Cultural Diversity, Perception of Work Atmosphere, and Task Conflict in Collaboration Technology
Supported Global Virtual Teams: Findings from a Laboratory Experiment

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Abstract
In this paper, we focus on work atmosphere and conflict in global virtual teams and report the findings of a laboratory experiment that involved twenty-seven cross-cultural virtual teams. The members of the teams used IBM’s Lotus Sametime to work on decision-making tasks. The findings of the study reveal that in collaboration technology supported virtual teams, the cultural heterogeneity of the team members influences their perceptions of the work atmosphere, which in turn influences members’ participation in group work. We also find that the number of occurrences of task conflict related discussion among the group members is positively related to their participation in group work. The findings of the study are interesting and provide motivation for future research on work atmosphere and conflict in virtual teams.

1. Introduction

Virtual teams are groups of geographically, organizationally and/or temporally dispersed individuals brought together by information and telecommunications technologies to accomplish one or more organizational tasks (Powell, Piccoli, and Ives, 2004). With the globalization of business, virtual teams have become almost indispensable for business organizations. Almost unheard of a decade ago, the global virtual teams have now become critical mechanisms for integrating information, making decisions, and implementing plans around the world. In many instances, the virtual teams are ad-hoc and are of short duration. Short duration project teams, ad-hoc groups of domain experts formed to solve some specific technical problem, are some common examples in this regard. Although the use of advanced communication and information technology has enabled geographically dispersed individuals to interact with each other, the technology mediated interaction pattern among team members is adding some challenges in the functioning of the teams. Virtual teams cut across organizational, national, and functional boundaries; thus, heterogeneity is an inherent aspect of virtual teams. Furthermore, virtual team members communicate using collaboration technologies, which have low level of media richness and are incapable of transmitting non-verbal cues, such as gestures. There is, however, an exception in case of video conferencing method. Video conferencing supports a reasonable set of cues that can be transmitted and has high level of media synchronicity (Dennis, Fuller, and Valacich, 2008). However, video conferencing also has high bandwidth requirements; it does not usually support side conversations (as all participants share a single audio channel); it has limitations in manipulating real world objects (Issacs and Tand, 1994). Although videoconferencing has been used in some “niche” markets (such as, training employees of Kodak who are distributed across the country, meeting ambitious schedules at Boeing), other types of communication media (such as, instant messaging, electronic conferencing) are widely used to support collaborative tasks. Reticent group members feel comfortable in using these media, which support some degree of anonymity. While these communication media usually support higher degree of parallelism, enable the sender to rehearse the message, and the receiver to reprocess or reexamine the message, they have limitations in transmitting non-verbal cues and achieving media synchronicity (Dennis et al., 2008). The limitation regarding media synchronicity becomes critical in situations that do not have well-established norms and in unfamiliar tasks (Dennis et al., 2008). The use of media with low synchronicity supports the conveyance of information but not the convergence of information. Thus, the use of collaboration technology, such as instant messaging, electronic conferencing systems in culturally diverse teams raise serious concerns regarding the convergence of information and the development of shared understanding among the team members. Coming from diverse cultural backgrounds, members do not necessarily share a common belief and norm regarding a task and its execution. Whether the difference in views about the
task results in task conflict or not will depend on group members’ open interaction to develop common understandings about the task and its execution. However, team members’ open interaction and participation in group work depend on team members’ perception of the work environment. Trust, respect, and open conflict norms are essential elements of a favorable work atmosphere (Jehn and Mannix, 2001). The development of favorable perception of the work atmosphere in culturally diverse virtual teams is a challenging task. In the technology-mediated interactions, by carefully examining the messages, team members can sense that others in the team are different but may not know exactly who the other members are. Thus, in these teams, the members find it difficult to develop trust and respect for others in the team and determine if open conflict norms exist in the teams. Moreover, being unable to ascertain the exact nature of conflict norms, the members of culturally diverse virtual teams may refrain from airing their differences in views openly. Thus, in collaboration technology supported virtual teams, the issue of task conflict is complex and the critical issue is team members’ perception of the work atmosphere. Moreover, the issue of conflicts resulting from team diversity is quite pronounced in short duration, ad hoc teams (Devine, Clayton, Philips, Dunford, and Melner, 1999). The exact nature of the task conflict in these teams may not be understood clearly unless group members’ discussions are analyzed. Although prior research has looked into various aspects of conflict in virtual teams, very few studies have attempted to measure conflict by analyzing the contents of the group members’ discussions. Most of the studies used standard instruments to measure conflicts in virtual teams. In this research, we focus on the conflicts that were manifested in the electronic meetings of twenty-seven experimental teams and demonstrate that conflict in virtual teams deviate considerably from the traditional concept of conflict discussed in the literature. Our objective is to study the relationships among manifested conflict, perceived work atmosphere, and participation in culturally diverse virtual teams. We focus on short duration, ad hoc teams because these teams are quite common in global virtual organizations. We propose and validate a research model (Figure 1) that links cultural diversity with the perception of work atmosphere, participation in group work, and task conflict.

