

LEADERSHIP EFFECTIVENESS IN GLOBAL VIRTUAL TEAMS

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Abstract

Given the fundamentally different work contexts faced in virtual team environments, traditional concepts of team leadership may take on an entirely new dimension for this new type of organizational structure. This field-based research study was undertaken to identify factors related to effective team leadership in virtual team environments. To accomplish this, we assembled twelve culturally diverse global teams from locations in Mexico, the United States and Europe, assigning each team a project leader and task to complete. The findings suggest that effective team leaders demonstrated the capability to deal with paradox and contradiction by performing multiple leadership roles simultaneously (behavioral complexity). Specifically, we discovered that highly effective virtual team leaders acted in a mentoring role and exhibited a high degree of understanding (empathy) towards other team members. At the same time, effective leaders were also able to assert their authority without being perceived as overbearing or inflexible. Finally, effective leaders were found to be extremely effective at providing regular, detailed, and prompt communication with their peers and in articulating role relationships (responsibilities) among the virtual team members. This study provides useful insights for managers interested in developing global virtual teams as well as for academics interested in pursuing virtual team research.

Introduction

A team can be defined as "a small number of people with complementary skills who are committed to a common purpose, set of performance goals, and approach for which they hold themselves as mutually accountable (Katzenbach & Smith, 1993)." Since the mid-1970's, team-based workgroups have increasingly become a dominant form of organization, widely used to achieve higher levels of productivity, creativity, and intrinsic motivation among workers (Townsend, DeMarie, Hendrickson, 1998; Solomon, 1995). Well known firms such as Disney, Xerox, and Kodak exemplify the use of teams and the extent to which they have become well entrenched institutions.

While the underlying concepts of team-based workgroups remain relatively stable (Solomon, 1995), certain business drivers have begun to alter the nature of teams as well as the ways they accomplish work. The growing popularity of inter-organizational alliances (e.g. Microsoft and Intel) combined with a growing tendency to flatter organizational structures and globalization has accelerated the need for firms to coordinate activities that span geographical as well as organizational boundaries (Townsend et al, 1998). In addition, the shift from production to service related businesses has spawned a new generation of knowledge worker not bound to physical work locations. Taken together, these factors suggest that firms are faced with increased challenges to coordinate tasks across time zones, physical boundaries, as well as organizational contexts. Driven by these demands, traditional face to face teams must increasingly operate in a virtual environment to coordinate activities among team members in physically dispersed locations. Consequently, the virtual team has begun to emerge as a new form of structure, supported by enabling information and communication technologies, able to meet the

challenges of this new work context. Townsend et al (1998) describe this emergent structure:

"Virtual teams are composed of coworkers geographically and organizationally linked through telecommunications and information technologies attempting to achieve an organizational task (page 17)."

Virtual teams provide numerous benefits not normally associated with traditional teams. First, they allow dispersed organizations to maximize their expertise without having to physically re-locate individuals. The required expertise for a given task or project may potentially be dispersed at multiple locations throughout the organization, however, the virtual team facilitates the "pooling" of this talent to provide focused attention to a particular problem without having to physically relocate individuals. In addition, virtual teams, may allow organizations to unify the varying perspectives of different cultures and business customs to avoid counterproductive ethno-centric biases (Solomon, 1995). Other benefits include cost reduction, cycle-time reduction, integration of distant members, and improved decision-making and problem solving skills (Lipnack & Stamps, 1997; Townsend et al, 1998, 1998)

Perhaps the growing importance of virtual teams can best be summarized by Hargrove (1998) who states: "in the future, the source of human achievement will not be extraordinary individuals, but extraordinary combinations of people." As firms stand poised to meet the business challenges of the 21st century, the use of virtual teams will provide a significant opportunity to coordinate complex business tasks across a potentially far-flung confederation of organizations. In spite of these benefits, the use of virtual teams poses significant challenges for organizations desiring to deploy them. While many of

these challenges are present in traditional teams, they become more pronounced in virtual settings (Solomon, 1995).

