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Cross-cultural issues in virtual team support: Communication characteristics and task/technology perceptions from Mexican and U.S. team members

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ABSTRACT

We present a study of cross-cultural virtual teams supported by two computer-mediated communication technologies (electronic mail and the World-Wide Web). Our primary focus is to identify how cultural differences affect users' task and technology perceptions. Dyads made up of members from the United States and Mexico created a five-page strategic plan for the implementation of a joint MBA international business capstone course that establishes strong international bonds between the students of both institutions. Team members generated ideas, made decisions, and created a common strategic course through Email-based correspondence. They also had access to a project coordination guide, which was a website with project guide- lines, timelines, updates, and the postings of all participants and information on their respec- tive institutions and host cities. Analysis of pretest questionnaires revealed strong similarities between the two cultural groups with respect to professional background and experience with relevant technologies, and differences in language facility with Spanish and English. Analysis of posttest data showed marked differences in communication characteristics (frequency and length of message) and perceptions of process, outcome and opinions of suitability of the tech- nologies to support the task. Results, consistent with earlier studies, show the limited power of popular theoretical characterizations of national culture to predict culture-based differences in information technology use and perceptions. Alternative, relevant culture-based factors are discussed.

INTRODUCTION

The growing popularity of the team work unit, advances in telecommunications networks and software to support distributed group work (groupware), and a hypercompetitive business environment have been the catalysts for new organizational forms, the virtual organization, and

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its smaller version, the virtual team (Javenpaa & Ives, 1994). Virtual team members are geographically and often temporally distributed, possibly anywhere within (and beyond) their parent organization and represent organizational knowledge assets that need to collaborate to accomplish tasks. Typically, the members have different areas of expertise and knowledge, and often work in different functional areas (Lipnack & Stamps, 1997; Townsend et al., 1998; Duarte & Snyder, 1999). The virtual team, via groupware, can interact and collaborate though separated by distance and time. This ability gives organizations increased flexibility and responsiveness, permitting them to rapidly form relevant distributed knowledge assets into a virtual team that can work on any urgent project. When finished, the team can be disbanded and members redeployed to other projects; members may also serve on multiple virtual teams simultaneously.

The virtual team is an emerging and relatively unstudied organizational form. Enabled by emerging technologies, new organizational forms can present a myriad of managerial challenges, with ambiguous roles for its members, potentially high coordination costs, worker reassignment, undetermined performance standards and metrics, and accountability issues (DeSanctic & Poole, 1994). Piccoli (1999) categorizes virtual team management issues as *internal* (e.g., identification of processes and characteristics of effective virtual teams), *external* (e.g., team boundaries, gatekeeping, external communication), *technological* (support systems), and *societal* (Implications for individuals and society). This study focuses on internal, technological, and societal issues of virtual team management. We present a study of cross-cultural collaboration supported by two computer-mediated communication technologies (electronic mail and the World-Wide-Web). Our primary focus is to identify how cultural differences affect users' task and technology perceptions.

Rather than using larger groups and many different cultures employed in similar studies (e.g., Knoll & Jarvenpaa, 1995), we limit the present research to intercultural dyads made up of one member from the United States and one from Mexico. Given the tremendous amount of business and social exchange between these two cultures and the fact that much collaborative work is dyadic, we believe that this specific and parsimonious focus is exceptionally valuable.

BACKGROUND

Virtual Teams and Their Technological Support

One of the major components of teamwork (virtual and face-to-face) is communication (McIntyre, Salas, Morgan, & Glickman, 1989; Morgan, Glickman, Woodard, Blaiwes, & Salas, 1986). According to Dickenson & McIntyre (1997), communication involves the exchange of information between two or more team members in the appropriate manner. It also serves to clarify, verify, and acknowledge messages. Communication is central to teamwork because it links together other components such as monitoring of performance and feedback. Although communication via basic computer-mediated communication (CMC) media such as Email has been extensively studied (Keisler & Sproul, 1992; Hiltz & Turoff, 1993), two issues require further attention. First, some virtual teamwork may entail capturing, displaying, and distributing

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information in some form other than text (such as graphs, tables, drawings, etc.). Second, cross-cultural virtual team members may have different culture-based preferences for communication support that may in turn reflect their perceptions of and satisfaction with particular technologies and their application to particular tasks (Straub, 1994; Balthazard & Potter, 1996; Potter & Balthazard, in press).

