bulletin board is a very public forum. Whatever is posted to the forum is accessible by all members of the workgroup. Prior to the introduction of the bulletin board in this organization, a decision was made not to allow anonymous posts. It was believed that allowing anonymous posting would remove restraint, and encourage flaming and other undesirable behaviors on the board. However, the practice of signing posts with the author's name enabled users to easily take a discussion out of the public forum, thereby depriving other readers of information that would otherwise have been posted to the board for the benefit of all. In addition, the practice of signing all posts also may have discouraged users from using the board to ask simple questions or to express an opinion that was different from that of other group members.

The second is to whether the tool clearly adds value for users. The organization that participated in this study is conservative, results-focused and emphasizes hard work. Little time is allocated to relationship building, socializing, or play. The work environment is fast-paced and high-energy. Several participants suggested they did not have enough time to use a bulletin board to discuss issues with colleagues. They were simply too busy to spend time talking to colleagues about anything but the current crisis

or project. Many participants viewed the board as just one more site they would have to visit each day and were not willing to add this task to their other responsibilities. These users did not see sufficient value from the tool to make the effort worth their time. Even when they saw value in the tool, many participants did not believe questions posted to the tool would yield timely responses from their colleagues and as a result, preferred to use other, more immediate means of communicating. Unfortunately, this belief becomes a self-fulfilling prophecy in regards to communication tools. If users do not use the tool, then communication is not enhanced and no value can be achieved from introducing the tool.

The last issue is one of control. Rafaeli and LaRose (1993) suggest that to be successful an electronic bulletin board must not restrict user access and must offer diverse content. At the beginning of this project, it was determined that access to the board should be limited, and would require a password to enter. This decision was made to ensure workgroup members the privacy required to freely discuss issues involving employee relations, compensation, or other confidential topics. While the ultimate impact of requiring a password to enter the discussion is not known, it is likely that the password was an obstacle to use of the board and discouraged some members from using the tool.

The organization also exercised control over the content of the bulletin board. During the course of this project, several topics suggested for the bulletin board were rejected by the organization due to concerns that the topics would lead to inappropriate posts, lead to questions about options the company was not prepared to discuss. or

portray company processes in a negative way. While these decisions may have been appropriate for the organization, such control unquestionably limited the variety of topics that would ultimately populate the board and reduced the likelihood of productive discussion. In a climate with such high aversion to risk, it was not surprising to find few group members were willing to post questions or initiate new discussions on the board. To successfully introduce a bulletin board as a workgroup tool, the organization must be willing to take risk and allow users to shape the way the tool will be used, or allow them to participate in decision-making about what topics will be allowed on the bulletin board.

<u>Conclusions</u>

This study involved a relatively small number of participants in a single organization. As a result, the findings from this study cannot be generalized to other organizations in different industries and circumstances. It would be interesting to conduct similar studies in different field settings to determine if similar results would occur. In addition, the short time period between introduction of the bulletin board and the follow-up survey did not allow sufficient time for the adoption rate of the board to reach a level appropriate for the purpose of this study. It would be interesting to survey the group again in the future to determine if use of the board has increased and user perceptions have changed in any way.

Although the results of this study failed to support any of the research hypotheses except for the relationship between use of the bulletin board and satisfaction with it, this project illustrated the importance of understanding and communicating the benefits to be derived from a tool when introducing new communication media. The project also

helped to identify conditions that can inhibit user acceptance of new communication

media. The conditions discussed included the nature of the communication (public vs.

private), the control exercised over use of the medium, and the work environment within

the organization. The project also demonstrated the importance of value propositions in

user adoption of technology, providing additional support for media richness theory.

Results of the project highlight the need for additional research on the relationship

between satisfaction with media and cohesion within a workgroup, and better

understanding of what factors influence user acceptance of communication media.