One of the most critical aspects to the successful deployment of virtual teams has to do with team leadership. Solomon (1995) notes that "companies must begin by selecting the right team leaders (page 56)." Consequently, the focus of this research will be targeted at the role of leadership in virtual teams. More specifically, this exploratory research investigates the following research question: *What factors contribute to effective leadership in virtual team environments?* A fundamental assumption of this research is that virtual settings are significantly more complex than traditional settings, thereby requiring a much more varied set of behavioral complexity (Hooijberg, Hunt, & Dodge, 1997) on the part of leaders to effectively manage these teams.

To address these issues, we first provide a summary of key challenges faced by virtual teams. Current leadership theory is then developed as a means to predict those leadership styles thought to be most effective in the virtual team context. This is followed by a discussion of the research methodology and the instrumentation used to investigate our research question. Subsequent sections examine the research findings and conclude with a summary of limitations as well as implications for practice and academic research.

The Challenges of Virtual Team Environments

Given the dispersed nature of virtual teams, technology plays a vital role in facilitating communication among team members. Numerous communication and information technologies such as desktop video conferencing systems (DVCS), group support systems, internets, and intranets have been used to connect team members across

time, space, and organizational boundaries (Townsend et al, 1997). In spite of the efficacy of these innovative technologies, virtual teams face significant challenges (see Table 1).

Table 1: Challenges of Virtual Teams

Type of Challenge	Description
Communications	<ul style="list-style-type: none"> • Traditional social mechanisms are lost or distorted (Townsend et al, 1998) • Less exchange of socio-emotional information (Walther & Burgoon, 1992) • Communication dynamics such as facial expressions, vocal inflections, verbal cues, and gestures are altered (Kiesler & Sproul, 1992; Warkentin, Sayeed, & Hightower, 1997) • Distinctions among member's social & expert status lost or distorted (Dubrovsky, Kiesler, & Sethna, 1991). • Inhibition in building trust (Jarvenpaa, Knoll & Leidner, 1998)
Culture	<ul style="list-style-type: none"> • Potential for multiple cultures requires greater communication skills (Townsend et al, 1998) • Unrealistic cultural expectations (Solomon, 1995) • Communication may be distorted through cultural misunderstandings/biases (Solomon, 1995)
Logistics	<ul style="list-style-type: none"> • Multiple time zones make scheduling meetings as well as travel very difficult (Solomon, 1995)
Technology	<ul style="list-style-type: none"> • Technophobia (Townsend et al, 1998) • Need for proficiency across a wide range of technologies (Townsend et al, 1998) • Computer mediated communication systems (CMCS) impose constraints on communication (Warkentin et al, 1997) • Comments from synchronous CMCS may appear out of context (Warkentin et al, 1997) • Conversation may lack focus (Warkentin et al, 1997) • Delays with asynchronous CMCS make it difficult to maintain a theme • Lower levels of richness requires more time for virtual teams to achieve mutual levels of understanding (Daft & Lengel, 1986)

First, information technology has limits and is not able transfer the same rich social, emotional, and non-verbal information present in traditional face-to-face settings (Walther & Burgoon, 1992; Townsend et al, 1998). For example, information rich non-

verbal cues such as facial expressions, voice inflections, and gestures, normally present in traditional settings, may be lost or distorted through computer mediated communication systems (CMCS). The severity of this information loss will be determined by the richness of the technology being used. Thus, team members could expect to experience much greater information loss through simple use of email as opposed to DVCS that provides a richer source of communication.