In the next section we review of the literature on the constructs involved in our study and propose research hypotheses. Next, we discuss the research method, which is followed by the presentation of the results. We end the paper with a discussion on the findings, the limitations of our study, and the conclusion.

2. Literature Review

2.1. Global Virtual Teams and Diversity

Global virtual teams are internationally distributed groups of people with an organizational mandate to make or implement decisions with international components and implications. The team members may not meet in person but they interact using communication technology to perform group tasks and make decisions (Maznevski and Chudoba 2000). Global virtual teams usually comprise of individuals from different countries with diverse cultural backgrounds. Diversity is, thus, an inherent characteristic of global virtual teams.

Diversity within a work group refers to its composition in terms of the distribution of demographic traits and cognitive differences manifested as surface-level and deep-level attributes (Chidambaram, 2005). Pelled (1996) classified diversity in terms of visibility and job related categories. Visible diversity arises from the differences in age, gender and race, while job related diversity stems from differences in organizational tenure, education and functional background. Harrison, Price, and Bell (1998) classified diversity as surface level and deep level diversity. Surface level diversity is important in face-to-face teams. Team members can make reasonable estimates of age, gender or racial ethnic background of the other members and therefore, of that person’s (dis) similarity to themselves almost immediately (Jackson, May, and Whitney, 1995). It is well established that individuals quickly use these characteristics to assign themselves and others to social classifications involving ascribed pattern of thoughts, attitudes and behaviors (Fiske, 2000). Tajfel and Turner (1986) have identified that as individuals are motivated to maintain or enhance their social identities, they are more likely to positively evaluate and identify with persons and groups whose members appear to hold the same overt features that they do.

Deep level diversity refers to differences among team members’ psychological characteristics, including personalities, values, and attitudes (Jackson et al., 1995; Harrison et al., 1998). Clues to these latent individual differences are taken from members’ interactions with one another as they unfold over time. Those clues are expressed in behavioral patterns, verbal and nonverbal communications, and
In virtual team, as team members do not usually meet face-to-face, they do not immediately perceive the surface level diversity. The members may perceive differences in ethnicity through the language used in conversation as D’Anglegan and Tucker (1973) observed that even sophisticated bilinguals in Canada sometimes fail to interpret correctly a monolingual’s message. This difference creates a psychological distance.

Although race or ethnicity has been identified as surface level diversity, their characteristics lead to deep level diversity. Intrinsically associated with a race or ethnicity is its culture. In cross-cultural teams, the difference in culture is a major cause of perceived dissimilarity and it is manifested through different cognitive processes. Culture is defined as the set of deep level values associated with societal effectiveness, shared by an identifiable group of people (Maznevski, Gomez, and Noorderhaven, 1997). Culture plays a major role in information processing of individuals. Cultural values influence the perceptual filter through which an individual interprets information needed to make decisions (Adler, 1997; Hofsted, 1980). In a cross-cultural global virtual team, different members analyze and interpret facts using the cues provided by their respective cultures. Two types of cultural difference may prevail among the members of these teams: difference in national and organizational cultures. In this study, we focus on national cultural diversity in virtual team.

National Culture is the collective programming of the mind, which distinguishes one group or category (nation) from another (Hofstede, 1980) and it helps us understand why the people from different countries may think, feel and behave differently when faced with problems. Hofstede identified five major cultural dimensions - individualism/collectivism, power distance, uncertainty avoidance, masculinity femininity, and long-term orientation and short-term orientation.