Information richness theory (IRT) Draft & Lengel, 1986) is concerned with characterization of different communication media and their relative suitability for different types of organizational communication. "Richness" is a quality that comes from a medium's capacity to support immediate feedback, alternative communication channels such as facial expressions, body language, and tone of voice, and variation in use of language. Face-to-face communication is considered the richest medium, followed by telephone, personal documents, impersonal written documents, and numeric documents. IRT holds that people select a medium for communication by matching the medium's richness (or leanness) to the particular task's demands for unambiguous or unequivocal communication. Tasks that can tolerate (or benefit from) some ambiguity or equivocality can be supported with a lean medium; those that cannot require a rich medium. IRT considers computer-mediated communication (CMC) to be a relatively rich medium. The task used in this study is relatively unequivocal and unambiguous. Therefore, IRT would consider the task-technology fit to be favorable.

Information richness theory's characterization of the richness of certain media, particularly Email, has been the focus of some debate. Hiltz and Turoff (1993) have shown that some forms of communication that are suppressed in a particular medium (e.g., facial expression cues in e-mail) can be replaced with alternative expressions of the same message appropriate to the media. Ngwenyam and Lee (1997), Lee (1994), building on work by Marcus and her colleagues (El-Shinnawy & Marcus, 1992; Markus, 1994) argue that an interpretist approach that gives greater importance to the environmental context of the (e-mail) message and the actors involved yields much greater insight and richness in textual communication compared to what would be found using the positivist approach implicit in information richness theory. Finally, in a recent study using CMC, Dennis and Kinney (1998) did not find support for IRT's central premise that matching media richness to task equivocality improves task performance. Although these findings raise serious questions about IRT, particularly with regard to Email, they generally imply that Email is more and not less suitable for the present task than the theory indicates.

As described below, our subjects were also supported by a web site where they could access additional task-related information. Although the task did not require use of nontextual information, the website did allow the display of different types of textual information along with some graphics (such as the logos of the study and the two universities) as well as an organized repository of task-related information (such as the biographies of the participants and links to related supporting information).

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Cultural Aspects of Virtual Team Support

Whether management practices or technologies developed in one culture are desirable or effective in different cultures has been a subject of research for some time (Hofstede, 1980a, 1980b, 1993). These questions have more recently been taken up by information systems researchers (Straub, 1994; Balthazard & Potter, 1996; McLeod, Kim, Saunders, Jones, Scheel, & Estrada, 1997; Mejias, Shepard, Vogel, & Lazaneo, 1997). Researchers have shown that cultural background shapes values, and values in turn shape behaviors in a number of tasks (negotiation, for example) (Bond & Smith, 1996). Research is now beginning to indicate that culture also shapes attitudes that impact on how technology is used. When considering the use of modern technologies to support collaborative work by users of different cultural backgrounds, understanding culture's effects is doubly important. Such an understanding is not easily gained, however, even when limited to well-understood tasks and technologies. There are many, many different national cultures, cross-cultural theories that frequently require creative interpretation to be applicable to common organizational tasks and circumstances, and numerous ethnographic and anecdotal characterizations of culture that may or may not generalize to the situation under study.

Findings of studies aimed at determining the influence of culture on management in general and information system use have been mixed (McLeod et al., 1997). Probably the most popular characterizations of culture and dimensions along which cultural differences can be measured come from Hofstede (1980a). His four most commonly used dimensions are power distance, uncertainty avoidance, masculinity/femininity, and individualism/collectivism. Power distance refers to the extent that a boss and a subordinate can determine each other's behavior. Uncertainty avoidance is the degree to which members of a society feel uncomfortable with uncertainty and ambiguity. Masculinity/femininity refers to preponderance of masculine or feminine goals endorsed by members of a particular culture. Individualism describes the relationship between the individual and the collectivity that prevails in a given society.