Second, important social/contextual information such as member's social status or level of expertise may be lost or distorted in virtual team environments characterized by high levels of anonymity (Dubrovsky, Kiesler et al 1991). Since virtual team environments provide a radically different social context, the ability to develop relational links among team members may be hindered. The inability to develop these relationships within a social context may negatively impact such outcomes as creativity, morale, decision-making quality, and process loss (Walther & Burgoon, 1992). Furthermore, the lack of a social context may alter or hinder the process through which team members develop trust (Jarvenpaa, Knoll & Leidner, 1998). As a result, virtual team communication through CMCS may appear out of context and without focus (Warkentin et al, 1997) resulting in lost meanings, distortion, and misinterpretation of information. These arguments are supported by prior research that suggests communication in virtual team environments may be significantly less effective than in traditional team settings (McGrath & Hollinshead, 1994; Warkentin, Sayeed, & Hightower, 1997; Hightower & Sayeed, 1995, 1996).

These communication challenges may be exacerbated by virtual teams composed of members with diverse ethnic, national, as well as organizational

backgrounds. As team members communicate, they will tend to filter information through their inherent cultural biases, thereby giving rise to a potentially broad range of misinterpretations or distortions (Solomon, 1995). Thus, an Asian team member may view the same issue in a totally different way than a member from a Western industrialized nation does. Although these cultural differences bring a greater variety of perspectives to bear on a problem domain, they may also create additional communications challenges for team members.

Another challenge is that heavy dependence on technology requires a high investment on the part of users to gain proficiency with new information technologies. Given the differences in individual pre-dispositions to learn new technologies, membership on virtual teams may be highly biased towards those individuals skilled at learning new technologies and against those who experience technophobia (Townsend et al, 1998).

Given these challenges with communication, technology, and culture, we argue that virtual team environments are much more complex than their traditional counterparts. Solomon (1995) notes:

"The fundamentals of global team success aren't very different from the practices that work for domestic work teams. But there are more variables. Overlay cultural behavior and expectations on the roles of communication, team leadership and group dynamics, and you immediately understand. Moreover, there are logistics to overcome: challenges inherent in working in different time zones, lots of travel, and busy conflicting schedules (page 50)."

Consequently, the success of virtual teams may be highly dependent on the availability of informed, skillful leaders able to engage in multiple roles to address the various cultural, technical, logistical, and communications issues faced by these groups.

The following pages discuss the nature of effective leadership and how these concepts might apply to virtual team settings.

The Leadership Perspective

Most theories have attempted to define leadership effectiveness in terms of bipolar categories (Denison, Hooijberg, & Quinn, 1995). For example, theory X vs. theory Y (McGregor, 1960), managers vs. leaders (Zaleznik 1977), transactional vs. transformation leaders (Burns, 1978), and autocratic vs. democratic Leaders (Stogdill, 1974) represent but a few of the many contingency based leadership theories. A common theme among these theories is that managers can be classified into one or more categories and that certain behaviors or styles may be appropriate under given circumstances to produce effective leadership (Denison, 1995). Under this contingency perspective, a given manager's leadership effectiveness will be dependent on his or her particular style as applied to specific circumstances. For example, an autocratic manager might be perceived as being highly effective under some circumstances (e.g. military organizations) and ineffective under others (e.g. academic institutions). One problem with these contingency based theories of leadership is that they may be overly simplistic and fail to take into account that multiple leadership styles may be applicable across a broad range of circumstances (Denison et al, 1995). Hooijberg, Hart, & Dodge (1997) articulate an alternative view of leadership. They state:

"Most leaders interact almost simultaneously with a variety of stakeholders in multiple and rapidly changing settings covering a virtually endless list of contingencies (page 376)."