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Appendix A: Approvals and Authorizations

1. Request to Use Human Subjects in Research Cover Sheet

2. Responsible Faculty Member Form

3. Authorization from Applied Materials to survey employees

4. Letter from Graduate Studies authorizing use of human subjects

San Jose State University
Human Subjects-Institutional Review Board

Request to Use Human Subjects in Research
Cover Sheet

Date Submitted: _7/1/02_ Project Period: From _Present_ To _May 2002_
Funded By: _N/A_
Name: _Lori Pullium_ Department: _Psychology_
Phone Number: Work _565 2620_ During _5 - 6_ Home _251-9332_ During _evening_
Address: _6117 Tarberry Ct_
Faculty _____ Student __x__ Staff _____ Non-SJSU (contact) _____
Title of Proposed Project _Using an Electronic Bulletin Board for Communication in a_
Dispersed Work group
Abstract: _____
_____ See attached proposal _____
_____
_____
_____
_____
_____

Number of Subjects: _325 member pool_ Age of Subjects: _18 - 65_
Type of Subjects: _Adults_
Proposed Research Method: _Survey_
What Kinds of Data Will be Collected: _opinions, demographic variables_
Is a copy or description of each data collection instrument attached: YES _X_ NO ____
Are procedures to protect confidentiality delineated: YES _X_ NO ____
Are agreements from participating institutions (on their letterhead) Included: YES _X_ NO ____
Is a consent form attached: YES _X_ NO ____
Is it on SJSU letterhead? YES _X_ NO ____
Possible Risks: _No foreseeable risks_

Category Risk   A

A. Research involving only minimal risk to human subjects:
Probably and magnitude of harm or discomfort are no greater than encountered in daily life.

Research involving reasonable risk to human subjects:
Risks to the subject are reasonable in relation to anticipated benefits to the subjects and the importance of the knowledge that may reasonably be expected to result.

Please submit two copies of the completed protocol and supporting materials to: San Jose State University, Human Subjects-Institutional Review Board, "Student Service Center, Room 424", San Jose CA 95192-0025. For questions call the HS-IRB at (408) 924-2479.

Responsible Faculty Member Form
Must be submitted with all student research protocols

Title of Proposed Project: _Using an Electronic Bulletin Board for Communication_
in a Dispersed Workgroup
Student Investigator(s): _Lori Pulliam_
Responsible Faculty Member(s): _Howard TeKurage_

I (we), the undersigned, have reviewed the above named study and believe the research conforms to federal, state, and SJSU policy for the protection of human subjects in research. Further, I (we) will monitor the course and conduct of the proposed research..

Signature _____ Date _2/1/02_ Department _Psychology_

Verification of Translation Accuracy

Title of Proposed Project _____

_____

_____

I, the undersigned, verify that all translated materials related to the above named study reflect the intent and spirit of English text.

Signature _____ Date _____ Phone _____

Mailing Address _____

Extension of Time Request Format

Name _____
Phone: work _____ Dept. _____
Address: _____ home _____
Title of project _____
Reason for request _____
Changes or significant events that have occurred during the approval period _____

_____

Include a copy of the original protocol.

APPLIED MATERIALS

January 21, 2002

To: SJSU Human Subjects-Institutional Review Board

The Human Resources department of Applied Materials. Inc. has implemented an informational website for members of the Human Resource team. The site provides access to an electronic bulletin board discussion forum developed and implemented in conjunction with the informational website. Lori Pulliam has been authorized to collect information about usage levels and perceptions of the discussion forum and other related communication media from Applied Materials Human Resource professionals for purposes related to her thesis. The results of the analysis will assist Applied Materials. Inc. in assessing the effectiveness of the discussion forum site. If you have any questions concerning this matter, please feel free to contact me at (408) 563-1939.

Regards,

Len de Llano
Senior Director,
Applied Materials, Inc.

San José State
UNIVERSITY

**Office of the Academic
Vice President**
*Associate Vice President
Graduate Studies and Research*

One Washington Square
San Jose, CA 95192-0025
Voice: 408-283-7500
Fax: 408-924-2477
E-mail: gstudies@wahoo.sjsu.edu
http://www.sjsu.edu

To: Lori Pulliam
        6117 Teaberry Court
        San José, CA   95123-5130

From: Nabil Ibrahim,
        AVP, Graduate Studies & Research

Date: March 29, 2002

The Human Subjects-Institutional Review Board has approved your request to use human subjects in the study entitled:

"Using an Electronic Bulletin Board for
Communication in a Dispersed Workgroup."

This approval is contingent upon the subjects participating in your research project being appropriately protected from risk. This includes the protection of the anonymity of the subjects' identity when they participate in your research project, and with regard to any and all data that may be collected from the subjects. The approval includes continued monitoring of your research by the Board to assure that the subjects are being adequately and properly protected from such risks. If at any time a subject becomes injured or complains of injury, you must notify Nabil Ibrahim, Ph.D. immediately. Injury includes but is not limited to bodily harm, psychological trauma, and release of potentially damaging personal information. This approval for the human subjects portion of your project is in effect for one year, and data collection beyond March 28, 2003 requires an extension request.