Unfortunately, the linkage between characterizations of external (i.e., national) cultures and organizational behaviors is often tenuous and inconsistent across organizations, even those embedded in the same culture. Hofstede's measures by themselves often cannot reliably account for differences (or lack of differences) in organizational behaviors across cultures. This does not mean that they are flawed, but rather that they are abstract and often require some careful interpretation to tie them to the dependent variable under consideration; even then, researchers have little a priori insight to the strength of effect that these manifestations of culture will have on their dependent variables. Hofstede's *uncertainty avoidance* measure had mixed explanatory power in Straub's (1994) study of Email and FAX use among Japanese and American knowledge workers. Straub theorized that increased desire of the Japanese for uncertainty avoidance relative to Americans should lead to a preference for rich communication media. The hypothesized perceptions of media richness and subsequent use of these media were only partially supported. Watson, Ho, and Raman (1994) developed hypotheses based on Hofstede's *power distance* and *individualism* dimensions in a study that examined culture's role in the effectiveness of a group support system to effect change in group consensus and distribution of influence within the group. Only 40 percent of their hypotheses were supported by the study's results. Another study by Tan, Wei,

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Watson, Clapper, and McLean (1997) examined the role of GSS support in moderating majority influence with American and Singaporean groups. The cultural components of their hypotheses were also based on Hofstede's *individualism* dimensions; only 50 percent were supported. A similar study by Tan, Wei, Watson, and Walczuch (1998), also run with Singaporeans and Americans, sought to identify cultural effects on CMC's ability to reduce status effects. Again drawing on the *power distance* and *individualism* dimensions, to hypothesize about culture's differential effects, 40 percent of the hypotheses were not supported.

For both researcher and practitioner, the only reliable way to assess the strength of cultural influences on an applied problem such as the suitability of a technology for a particular task is through empirical investigation. Although the subjects in the present study come from cultures that differ significantly on most of Hofstede's dimensions, given that such comparisons have rarely yielded much predictive insight in communication/coordination technology-oriented studies like this one, we are not prepared to offer specific directional hypotheses on how members of each culture will differ on their perceptions of the technology and its suitability of the task, satisfaction with process and outcomes, or culture's effects on the quality of the outcomes themselves.

On a more pragmatic level, cultural effects with cross-cultural virtual teams may manifest themselves as differential perceptions of satisfaction with the task, technology, outcomes, and relative contributions of the team members. This may be more likely to occur if members from one culture have significantly more experience with the technologies than do those of the other culture. This may also occur if task communication is conducted in the first (native) language of one member but not the other. In the present study, all communication was in English, the first language for all of our U. S. subjects but for none of our Mexican subjects. The traditional technology for virtual team support is the telephone, and its use requires real-time verbal fluency in the language used. CMC, as used in the present asynchronous manner, however, allows participants more time to properly construct and edit their written communication, and may represent an advantage for those who are not communicating in their first language. Given the ease with which U. S. subjects can communicate in English via e-mail relative to their Mexican teammates, we can expect that they may send more messages and/or messages of greater length. This may impact perceptions of relative ability and contribution.

H1: Due to cultural factors such as language differences, dyad members will hold differing perceptions of the suitability of the technologies to support the task.

H2: Due to cultural factors such as language differences, dyad members will hold differing perceptions about their partner's contribution to the task.

METHOD

Subjects

Twenty American MBA students from the University of North Carolina at Greensboro and twenty Mexican MBA students from the Instituto Tecnologico y Estudios Superiores de Monterrey

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(ITESM) Graduate School of Business in Mexico City voluntarily participated in the study. Subjects posted brief descriptions of themselves (age, professional and personal interests) to a website devoted to supporting the exercise. On the basis of this information, subjects sent messages via Email to desired candidates from the other country until pairings were ultimately decided upon. They then undertook the task.

Task

Dyads created a give-page strategic plan for the implementation of a joint MBA international business capstone course that establishes strong international bonds between the students of both institutions. The task was quite complex, entailing the planning of one-week visits by students from one campus to the partner's and vice versa. This required decisions about itineraries, desired lectures, and site visits in each location. This entailed extensive information exchange, with one partner advising the other as to desirable points of interest and lectures available in their respective locations.