This definition mirrors recent leadership theory which suggests that effective leadership may be more of a function of the manager's ability to display a more varied and

complex set of behavioral repertoires in response to complex organizational circumstances (Denison et al, 1995; Hooijberg & Quinn, 1992; Hooijberg, 1992; Hooijberg, Hart, & Dodge, 1997). This behavioral complexity theory suggests that the ability of managers to display multiple contrasting (e.g. paradoxical) leadership styles in a given situation will determine to a large extent his or her leadership effectiveness. Put another way, effective leaders must be able to deal with paradox and contradiction by performing multiple leadership roles simultaneously (1995). Whereas earlier contingency based theories would identify the most appropriate leadership style for the given situation, this paradox perspective recognizes that the ability to perform multiple, contrasting leadership behaviors may be a better indicator of effective leadership. Support for this theory has been found in numerous empirical studies (Bass, 1981; Hooijberg, 1996; Hart & Quinn, 1993; Bullis, 1992; Quinn, Spreitzer, & Hart, 1991; Denison et al,1995).

While behavioral complexity is believed to result in more effective leadership, others suggest that cognitive and social complexity are pre-cursors to behavioral complexity (Denison et al, 1995; Hooijberg et al, 1997). Cognitive complexity deals with how individuals construct meaning through differentiation and integration (Goldstein Blackman, 1978; Streufort & Swezey, 1986). Studies have indicated that managers with higher levels of cognitive complexity will demonstrate higher capabilities at communication, assessment of information, adaptation to task demands, interpersonal perceptions as well as the formation of impressions (Streufort & Swezey, 1986). The implication is that individuals with higher levels of cognitive complexity will be better able to construct meaning of their respective contexts. This, in turn, will facilitate a much broader range of behavioral responses. Social complexity refers to the manager's ability to

discriminate and recognize the various facets, aspects, and significance of a given social situation over time (Hooijberg et al, 1997). Managers with high social complexity will form a much more comprehensive assessment of the social context and ultimately engage in behaviors consistent with these assessments. Taken together, cognitive and social complexity are theoretical constructs used to predict a given leader's behavioral complexity.

Applied to the virtual team context, behavioral complexity theory would suggest that effective virtual team leaders should exhibit a much more varied and complex set of behaviors than those who are perceived to be less effective. This is consistent with remarks by Hooijberg et al (1997) who note that:

"When teams contain members with different demographic characteristics and/or different nationalities, the cognitive, social, and behavioral demands are likely to increase dramatically (page 400)."

Although the notion of behavioral complexity is not explicitly addressed in the virtual team literature, support for this idea is implied through the numerous lists or traits associated with virtual team leaders (Grove & Hallowell, 1998; Solomon, 1995; Lipnack & Stamps, 1997).

Given the inherently complex nature of virtual team environments, we argue that leadership effectiveness in virtual teams will be a function of each leader's behavioral complexity as defined by his or her ability to demonstrate multiple or contradictory behaviors. From a theoretical perspective the ability to demonstrate behavioral complexity will be determined by each individual's cognitive as well as social complexity (Denison, 1995; Hooijberg et al, 1997). The following section discusses the research method used to study leadership effectiveness in virtual teams.

Research Methodology

Prior discussions suggest that actual leadership behavior (e.g. behavioral complexity) will be determined by the leader's ability to construct meaning from information (cognitive complexity) as well as his or her ability to assess the social context (social complexity). The implication of this is that leadership does not occur in a vacuum, rather, it occurs through a complex maze of interpersonal interactions over time within specific organizational and social contexts. Consequently, we argue that a study of leadership effectiveness cannot take place divorced from the specific context within which it occurs. Rather, we view leadership as a phenomenon that is inextricably linked, and a part of, the specific organizational and social context to which it belongs. Given these arguments we adopted a field based approach to investigate leadership effectiveness in virtual teams. Use of such an intrusive methodology would allow us to better understand the nature and role of leadership effectiveness taking into account the various contextual influences (Eisenhardt, 1990; Yin, 1989).