Please also be advised that all subjects need to be fully informed and aware that their participation in your research project is voluntary, and that he or she may withdraw from the project at any time. Further, a subject's participation, refusal to participate, or withdrawal will not affect any services that the subject is receiving or will receive at the institution in which the research is being conducted.

If you have any questions, please contact me at (408) 924-2480.

The California State University:
Chancellor's Office
Bakersfield, Channel Islands, Chico,
Dominguez Hills, Fresno, Fullerton,
Hayward, Humboldt, Long Beach,
Los Angeles, Maritime Academy,
Monterey Bay, Northridge, Pomona,
Sacramento, San Bernardino, San Diego,
San Francisco, San Jose, San Luis Obispo,
San Marcos, Sonoma, Stanislaus

Appendix B: Survey Materials

1. Cover letter distributed with survey

2. Survey

San José State
UNIVERSITY

College of Social Sciences
Department of Psychology
One Washington Square
San José, CA 95192-0120
Voice: 408-924-5600
Fax: 408-924-5505
E-mail: csych@email.sjsu.edu

March 20, 2002

Dear Friend,

As part of my Master's thesis research project at San Jose State University, I am conducting a study to examine user perceptions of computer-mediated communication tools. Attached is a questionnaire asking about your use of certain communication tools. The information gathered in the questionnaire will be used solely to better understand how users perceive and react to computer-mediated communication tools. The questionnaire should take no more than seven minutes to complete.

There are no known risks associated with participation in this study. While your participation may have no direct benefits to you, the results of this study will be shared with the Applied Materials Human Resources Department to enhance understanding of new communication media and to assist in improving existing communication tools at Applied Materials.

Please understand that your participation in this study is completely voluntary. You may choose not to participate in this study, or in any part of it, without any negative effect on your relations with San Jose State University or Applied Materials. If you choose to participate, your identity will remain confidential. No information that could identify you will be disclosed in reporting the results of this study.

If you have questions about any aspect of this study, please contact me at (408) 563-2620. Questions about research subjects' rights, or research-related injury may be presented to Nabil Ibrahim, Ph.D., Associate Vice President, Graduate Studies and Research, at (408) 924-2480.

Sincerely,

Lori L. Pulliam
I/O Psychology Graduate Student
San Jose State University

Listed below is a series of statements regarding HRdiscussion. the electronic discussion group recently introduced with the HR Action Center. Please read each statement and indicate your level of agreement or disagreement by selecting the appropriate box on the scale.

Thank you for your participation.

1. HRdiscussion is easy to use.
   ○ Strongly Agree   ○ Agree   ○ Neutral   ○ Disagree   ○ Strongly Disagree

2. HRdiscussion messages are well organized.
   ○ Strongly Agree   ○ Agree   ○ Neutral   ○ Disagree   ○ Strongly Disagree

3. I can easily locate specific messages.
   ○ Strongly Agree   ○ Agree   ○ Neutral   ○ Disagree   ○ Strongly Disagree

4. I enjoy using HRdiscussion.
   ○ Strongly Agree   ○ Agree   ○ Neutral   ○ Disagree   ○ Strongly Disagree

5. HRdiscussion helps me to complete job-related tasks.
   ○ Strongly Agree   ○ Agree   ○ Neutral   ○ Disagree   ○ Strongly Disagree

6. HRdiscussion helps me gather job-specific information.
   ○ Strongly Agree   ○ Agree   ○ Neutral   ○ Disagree   ○ Strongly Disagree

7. HRdiscussion is an effective way to request information from colleagues.
   ○ Strongly Agree   ○ Agree   ○ Neither   ○ Disagree   ○ Strongly Disagree

8. HRdiscussion is an effective way to provide information to colleagues.
   ○ Strongly Agree   ○ Agree   ○ Neutral   ○ Disagree   ○ Strongly Disagree

9. I use HRdiscussion to share job-related reports with colleagues or supervisors.
   ○ Strongly Agree   ○ Agree   ○ Neutral   ○ Disagree   ○ Strongly Disagree

10. I use HRdiscussion to discuss issues with colleagues.
   ○ Strongly Agree   ○ Agree   ○ Neutral   ○ Disagree   ○ Strongly Disagree

11. Overall, I think HRdiscussion is an effective way to communicate.
   ○ Strongly Agree   ○ Agree   ○ Neutral   ○ Disagree   ○ Strongly Disagree

Please read the following questions and indicate the appropriate response:

12. Approximately how often do you read posts on HRdiscussion?
   ○ Never   ○ Less than once a week   ○ 1-2 times per week   ○ 3-4 times per week   ○ Daily

13. Approximately how often do you post to the HRdiscussion board?
   ○ Never   ○ Occasionally   ○ Frequently

14. Have you subscribed to an HRdiscussion topic?
   ○ Yes ○ No

15. How can we make HRdiscussion more useful and appealing?

Listed below is a similar series of statements regarding the Applied Materials email system. Please read each statement and indicate your level of agreement or disagreement with the statement by selecting the appropriate box on the scale.