Team members generated ideas, made decisions, and created a common strategic course through Email-based correspondence. They also had access to a project coordination guide, which was a website with project guidelines, timelines, updates, and the postings of all participants and information on their respective institutions and host cities. The website also has a link to a site maintained by Knoll (1996) that featured suggestions for developing virtual collaboration skills such as organization, role playing, developing the deliverable, expression with typed text, tips on cross-cultural communication, and tips on coping with technology. The task spanned four weeks. Students were instructed to allocate approximately 15 hours per week to the task.

Procedure

Subjects completed a pretest questionnaire after selecting their partner, but prior to any task-based interaction with him or her. Participants then went to the website, read and/or downloaded task instructions. Participants worked independently and interactively in an iterative fashion until the project was completed. Dyads were instructed to keep records of all messages sent and received. These were turned into their respective professors (the authors) along with completed pretest and posttest questionnaires and the final deliverable.

Technologies

Participants used electronic mail (e-mail) to communicate with each other. They were free to use any account they maintained, through work or through their respective universities. As noted above, the task was supported by a website, where task information included a project coordination guide with project guidelines, timelines, updates, and the postings of all participants and information on their respective institutions and host cities. The website was also linked to Knoll's (1996) website with its guide to developing virtual collaboration skills.

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Measures

Language skills and technology experience: Using a six-point Likert scale (0 = none, 5 = a high level) on a pretask questionnaire, subjects reported their ability in writing, reading, and speaking Spanish and English. Another scale asked them to indicate these abilities with any other language. Additional pretest questions asked subjects to report their experience with various computer-based technologies, and to report their professional background.

Perceptions of task, technology, and outcomes: A post-task questionnaire asked subjects to report their activities during the formative stage of the exercise. This was composed of nine questions on the number and type of e-mails sent and received during the process of partner selection. A second post-task questionnaire asked 11 questions about quantity and quality of correspondence during the task, as well as opinions of outcome quality, process quality, language-based challenges, and intention to communicate with partner after the task was completed. Seven additional questions asked subjects to report satisfaction with the outcome of the task, satisfaction with international content and accuracy/detail of the final report, hours devoted to the project and time dedicated to communication, and desire to be involved in future virtual teamwork exercises. As noted above, each dyad was required to submit a deliverable upon completion of the task. Each deliverable was graded by the second author.

A final post-task questionnaire, using a five-point Likert scale (1 = strongly disagree, 5 = strongly agree), asked subject to indicate their agreement with 37 statements regarding a variety of factors having to do with the appropriateness of specific information/communication technologies to support the task, and perceptions of their own and their partner's interaction/performance. These questions addressed technology preferences for various tasks, issues of privacy and security, efficiency, effectiveness, and comparative preference for telephone, e-mail, and face-to-face formats for supporting virtual collaborative work.

RESULTS

Background Characteristics

All subjects were remarkably similar to each other with respect to professional background (i.e., middle level managers in large corporations). The majority of the Mexican subjects worked for American and European multinational corporations (as did the majority of the U. S. subjects). The amount of experience with various computer and telecommunications technologies, including e-mail, Internet/WWW, decision support systems, and FAX did not differ significantly. As expected, Mexican subjects reported a higher level of fluency with writing, reading and speaking Spanish than U. S. subjects, although a somewhat lower level of fluency in English.

Communication Characteristics

Culture-based communication differences were evident from the formative stages of the exercise onward. During the initial stages (i.e., forming the dyad) Mexican subjects reviewed

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only half as many bios of potential partners as did U. S. participants (an average of 4.82 vs. 11.11). The Mexican subjects also reported receiving about twice as many e-mails from prospective U. S. Partners (4.47 vs. 2), and contact from nearly three times as many potential partners (3.55 vs. 1.22). During the task completion stage, U. S. subjects continued to send more e-mail messages than their Mexican partners (an average of 10.33 vs. 7.11). Mexicans exclusively reported that language was not a difficulty (average = 0), whereas a slight number of U. S. subjects felt it was (.03). Mexicans also reported over twice the intention to continue communicating with their partner after the exercise (.89 vs. .44). These results are summarized in Table 1.