Sample Selection

To assess leadership effectiveness, we created twelve virtual teams, each composed of 5-7 members from three universities located in Europe, Mexico, and the United States. The task design involved a virtual matrix structure wherein team members report to an individual (in this case, their respective professors) and team leaders, to another (in this case, their respective professor). The participating European students were selected from an MBA program at a leading business school. The Mexican participants were graduate students from a variety of technical and business backgrounds

while the US students were composed of upper level business undergraduates attending a cross-disciplinary introductory course to MIS. Each virtual team contained one team leader from the European school and at least two students from each of the two remaining schools. High levels of prior work experience among team leaders help to insure a more realistic setting for the study. Finally, cultural diversity among teams was further enhanced due to the multi-national composition of the European executive MBA program.

Our strategy was to create highly diverse virtual teams of reasonable size to provide a realistic setting to study global virtual team dynamics. Since multiple nationalities were represented on each team, we could expect a requisite degree of diversity in terms of language, customs, and perceptual differentiation. In addition, there was a wide range of technical competence among students as well as infrastructure capability among member educational institutions. All these factors helped to insure a realistic setting for a virtual team not unlike those used by major organizations.

Task Assignment

Each team was assigned a mandatory task to complete a research project on a given topic assigned to them by the research team. Each project addressed a specific aspect of information technology and team leaders were asked to produce a written report that specifically addressed the theme of the topic (see Appendix A for list of topics). Team leaders were given the following instructions by the research team:

"You are not to research the content or write the report. Rather, you are to guide the team, give helpful comments on content, structure, organization, writing, and to point the members to appropriate places to find information and resolve any difficulties."

Although project teams members were given basic guidelines regarding project task and deliverables, no further advice was given to teams regarding how they were to accomplish the task. This was left up to the project team leader. The US students received the following instructions:

"I will provide no guidance on how you are to complete this project. This guidance will come from your project leader counterpart in France. Your main objective will be to segment the work among yourselves and to complete the project as specified by the project leader. The exact details on how your group will communicate (e.g. frequency, what technology, time of day) will all be handled by your group."

Consequently, these guidelines helped to insure that project team leaders would not do all the work and that high levels of communication among team members and their respective team leaders would be necessary to complete the task. Other than these specific guidelines, individual teams were given complete autonomy to assign priorities, set schedules, meeting times, and to decide on which telecommunications technologies to interact with. Although certain CMCS were recommended (e.g. TCBWorks, PowWow), none were required.

Each team member was evaluated on the overall quality of the final research paper and assigned an individual grade that was part of the overall grade for the class he or she was a participant in. In addition, team leaders were asked to evaluate individual performances of their respective team members and individual members were asked to rate the team leader's effectiveness. Each team was given approximately five weeks to complete the project.

Data Collection

Data were collected through a series of survey and open-ended questions administered upon the completion of the project (see Appendix B). Since the question of interest addressed leader effectiveness, project team leaders did not participate in completing the instrument. To assess the underlying factors of effective virtual team leadership, we measured participant perceptions along several variables: leader effectiveness, leader roles, perceived role clarity, communication effectiveness, communications satisfaction, and extent of communication technology use. These variables were measured as follows:

Leader Effectiveness. This was a five-item measure on a five point Likert scale adapted from Denison, Hooijberg, and Quinn (1995). On a scale of 1 to 5 (poor=1 and excellent=5), participants were asked to rate their virtual team leader's performance. This was done to rate their virtual team leader's performance compared to other leaders under whom they had worked, and to rate their virtual team leader's performance as a role model. On a scale of 1 to 5 (failure=1 and success=5), participants were also asked to rate their assessment of their virtual team leader's managerial success. Finally, on a scale of 1 to 5 with (ineffective=1 and effective=5), respondents were asked to rate the overall managerial effectiveness of their virtual team project leader.