Hofstede’s demonstrates that Indian culture is characterized as preference for large power distance and low individualism, whereas the US culture is highly individualistic and has preference for lower power distance. Both US and Indian cultures are oriented towards low uncertainty avoidance and masculinity.

Similarly, other countries have different cultural orientations. In heterogeneous virtual teams that consist of members from different national cultures (such as, USA, India, and other countries), the differential preference for different cultural dimensions (i.e. power distance, individualism, uncertainty avoidance, and masculinity) affect group dynamics, emergence of leaders, and conflict management styles. Individuals with strong orientation for high power distance may find it difficult to work in a self-managed teams; team members from individualistic culture may want do what they think is best rather than doing what the group wants them to do.

In our present study, we have not probed into the impact of the individual cultural dimensions on the virtual team dynamics. Instead, we have considered that the overall impact of the differences in cultural dimensions on group members’ perception of work atmosphere and task conflict.

The effect of diversity on group behavior is discussed next in the paper.

2.2. Diversity and its effect on group behavior

Research has shown that diversity yields both advantages and disadvantages for the effective functioning of the small groups (Jackson, 1991). Heterogeneous groups are more creative and more likely to reach high quality decisions than homogeneous groups (McGrath, 1984; McLeod, and Lobel, 1992; Triandis, Hall, and Ewen, 1965; Willems and Clark, 1971). It can increase potential productivity of the group (Jackson 1991; McGrath, 1984); improve the qualities of ideas generated by a group (McLeod and Lobel, 1992). The people of different cultures bring a variety of perspectives and outlooks to a task; thus, diversity may add to the pool of resources available to a group (Adler, 1990). The differences in the perspective offer potential for multicultural teams to perform well (McLead and Lobel, 1992; Watson, Kumar, and Michaelsen, 1993). Another positive effect of diversity is that it reduces the probability of groupthink (Janis, 1982), a phenomenon that occurs when homogeneous and cohesive groups dedicated to unanimity do not explore full range of available solutions. Groupthink can lead to drastic errors in decision-making (Janis, 1982). Diverse groups, on the contrary, have built in protection against groupthink (Adler, 1990). However, there is evidence that diversity is related to lower levels of interpersonal attraction, more stress and more turn over. Diversity has the effect of greatly increasing the complexity of the process that must occur in order for the group to realize its full potential (Adler, 1990). Members of diverse groups may require more time to reach a decision (Fisher, 1980). They are more likely to explore the full range of possible solutions to the problem. Diversity has a negative impact on communication and interpersonal
attraction (Adler, 1990; Steiner, 1972; Storey, 1991; Triandis, 1959). Language differences can impair communication and increase the chances of errors in message transmission and decoding (Samovar and Porter, 1988). Rogers and Bhownick (1971) found that heterogeneous groups suffer from delayed transmission of messages, message distortion, and restriction of communication channels. The cultural values also influence members’ preferences for social interaction norms (Bettenhausen and Murnighan, 1991; Earley, 1993). Because of these hidden influences, multicultural groups find cooperative decision-making difficult (Kirchmeyer and Cohen, 1992; Watson et al, 1993).

Watson et al (1993) found that heterogeneous groups are low performers in the short run and the performance, however, improves in the long run. Chidambaram (2005) suggested that time is a key mediator of interaction processes and outcomes.

2.3. Cultural Diversity and the Perception of Work Atmosphere

Formation of a favorable perception of the work environment is critical in fostering collaborative interaction among the team members. Jehn and Mannix (2001) identify trust, cohesion, open conflict norms, and respect as four underlying dimensions of the perception of the work environment. Although Jehn and Mannix (2001) study these dimensions in the context of face-to-face teams, we expect these to be more relevant for virtual teams. The importance of these factors in group work has also been discussed in the literature (Jarvenpaa and Leidner, 1998; Jarvenpaa and Leidner, 1999; Cartwright, 1968; Edmondson, 1999).

In the heterogeneous group, the cultural distance is a major cause of perceived dissimilarity. Triandis (2003) suggests that cultural distance is greater when members of two cultures speak very different languages, have different social structures, religions, standards of living, and values. People work comfortably when they interact with persons from same culture.