Table 1. Communication Characteristics in Team Forming and Task Completion Stages

	Mexican Participant	American Participant	t[a]
Team Forming Stage			
Number of bios reviewed	4.82	11.41	-2.14*
Number of people sent e-mails	3.56	3.22	0.47
Number of e-mails sent seeking a partner	3.67	3.56	0.13
Number of e-mails received	4.47	2.00	3.69**
Percentage of e-mails responded to	93.87	81.60	1.05
Task Completion Stage			
Number of e-mails sent partner	9.94	9.72	0.251
Number of e-mails received from partner	10.33	7.11	3.24**
Opportunity to communicate with partner (Y/N)	0.72	0.50	1.72
Adequately coordinated activities (Y/N)	0.78	0.33	3.06**
Adequately made specific decisions (Y/N)	0.72	0.39	2.38*
Language skills a difficulty (Y/N)	0.00	0.03	-1.00
Continue exchanges after task done (Y/N)	0.89	0.44	2.76*

[a]   Paired t-test, 2-sided, 17 d.f.
*   Indicates significant at $p < .05$
**   Indicates significant at $p < .01$
*** Indicates significant at $p < .001$

Cultural Effects on Process and Outcome Perceptions

Americans were less satisfied with the exercise's outcome than Mexicans (with yes = 1 and no = 0, the average score for Americans was .46; Mexicans, .71). Dyad members also differed significantly on their perceptions of adequately coordinating the task (with yes = 1 and no = 0, the average score for Americans was .33; Mexicans, .78), and adequately making specific decisions (Americans = .39, Mexicans, .72). Another portion of the post-test questionnaire asked subjects' agreement with a number of statements (1 = strongly disagree; 5 = strongly agree) regarding task process and outcomes. Mexicans were in more agreement that both participants contributed equally (an average of 4.05 vs. 2.0 for U. S. subjects), that they were able to create a common document with their partner (4.11 vs. 2.94), and that could reach agreements concerning the deliverable with their partner (3.94 vs. 3.33). U. S. participants also much less in agreement that their partner answered their questions (3.56 vs. 4.38) and they answered their partner's question (3.89 vs. 4.44). U. S. members, relative to their Mexican counterparts, were less in agreement that there was a high level of conflict between partners, and were less in agreement that they considered the project a success (3.05 vs. 3.94).

Cultural Effects on Technology and Task Perceptions

Mexicans were less in agreement with being less apprehensive about using e-mail than a phone call for communication with their partner (3.0 vs. 3.72). However, they were in greater agreement that e-mail was an effective medium to discuss the task to be accomplished (4.17 vs. 3.56). Mexican participants were in greater agreement that geographic dispersion did not hinder outcome quality. The team members did not differ significantly in their assessment of the suitability of the technologies to support accomplishing the task itself. Table 2 presents a summary of the results of paired t-tests comparing Mexican and U. S. participants on process, outcome, technology, and task perception.

DISCUSSION

Our results do not fully support Hypothesis 1: Subjects' cultural background did not significantly effect their perceptions of suitability of the technologies for the task. However, their opinions on the effectiveness of the medium for task discussion did vary significantly, as did their opinions comparing e-mail with telephone communication. The amount of e-mail generated by the Mexicans is consistent with their somewhat greater apprehension to use this medium for communication instead of the telephone. We expected the opposite results, speculating that the ability to edit their communication as they wished (not possible with real-time telephone conversation) would be a benefit that would translate into a higher opinion of the CMC technology for the task relative to Americans. This result may be manifest in the Mexicans' greater support for e-mail vs. the telephone as a medium of discussion of the task, but this is purely speculative.[2]

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Table 2. Cultural Effects on Process, Outcome, Technology, and Task Perceptions[a]