Leader Roles. To assess leader roles, items were taken from Denison, Hooijberg, and Quinn (1995). The scale is from *Almost Never (1)* to *Almost Always (5)*. These items were used to rate the extent that project managers exhibited leadership roles along each of the following eight dimensions:

Innovator Role

- came up with inventive ideas
- experimented with new concepts and ideas

Broker Role

- exerted influence in the virtual team

Producer Role

- ensured that I met short-term stated goals
- ensured that I met long-term stated goals

Director Role

- made my role very clear
- clarified my priorities and directions

Coordinator Role

- anticipated problems and avoided crisis
- brought a sense of order into my work

Monitor Role

- was in control of his/her work
- compared records, reports, and so on to detect any potential problems

Facilitator Role

- surfaced key differences among team members and then worked participatively to resolve them
- encouraged participative decision making

Mentor Role

- showed empathy and concern in dealing with me
- treated me in a sensitive caring way

Role Clarity. This is a four-item measure taken from Fritz, Narasimhan, and Rhee (1998). On a five point scale ranging from *To No extent (1)* to *A High Extent (5)*, participants were asked the extent to which they agreed with the following statements:

- I felt certain about how much authority I had on this virtual team
- I knew what my responsibilities were on this virtual team
- I knew what was expected of me on this virtual team
- I felt that I had sufficient time to perform

Communication Satisfaction. This is a three-item measure taken from Fritz, Narasimhan, and Rhee (1998). On a scale of *Very Dissatisfied (1)* to *Very Satisfied (5)*, participants were asked to rate their satisfaction with the following:

- Your ability to find out about changes or news that affected your virtual team
- Your ability to get help on virtual team related problems
- Your sense of belonging to the virtual team

Communication Effectiveness. We assessed this variable through developing several items to measure communications quantity, quality, and clarity. The following items were used to measure these three dimensions of communications effectiveness:

- In terms of the overall quantity of communication between yourself and your VTL, how would rate this in terms of quantity?

The scale consisted of:

1 _____ 2 _____ 3 _____ 4 _____ 5
Far too little <-----*Just Right*-----> *Far too much*

- When you have required important information about the virtual team project, your VTL has communicated this information?

The scale consisted of:

1 _____ 2 _____ 3 _____ 4 _____ 5
Not at all <-----*In too little detail*-----*Just Right*-----*In too much detail*----->

- In terms of the regularity of communication with your VTL, how would you rate this?

The scale consisted of:

1 _____ 2 _____ 3 _____ 4 _____ 5

Highly Irregular <-----*Somewhat Regular*-----> *Very Regular*

- In terms of the quality of the communication between you and your VTL, how would you rate this?

The scale consisted of:

1 _____ 2 _____ 3 _____ 4 _____ 5

Not very good <-----> *Extremely Good*

- When there are important changes/news concerning the project, your VTL communicated these changes:

The scale consisted of:

1 _____ 2 _____ 3 _____ 4 _____ 5

Not at all <-----> *Very Clearly*

- When you had important questions about the project, your VTL responded:

The scale consisted of:

1 _____ 2 _____ 3 _____ 4 _____ 5

Not at all <-----*Very Late*-----*Late*-----*Promptly*----> *Very Promptly*

Extent of Communication Technology Use. Single item questions measured the extent of team's usage of a variety of communication technologies (see Appendix B, item 10 for list of technologies).

Without formally hypothesizing, we argue that virtual leaders who exhibit multiple roles will be perceived as more effective by their subordinates. More effective leaders will have teams that are more satisfied with the communication, clear on their roles, and perceive communication effectiveness. We would also expect teams with more effective leaders to produce more effective results. To measure results, the quality of the

team reports submitted for a course grade was assessed by the instructors. To ensure disinterested scoring, the grades were determined before the survey data was analyzed.

The project grades are given in rank order, rather than as a raw number.

Research Findings

We conducted some preliminary quantitative analysis before proceeding with a qualitative assessment of the team leaders' and team members' personalized assessment of their virtual teams. Cronbach reliability analysis was conducted on the variables measured to confirm their reliability. Table 2 presents the variables, means, standard deviations, and Cronbach alphas. As can be seen, the alphas are very high. There is no reliability for the "Broker" role as it was comprised of a sole item.