Team social integration is considered as a multifaceted construct that includes elements of cohesiveness, satisfaction with coworkers, positive social interaction, and enjoyment of team experiences (O’ Reilly, Caldwell and Barnett, 1989; Smith, Smith, Olian, Sims, O’Bannon, and Scully, 1994). Elements of team social integration are the most commonly studied outcomes in diversity research (Tsui and Gutek, 1999). Prior research suggests a negative relationship between work team diversity and team social integration. At the same time, team social integration is a strong predictor of team performance (Harrison et al, 2002). According to Harrison et al. (2002), early perceptions of both demographic and psychological differences among team members have important negative consequences for how well a diverse group gets along over a period of time with the perceptions developed at the later time being more consequential than the former.

Cultural values also influence members' preferences for social interaction norms (Bettenhausen and Murnighan 1991; Earley, 1993). Communication difficulties in the diverse group can result in reduced attraction and cohesion (Adler, 1990; Jackson, 1991; O’Reilly, Caldwell and Barnett, 1989). Conversely, similarity in beliefs, attitudes, and values contribute to cohesiveness (Yukl, 1985) and heterogeneous groups are generally less cohesive (Adler, 1990; Shaw, 1981).

Heterogeneous groups, as evident from the literature review, are less cohesive. In the global virtual team, while the members can perceive surface level diversity members through the language used in group communications, some aspects of the deep level diversity (the difference in the culture, attitude, and beliefs) can also become apparent through the interaction process. The cultural heterogeneity, thus, is expected to hinder the development favorable trust, cohesion, open conflict norms, and respect among the team members. Thus, we propose:

**Hypothesis 1:** In collaborative technology supported global virtual teams, the perceived work atmosphere of culturally heterogeneous groups will be less favorable than that of their homogeneous counterparts.

2.4. Intra-group Conflict in Virtual Teams and Perceived Work Atmosphere

Conflict is broadly defined as perceived incompatibilities or perceptions by the parties involved that they hold discrepant views or have interpersonal incompatibilities (Boulding, 1963). Conflict is an inevitable part of the team work. Although conflict has traditionally been viewed as dysfunctional, recent studies support that certain amount of conflict is necessary for the flow of innovative ideas in organizations. In reality, conflict can be both functional and dysfunctional. In a team, the members contribute to the team through social and task inputs. Thus conflict in any team is concerned with relationship issues and with task issues (Guetzkow and Gyr, 1954; Jehn, 1997). Relationship conflicts arise from difference in personal taste, political preference, values and
ideology, whereas task conflicts are conflicts about the distribution of resources, about procedures and policies, and about judgments and interpretation of facts (De Dreu and Weingart, 2003). Relationship conflict exists when there are interpersonal incompatibilities among group members, which typically include tension, animosity, and annoyance among group members within a group (Jehn, 1995). The relationship conflict, which is based on emotional or interpersonal issues is detrimental to the functioning of a team. But task conflict is actually beneficial to the team effectiveness (Van de Vliert and De Dreu, 1994). Task conflict is the disagreement on task content or process. A moderate level of task conflict is positively associated with team performance because it causes team members to consider more alternatives. Considering diverse opinions and strategies enable a group to arrive at a better solution (Pelled et al., 1999). Jehn (1997) found that type of task group members perform shapes whether conflict helps, hinders, or has no significant impact on individual and group performance. Rahim (2002) mentioned that one of the problems of conflict management is that the two dimensions of conflict are positively correlated. Studies reported significant positive correlations between these conflicts that range between .34 and .88 (Simmons and Peterson, 2000).