Perception Issues	Mexican Participant	American Participant	t[b]
Voluntary participation	3.94	4.61	-2.20*
Same grade for both	3.89	2.22	5.51***
Same requirements for both	3.72	2.33	4.03***
Equal contribution to project	4.06	2.00	6.68***
Best introduced to partner via spoken word	3.67	3.39	.84
Best introduced to partner via written comm.	3.44	3.50	-.16
Evaluation of partner best by listening to him/her	3.28	3.06	.68
Evaluation of partner best by reading his/her corr.	3.62	3.00	3.34**
Counting exercise as international project	3.61	3.28	1.14
Need to see a picture of partner	3.83	3.33	2.70*
Need to show a picture of me	3.50	3.28	1.00
Success in creating document	4.11	2.94	7.00***
Success at integration	3.83	2.94	3.06**
Success at reaching agreements	3.94	3.33	2.83*
Even participation over time	3.67	2.11	5.50***
Questions answered from partner	4.39	3.56	4.12***
Answered partner's questions	4.44	3.89	3.83***
E-mail is adequate for task	4.22	3.56	4.12***
High level of conflict between partners	2.72	1.83	2.47*
Project a success	3.94	3.06	6.47***
Created sense of team necessary to succeed	3.93	3.72	1.02
Interaction managed by set or rules	3.28	2.50	2.96**
Assumptions & expectations defined	3.67	2.89	2.61*
Machines best to deal with lack of comm. skills	2.67	2.72	-.20
Less apprehensive about email than phone	3.00	3.72	-4.08***
Prefer verbal over written correspondence	2.67	2.89	-1.07
Email is effective to discuss task	4.17	3.56	3.05**
Email is effective to coordinate	3.94	3.63	1.43
Email is effective to make decisions	3.89	3.56	1.68
Full control of content with email	3.67	3.89	-.68
Full control of content using phone	3.89	3.28	1.57
Email is efficient for international comm.	4.17	3.94	.75
Phone is efficient for international comm.	4.22	3.89	1.56
Geographic dispersion did not hinder quality	4.11	3.22	2.85*
Time dispersion was an important constraint	4.06	3.94	.40
Time was an important constraint	4.22	4.50	-1.23

[a] 5-point Likert scale from strongly disagree (1) to strongly agree (5)
[b] Paired t-test, 2-sided, 17 d.f.
* indicates significant at $p < .05$
** indicates significant at $p < .01$
*** indicates significant at $p < .001$

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Hypothesis 2 was supported. American subjects reported perceptions of less equal contribution and more communication problems with their partners. They also reported lower levels of satisfaction with the task outcomes. This was part of a more general pattern of U. S. subjects being more critical of team processes and task outcomes compared to their Mexican partners. Although Mexican participants reported that corresponding in English was not a problem for them, some U. S. subjects appear to have had some difficulty with their partner's writing. The differences in the volume of email messages sent and received by the two cultural groups may indicate that correspondence in English was more difficult for the Mexican subjects and it had the effect of reducing the amount of messages they generated. This is also consistent with the number of potential partner biographies reviewed by each group. Alternatively, this effect may be due to the differential availability of the telecommunications technology. However, all subjects entered the study voluntarily with the understanding that they had sufficient access to electronic mail to complete the exercise.

A shortcoming of the present study is that although we were able to determine that both cultural groups had very similar amounts of experience with relevant technologies, we did not ask subjects directly about their experience with cross-cultural teamwork. As the great majority of the Mexican subjects worked for multinational firms, we expect them to have had more professional contact with other organizational members outside of their home country (e.g., the United States), whereas we would not automatically expect that from their U. S. counterpart. The notable differences in satisfaction with task outcomes and satisfaction of the technology for the task between the two cultural groups may thus stem from the fact that the Mexican subjects have done more work across cultures than U. S. subjects and thus have a more objective, experiential reference point from which to judge the success of the processes and technology.

These speculations also underscore our concerns regarding the somewhat abstract nature of cultural characterizations. Although our conclusions are quite tentative (due in part to the modest size and duration of the present study), our explanations of differences due to language, technology availability, and experience with cross-cultural work may be more proximate and useful than applications of extant cross-cultural theory. It is, for example, difficult to formulate meaningful explanations of our results (or even, as noted, hypotheses) based on how the two cultures differ with respect to masculinity/femininity, power distance, and collectivism/individualism. Differing culture-based preferences for uncertainty avoidance, manifest in facility with a second language and relative preferences for one communication medium or another, may be playing a role in the present study, but that is also a matter that warrants additional research.