Table 2: Descriptive Statistics and Cronbach Alpha Reliability

Variable	Mean	Standard Deviation	Reliability
Leader Effectiveness	3.46	0.74	0.95
Leader Roles:			
Overall	3.17	0.82	0.93
Innovator	2.68	0.86	0.87
Broker	3.40	1.08	--
Producer	3.25	1.04	0.89
Director	3.01	1.06	0.86
Coordinator	3.04	1.07	0.81
Monitor	3.09	1.03	0.65
Facilitator	2.97	1.06	0.60
Mentor	3.41	0.82	0.86
Communication Effectiveness	3.16	0.74	0.78
Communication Satisfaction	3.26	0.86	0.78
Role Clarity	3.47	0.78	0.83

Regression was run using leadership effectiveness as the dependent variable, and the various roles and technology variety as independent variables. The regression is significant ($F=7.46$, $p>.000$); however, the only role to significantly predict leadership effectiveness is that of Mentor ($t=3.547$; $p>.001$).

MANOVA was run using Communication Effectiveness, Communication Satisfaction and Role Clarity as dependent variables and Leadership Effectiveness as the independent variable. Leadership Effectiveness was a strong predictor of the dependent variables ($F=6.69$, $p>.000$; $F=6.984$, $p>.000$; and $F=5.359$, $p>.000$ respectively).

The data was aggregated according to team, as shown in Table 3. Inter-rated reliability scores were computed for each team (i.e., a measure of the extent of agreement among team members in response to the questions). These scores are given in Table 3. Three teams have troublesome scores--Teams 8, 11, and 12, indicating low agreement (high standard deviations) among team members as to their perceptions of the team. The remaining 10 teams have acceptable inter-rated reliability.

Table 3: Team Scores and Inter-Rater Reliability

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13
Inter-rater Reliability	0.86	0.68	0.69	0.70	.086	0.77	0.96	0.34	0.91	0.90	0.55	0.24	0.73
Number Responses	3	3	4	5	4	5	5	4	5	5	3	4	4
Mean Leader Effectiveness	3	2.80	2.25	4.56	4.4	3.76	4.08	2.7	3.44	3.85	4.27	2.85	2.45
St. Dev Leader Effectiveness	0.53	0.8	0.79	0.78	0.52	0.68	0.3	1.15	0.41	0.44	0.95	1.23	0.74
Project Quality	8	3	10	1	5	7	11	8	4	9	2	6	13
Technology Used: 1-Email 2-Fax 3-Face 4-Phone 5-Web Collab.	1,3	1,2	1,3,4	1,2,5	1,2,5	1,2	1	1	1,5	1	1	1,5	1
Communication Effectiveness	3.07	3.13	2.65	3.88	4.25	2.96	2.8	2.65	3.36	3.56	3.6	2.95	2.1
Communication	3.42	3.25	2.44	4.1	4.19	2.95	3.15	2.81	3.85	3.8	3.25	2.94	1.94

Satisfaction													
Role Clarity	3.56	3.22	3.17	3.87	4	3.8	3.8	2.67	3.93	3.6	3.44	3.17	2.42
Leadership Roles:													
Innovator	2.33	2.5	2.25	2.8	3.88	3.5	2.2	1.88	3.2	2.63	4	2.5	1.88
Broker	2.33	3.67	2.75	3.6	4.5	4.4	2.8	3	3.8	3.5	3.67	3.75	2
Producer	3	3.17	2.63	4.2	3.88	3.4	3	2.63	3.8	3.5	5	2.75	2
Director	2.83	3	2.75	3.6	3.75	2.7	3.2	2.38	3.5	3.5	4.83	2.63	1.38
Coordinator	3.33	2.5	2.5	4.2	3.63	2.9	2.6	2.5	3.5	3.25	3.73	3	1.63
Monitor	3.17	2.33	2.75	4.4	3.63	3.1	2.3	2.63	3.5	3.50	3.73	3.13	1.75
Facilitator	2	3	2	4	4.13	3.4	2.4	2.5	3.6	3.25	3.17	3	1.63
Mentor	2.83	3.5	3.25	4.6	3.75	3.6	3.5	2.38	3.3	3.67	3.5	4	2