16. The Applied email system is easy to use.

○ Strongly Agree   ○ Agree   ○ Neutral   ○ Disagree   ○ Strongly Disagree

17. I am able to organize my email messages.
○ Strongly Agree   ○ Agree   ○ Neutral   ○ Disagree   ○ Strongly Disagree

18. I can easily locate specific messages.
○ Strongly Agree   ○ Agree   ○ Neutral   ○ Disagree   ○ Strongly Disagree

19. I enjoy using the email system.
○ Strongly Agree   ○ Agree   ○ Neutral   ○ Disagree   ○ Strongly Disagree

20. Email helps me to complete job-related tasks.
○ Strongly Agree   ○ Agree   ○ Neutral   ○ Disagree   ○ Strongly Disagree

21. Email helps me to gather job-specific information.
○ Strongly Agree   ○ Agree   ○ Neutral   ○ Disagree   ○ Strongly Disagree

22. Email is an effective way to request information from colleagues.
○ Strongly Agree   ○ Agree   ○ Neutral   ○ Disagree   ○ Strongly Disagree

23. Email is an effective way to provide information to colleagues.
○ Strongly Agree   ○ Agree   ○ Neutral   ○ Disagree   ○ Strongly Disagree

24. I use email to share job-related reports with colleagues or supervisors.
○ Strongly Agree   ○ Agree   ○ Neither   ○ Disagree   ○ Strongly Disagree

25. I use email to discuss issues with colleagues.
○ Strongly Agree   ○ Agree   ○ Neutral   ○ Disagree   ○ Strongly Disagree

26. Overall, I think email is an effective way to communicate.
○ Strongly Agree   ○ Agree   ○ Neutral   ○ Disagree   ○ Strongly Disagree

---

The following is a series of questions about yourself and your background. Please read each question and indicate the appropriate response. Again. please answer the questions to the best of your ability. Your responses will remain confidential.

27. What is your work location?
○ Santa Clara   ○ Austin   ○ Other US   ○ Outside US

28. What is your gender?
○ Male.   ○ Female

29. What is your age group?
○ 18-24   ○ 25-34   ○ 35-44   ○ 45-54   ○ 55 or over

30. What is your highest level of education?
○ High School   ○ Some College   ○ Associate's Degree ○ Bachelor's Degree ○ Graduate Degree

31. Which category best describes your job role?
○ Generalist   ○ Specialist   ○ Manager   ○ Administrative

32. What is your functional role?
○ Corporate Assignment ○ Line Assignment

33. How long have you worked at Applied Materials?
○ Less than 1 year ○ 1 - 2 years   ○ 2 - 3 years   ○ 3 - 5 years   ○ 5 or more years

34. Which category best describes your proficiency level with computers?
○ Beginner   ○ Generally Competent ○ Highly Competent   ○ Expert

35. Approximately how many work-related emails do you receive per day?

61

○ 10 or less　　○ 11 - 20　　○ 21 - 50　　○ 51 - 100　　○ More than 100

36. Approximately how many work-related emails do you send per day?
○ 10 or less　　○ 11 - 20　　○ 21 - 50　　○ 51 - 100　　○ More than 100

37. Is use of an Internet browser important in performing your job?
○ Yes ○ No

Indicate your level of agreement with the following statements:

38. I have opportunity to interact with the AMAT HR community outside my immediate workgroup.
○ Strongly Agree　　○ Agree　　○ Neither　　○ Disagree　　○ Strongly Disagree

39. Members of the AMAT HR community are supportive of each other.
○ Strongly Agree　　○ Agree　　○ Neither　　○ Disagree　　○ Strongly Disagree

40. I feel connected to the larger AMAT HR community.
○ Strongly Agree　　○ Agree　　○ Neither　　○ Disagree　　○ Strongly Disagree

Thank you for your time and assistance.