CONCLUSION

The economic incentive to utilize CMC technologies to support collaborative work instead of requiring team members to travel for a traditional face-to-face meeting is often significant, and becomes more compelling as distances increase. Electronic mail supports asynchronous communication for virtual teams, but it can now be augmented (or even replaced) by Web-based CMCs that support inexpensive and virtually free real time interaction. Real time interaction is not only

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supported by the Internet's infrastructure but is being utilized by organizations reaching out to their workers, business partners and customers. Real time collaboration tools are proliferating and adoption is occurring very rapidly.[2]

Both electronic mail (Email) and the Internet are common in large Mexican business organizations. The two CM C technologies used in the present study. organizations in the United States and Mexico can give increased consideration to using CMC technologies to support virtual teams composed of people from cultures. However, before creating cross-cultural virtual teams, managers should realize that differing levels of facility with a chosen language. as well as the amount of experience team members may have with this work style may bear upon how well the technology is perceived to support the team's tasks and may also affect perceptions of member competence and contribution to the task. Considering the ubiquity of transnational business organizations, the increasing popularity of team work, and the existence of technologies that can support geographically dispersed and both synchronous and asynchronous collaboration, both researchers and the business community are likely to pay increased attention to culture's role in the application of technology in support of cross-cultural virtual teams.

NOTES

[1] The first author (a member of the faculty of the Mexican University) was told by several of his student subjects that, due to their imperfect English, they feared that they may be perceived as less intelligent or capable by their U. S. partners. The asynchronous nature of email helped them to avoid some potential embarrassment, as they had time to edit their communications. It is possible, however, that some subjects' fluency in speaking English is superior to their ability to write grammatically correct English. Our analysis of subjects' self-reported English fluency did not provide any conclusive evidence on this point.

[2] The real time collaboration (RTC) marketplace is made up of three interlocking technologies: audioconferencing, dataconferencing and videoconferencing. RTC was a $6.2 billion collar market in 1999. Worldwide, audioconferencing will represent a $2.3 billion industry this year, while videoconferencing (counting both room-based and desktop figures) has a value of #3.4 billion. These segments are respectively growing at 19% and 25% annually. Sales channel revenues were factored into the videoconferencing estimates since most vendors pass through a channel partner before reaching the customer. The teleconferencing estimate accounts for service provider revenues only, and does not include hardware sales (such as bridges, switches and PBXs). The dataconferencing market is growing at a much faster rate than the other two segments of RTC. The average annual growth rate between 1998 and 2002 for data sharing is estimated to be 64%. The growth rate between 1998 and 1999 is an astounding 111%. In 1999, dataconferencing vendors and their channel partners comprised a $550 million market. This is estimated to grow to $1.8 billion by 2002, with a total of 12.9 million users and 35,750 corporate or other organizational deployments (Collaborative Strategies, 1999).

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REFERENCES

Balthazard, P. & Potter, R. (1996). Web-centric collaboratories and international virtual team-work: An analysis of emerging platforms in IS education. *Proceedings of the 27th Annual Meeting of the Decision Sciences Institute.*

Bond, M. H. & Smith, P. B. (1996). Cross-cultural social and organizational psychology. *Annual Review of Psychology, 47,* 205-235.

Collaborative Strategies (1999). www.colaborate.com

Daft, R. & Lengel, R. (1986). Organizational information requirements, media richness and structural design. *Management Science, 32*(5), 554-571.

Dennis, A. R. & Kinney, S. T. (1998). Testing media richness theory in the new media: The effects of cues, feedback, and task equivocality. *Information Systems Research,* 9.

DeSanctis, G. & Poole, M. S. (1994). Capturing the complexity in advanced technology use: Adaptive structuration theory. *Organization Science, 5*(2), 121-147.

Dickinson, T. L. & McIntyre, R. M. (1997). A conceptual framework for teamwork measurement. In M. T. Brannick, E. Salar, & C. Price (eds.), *Team Performance Assessment and Measurement.* Mahwah, NJ: Erlbaum Associates.

Duarte, D. L. & Snyder, N. T. (1999). *Mastering virtual teams.* San Francisco: Jossey-Bass.

El-Shinnawy, M. M. & Markus, M. L. (1992). Media richness theory and new electronic communication media: A study of voice mail and electronic mail. In J. I. DeGross, J. D. Becker, & J. J. Elam (Eds.), *Proceedings of the thirteenth international conference on information systems,* 91-105.