In the virtual teams, the members are physically separated from one another and the scope of their social interaction is also limited. Thus, the nature of the conflict in these teams is expected to differ from that of face-to-face groups. According to Hinds and Bailey (2000), virtual teams experience two direct consequences of their virtuality: mediated communication and unshared context. Mediated communication causes higher levels of affective and task conflict as group members neglect to censor their comments and to accommodate the preferences of their team members. Short, Williams and Christie (1997) argue that mediated communication reduces the extent to which participants and the interpersonal relationships are salient in the interaction. Similarly, Sproull and Kiesler (1991) argue that computer-mediated communication depersonalizes the interaction, leading to greater concentration on the message rather than the interacting persons. Thus, in collaboration technology supported virtual teams, relationship conflict is expected to be less prevalent than task conflicts. Thus, in our study we have considered only the task conflict among the members of the teams. However, we argue that the virtual team members will refrain from expressing their differences on tasks freely unless they are comfortable with virtual environment. Time is an important factor here. In any team development process the first stage, the Forming stage, is characterized by a great deal of uncertainty and mutual suspicion. The team members need some time to develop mutual trust and enter into a congenial environment where they can interact freely without any hesitation. In ad-hoc, short duration global virtual teams, because of the technology mediated interaction, this initial period of suspicion is expected to stretch longer than that of the face to face teams. This initial stage of suspicion may be shortened with proper facilitation. Alternately, the teams need considerable time to develop the trusting environment. Thus, in virtual groups, the members will initially refrain from getting engaged in serious task related debates. Because of the uncomfortable feeling that is linked with unawareness of the characteristic of other team members, they will hesitate to debate openly on the contents of the tasks.

However, when members perceive favorable work environment, they participate freely in the discussion on the group task and their increased participation will allow them to express their differences on the task. Thus, we propose:

**Hypothesis 2:** In collaborative technology supported global virtual teams, the perceived work atmosphere will have a positive relationship with group members’ participation with group work.

**Hypothesis 3:** In collaborative technology supported global virtual teams, the group members’ participation with group work will have a positive relationship with task conflict.

The research model of the study is shown in figure 1.

![Research Model Diagram](image-url)
3. Research Method

3.1. Subjects and Tasks

We conducted a laboratory experiment to test our hypotheses. We used IBM’s Lotus Sametime, a popular groupware technology. Volunteer subjects enrolled in graduate business programs at a major Midwestern university in the US participated along with graduate students from a major management institute in India. All subjects were experienced with information and communication technology and familiar with Internet and web-based applications. The students enrolled at the US university represented different cultural and ethnic backgrounds, in addition to students who were born and raised in the US. The non-US born students were from Argentina, China, Cyprus, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, Palestine, Taiwan, and Thailand.

Each participant was trained on Lotus Sametime in separate training sessions in which the participants worked on a task that was similar to the experimental task. Altogether 27 three-member groups participated in the experiments. Each group was assigned to one of the following two categories: Homogeneous and Heterogeneous based on their national origin. Altogether there were 12 homogeneous groups and 15 heterogeneous groups.

Due to the nature of the study, the approximate 10 ½ hour time differences between the two countries, and the schedules of the students in each location, complete random assignment of subjects to groups was not possible. However, once the availability of the students in each location was known, accounting for the time differences, class schedules, etc., students were randomly assigned to either homogeneous or heterogeneous groups.

The groups were asked to assume the role of an advisory committee that would recommend to the administration of a fictitious university 5-6 proper uses of the technology fees that were collected from the students of the university. Two versions of a decision making task that were employed in the research had different levels of complexity. Thirteen groups performed this basic version of the task whereas the remaining fourteen groups had an additional component of the task. These groups suggested the allocation of technology fees to the 5-6 uses that they identified. Thus,

3.2. Experimental Procedure

Anonymity among group members was maintained during the experiment. Each group was under the control of a facilitator, who communicated using “instant messaging” option of Lotus Sametime. The facilitator monitored the discussions and dealt with any technical software questions that any participant had during the meeting; the facilitator did not interject anything into the discussion regarding the task and the computer use fee options. Each session consisted of the following activities:

- Activity 1: Commenting on advantages and disadvantages of each option of using technology fees [performed by all groups]
- Activity 2: Selecting 5-6 options of using technology fees [performed by all groups]
- Activity 3: Allocating technology fees to the selected options [performed by groups engaged in the complex task]
- Activity 4: Voting the final decision [performed by all groups]
- Activity 5: Completing questionnaires used to collect data of the experiment. [performed by all groups]