Hilz, S. R. & Turoff, M. (1993). *The network nation: Human communication via computer.* Cambridge, MA: MIT Press.

Hofstede, G. (1980a). *Culture's consequences: International differences in work-related values.* Beverly Hills, CA: Sage.

Hofstede, G. (1980b). Motivation, leadership, and organization: Do American theories apply abroad? *Organizational Dynamics, 9*(1), 42-63.

Hofstede, G. (1993). Cultural constraints in management theories. *Academy of Management Executive, 7*(1), 81-94.

Jarvenpaa, S. & Ives, B. (1994). The global network organization of the future: Information management opportunities and challenges. *Journal of Management Information Systems,* 10.

Kiesler, S. & Sproul, L. (1992). Group decision making and communication technology. *Organizational Behavior and human Decision Processes, 52*(1), 96-123.

13

Knoll, K. &   Jarvenpaa, S. (1995). Learning to work in distributed global teams. In the proceedings of the *1995 HICSS Conference*.

Lee, A. S. (1994, June). Electronic mail as a medium for rich communication: An empirical investigation using hermeneutic interpretation. *MIS Quarterly*, 143-157.

Lipnack, J. & Stamps, J. (1997). *Virtual teams: Reaching across space, time, and organizations with technology*. New York: John Wiley & Sons.

Markus, M. L. (1994). Electronic mail as the medium of managerial choice. *Organization Science*, 5(4), 502-527.

McIntyre, R. M., Salas, E., Morgan, B., & Glickman, A. S. (1989). *Team research in the 80's: Lessons learned*. (Tech Rep.). Orlando, FL: Naval Training Systems Center.

McLeod, R., Kim, C. N., Saunders, C., Jones, J. W., Scheel, C. S., & Estrada, M. C. (1997, Summer). Information management as perceived by CIOs in three Pacific Rim countries. *Journal of Global Information Management*, 5(3), 5-16.

Meijas, R., Shepard, M., Vogel, D. R., & Lazaneo, L. (1997). Perceived satisfaction and consensus levels: A cross-cultural comparison of GSS and non-GSS outcomes within and between the United States and Mexico. *Journal of Management Information Systems*, 13(3), 137-161.

Morgan, B. B. Jr., Glickman, A. S., Woodard, E. A., Blaiwes, A. S., & Salas, E. (1986). *Measurement of team behaviors in a Navy environment*. (Tech Rep.). Orlando, FL: Naval Training Systems Center.

Ngwenyama, O. K. & Lee, A. S. (1997, June). Communication richness in electronic mail: Critical social theory and the contextuality of meaning. *MIS Quarterly*, 145-167.

Potter, R. E. & Balthazard, P. A. (in press). Supporting integrative negotiation via computer-mediated communication technologies: An empirical example with geographically dispersed Chinese and American negotiators. *Journal of International Consumer Marketing*, 12(4).

Piccoli, G. (1999). Assessing Managerial Impact in Virtual Teams: Possible Directions for Future Research. *Proceedings of the Fifth Americas Conference on Information Systems*, Milwaukee, WI.

Straub, D. (1994) The effect of culture on IT diffusion: E-mail and FAX in Japan and the U. S. *Information Systems Research*, 5(1), 23-47.

Tan, B. C. Y., Wei, K., Watson, R. T., Clapper, D. L., and McLean, E. R. (1997). Computer-mediated communication and majority influence: Assessing the impact of an individualistic and a collectivistic culture. *Management Science*, 44(9), 1263-1278.

Tan, B. C. Y., Wei, K., Watson, R. T., & Walczuch, R. M. (1998). Reducing status effects with computer-mediated communication: Evidence from two distinct national cultures. *Journal of Management Information Systems*, 15(1), 119-141.

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Townsend. A., DeMarie, S., & Hendrickson. A. (1998). Virtual Teams: Technology and the workplace of the future. *Academy of Management Executive*, 12.

Watson, R. T., Ho, T. H., & Raman, K. S. (1994). Culture: A fourth dimension of group support systems. *Communications of the ACM, 37*(10), 45-55.

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