3.3. Operationalization of Variables

This study involved one independent variable (cultural diversity of virtual teams), and three major dependent variables (the perception of work atmosphere, task conflict, and participation). The operationalization of the variables is presented in table 1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Operationalization</th>
<th>Source of Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural Diversity</td>
<td>• Heterogeneous: The members are from different national cultures</td>
<td>Objective data</td>
</tr>
<tr>
<td></td>
<td>• Homogenous: The members are from same national cultures</td>
<td></td>
</tr>
<tr>
<td>Perceived Work</td>
<td>• Average score of ten indicator items reported in Appendix 1</td>
<td>Self-reported data (Questionnaire)</td>
</tr>
<tr>
<td>Atmosphere</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intra-group Conflict</td>
<td>• Number of episodes of task conflicts in each session, identified through content analyses of team members’ discussions in each session. An example is shown in Appendix 2</td>
<td>Transcripts of each meeting</td>
</tr>
<tr>
<td>Participation</td>
<td>• Average score of the first five indicator items reported in Appendix 1</td>
<td>Self-reported data (Questionnaire)</td>
</tr>
</tbody>
</table>
4 Results

4.1 Reliability and Validity

Reliability assessments were made for the self-reported variables. Experts on group decision-making and attitude measurement conducted initial reviews of these measures to establish their face validities. Subsequently, Cronbach Alpha coefficients were calculated. Since the measurement scales used had not been tested and validated adequately for virtual teams and in view of the exploratory nature of this research, a cut-off value 0.70 was considered acceptable (Nunnally, 1978). To examine convergent validity, factor analyses employing VARIMAX orthogonal rotation was carried out. The reliability and validity results are presented in table 2. Both measurement scales met the conditions of reliability and validity.

Table 2. Reliability and Validity of the Instruments Used in the Study

<table>
<thead>
<tr>
<th>Variable</th>
<th>Reliability [Cronbach’s Alpha]</th>
<th>Validity [Factor Loadings]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Work Atmosphere</td>
<td>0.791</td>
<td>0.614 - 0.698</td>
</tr>
<tr>
<td>Participation</td>
<td>0.822</td>
<td>0.700 - 0.837</td>
</tr>
</tbody>
</table>

4.2 Hypotheses Testing

The hypotheses were tested using analysis of variance (ANOVA) and regression analyses with a level of significance of 0.05. Any weak significance level in the range of .05 to .10 was treated as suggestive of the nature of relationship between the variables. We tested the groups in two different task types to ascertain that their performance did not vary significantly. Task type was used as a control variable in the statistical analyses.

In order to test hypotheses 1 and 2, we conducted analysis of variance (ANOVA) considering the level of diversity as the categorical variable and found support for hypothesis 1. Perceived work atmosphere values for homogeneous groups were significantly higher than those of their heterogeneous counterparts. The results are shown in table 3 below.

Regression analyses were employed to test the hypotheses 2 and 3. The regression results demonstrate that participation is positively related to perceived work atmosphere in the teams ($\beta=0.207; \ p<0.0001; \ R^2=0.641$) and task conflict is positively related to participation ($\beta=1.451; \ p=0.01; \ R^2=0.218$). Thus, we find support for both hypotheses 2 and 3.

Table 3: Means and Standard Deviations of the Perceived Work Atmosphere and the Results of ANOVA

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Mean (Std. Deviation)</th>
<th>F Value, df</th>
<th>Sig. Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Homogeneous n=16</td>
<td>Heterogeneous n=11</td>
<td></td>
</tr>
<tr>
<td>Perceived Work Atmosphere</td>
<td>4.09 (0.283)</td>
<td>3.77 (0.477)</td>
<td>(4.75, 1)</td>
</tr>
</tbody>
</table>

Hypothesis 1 Supported

5 Discussion

In this research we examined the effect of the cultural heterogeneity on the perceived work atmosphere. We found strong support for our hypotheses. The findings highlight the importance of developing favorable perceptions of the work atmosphere in culturally diverse virtual teams. This is a challenging task, especially for the managers of the global virtual teams. Some degree of facilitation of team activities in the initial phases of the interaction may help group members to overcome the barriers and interact freely in the teams. The importance of forming favorable perceptions of the work atmosphere is further reinforced through our other finding in this study. As hypothesized, we find that perceived work atmosphere is positively related to the participation of the members with group work. Free interaction among the team members is primary condition for a team to function properly. Task conflict at moderate level is beneficial for the team engaged in problem solving or decision-making tasks. Moderate level of task conflict improves quality of decision. We also find that task conflict is positively related to participation of team members with group activities. This is an interesting finding. In our study, the members of the virtual teams interacted using collaborative technology; there was no face-to-face interaction involved in the team work and complete anonymity among group members was maintained; thus, the members had to rely only on the written messages to form the perception about the work atmosphere. When work atmosphere appeared favorable, the members participated freely, and were not hesitant to get engaged in task conflict. This is a
new finding and it demands in depth study of conflict in culturally diverse virtual teams.

5.1 Limitations of the Study

There can be a large number of culturally heterogeneous groups with different cultural dimensions. This study considers only a few of such diverse groups. Therefore, the results cannot be generalized to all culturally heterogeneous groups. Only through cumulative research can we arrive at a clear picture of the impact of cultural heterogeneity on the performance of virtual team. Future research directions should consider the examination of other types of cultural heterogeneity.

The participants in this study were graduate business students and not regular users of groupware tools. Although these students were excited at the prospect of participating in the electronic meetings, it was difficult to ensure that the subjects put their best effort to work on the assigned task (which is true with most laboratory research).

The participants of the study were located in the US and India and were separated temporally (about 10 ½ hours). As the meetings were synchronous, there was a variation in the actual working condition of the team members. Some members worked during their normal work hours (i.e. daytime) while others had to compromise and work at night to participate in the teamwork. This could have impacted group members’ perception of work atmosphere.

We excluded some of the important contextual factors in our study. As suggested by Paul and Seetharaman (2004), there are other contextual factors such as media richness and facilitation that shape the nature and extent of conflict in collaborative technology supported virtual teams. We intend to include these variables in our future research on virtual teams.

6 Conclusion

Although this study marks the beginning of research on the perception of work atmosphere in collaborative technology supported virtual teams, we can draw some conclusions from this research. We found that even when virtual teams interact using collaborative technologies, the teams may not express task conflict unless the group members form favorable perceptions about the work environment and participate in group work. We also found that the issue of cultural heterogeneity is complex and has interesting relationship with group members’ perception of the work environment in virtual teams.

In our future study, we plan to focus on the individual dimensions of the perception of work atmosphere, which are trust, respect, open conflict norms, and cohesiveness. This will help us to understand the exact causes of task conflict in virtual teams.

Although no generalization can be made from the findings of one experiment, the results provide enough motivation to pursue in-depth research on the perceived work atmosphere and task conflict in cross-cultural virtual teams.

7 References

APPENDIX 1
Indicator Items of Perceptual Variables

Perceived Work Atmosphere (adapted from Jehn and Mannix, 2001)

1. How much did you trust your fellow group members?
2. How comfortable did you feel delegating to your group members?
3. Were your group members truthful and honest?
4. How much did you respect your fellow group members?
5. How much did you respect the ideas of others members in your group?
6. How much open discussion of issues was there in your group?
7. To what degree was communication in group open?
8. To what degree was conflict dealt with openly in your group?
9. To what extent is your group cohesive?
10. How much did you feel like your group had team spirit?

Participation (adapted from Paul, Seetharaman, Samarah, and Mykytyn, 2004)

1. I always felt free to voice my comments during the meeting
2. Other members appeared to have felt free to make positive and negative comments
3. Everyone had a chance to express his/her opinion
4. Group members responded to the comments made by others
5. The group members seemed to have participated actively in the meeting
6. Overall, the participation of the group in the task was effective

APPENDIX II
An Example of Task Conflict Episode:

user25/Guest i believe #3 is a must have
user59/Guest # 3 is important but it is not show stopper
user27/Guest i agree #25
user59/Guest i dont think its should be in top 5
user25/Guest why is that
user59/Guest you can do with not so fast internet connections
user25/Guest i disagree. there is quite a difference between 56k and broadband
user25/Guest as an example
user27/Guest do not forget this is online univ.
user25/Guest all discussions, coursework etc is over the internet...i think you want the fastest connection possible
user27/Guest i think fast, cheap, comprehensive tech and software are critical
user59/Guest you do have a point