We then took the mean of leadership effectiveness (3.46) and plotted the teams according to leadership effectiveness. The distribution is normal with three teams having leaders with a score greater than one standard deviation above the mean (Teams 4, 5, and 11) and three teams having leaders with a score less than one standard deviation below the mean (Teams 3, 8, and 13). To help understand what contributed to the variation in leadership effectiveness, the short answers of the team members as well as the reflections of the team leaders were analyzed. This is reported in the following analysis.

Analysis of Findings

According to the survey data, leadership effectiveness exhibited marked variation among the thirteen teams. Leadership effectiveness was most closely associated in the virtual environment with the mentoring capabilities of the leader. Effective leadership is then associated with communication effectiveness, communication satisfaction, and role clarity. Although the small number of teams precludes a quantitative evaluation using the team score as a dependent variable, one can see in Table 3 that the projects ranked highest in terms of quality were in fact received by the teams with the leaders who received high effectiveness scores. These results can be supplemented through a qualitative analysis of both leader and team member responses to open-ended questions. The following pages

present these qualitative findings on leadership effectiveness first from the standpoint of the team member and then from the perspective of the project team leader.

Leadership Effectiveness- The Team Members' Perspective

Team members were asked their reflections on effective and ineffective global virtual team leadership, and team leaders were asked to write reports indicating their analysis of their own leadership. The team member responses revolved around primarily four critical issues: communication, understanding, roles and attitude.

Communication. In terms of communication, complaints were voiced by members who felt that their leaders did not respond to questions promptly. Comments by team members of leader's with low effectiveness scores reflected this dissatisfaction:

“The incompetence of our leader hindered our success. She never acknowledged our suggestions concerning the use of web technology despite our repeated efforts to encourage the use of such techniques. She failed to give us direction, and never encouraged our group to explore any technologies.”

In contrast, other teams who rated their team leaders as being highly effective commented on their leader responsiveness to a variety of project related issues and questions:

“Our group leader was very effective in directing our teams' activities. She contacted us promptly with her ideas concerning the electronic commerce project. She responded quickly to questions and comments that the team members had.”

“Carlos was an extremely effective team leader in our virtual team project. He provided us with a clean and precise outline of goals, he spoke/wrote excellent English and he answered our questions promptly.”

Another frequent communication complaint was that the leader was too vague. The word vague appeared frequently and mostly in the context of an ambiguous assignment of tasks. The members wanted more detail and "clear division of tasks". They desired specific messages about what needed to be done and when. Members were irate

when a leader would tell them of a deadline one day in advance and expect their compliance.

“I had a hard time getting any direction from him [leader].”

“He gave us deadlines without asking us how much time we needed, or whether it was even plausible. Then, he wouldn’t care about the deadlines-indirectly creating an attitude that timing was not important.”

Members were also bothered by turning in materials to the leader but receiving no comments or feedback. In contrast, effective leaders were perceived to have willingly provided continuous feedback and suggestions regarding team activities.

“He was also willing and anxious to hear our opinions and ideas on the topic. After hearing our suggestions, he would direct and advise us.”

Three teams used web collaboration tools. Among these, one leader designed a homepage to house team information and progress. It is not surprising that this team (Team 4) had the highest rated leader. Additionally, this team also engaged in weekly 1.5 hour chat sessions to facilitate communication. While one team member claimed to "not see the point of spending 1.5 hours every week on Pow-Wow," others enjoyed the closer relationship they felt they developed with the leader and team members as a result of the extensive communication. Members from Team 4 commented:

“He [the leader] allowed us to get to know each other on PowWow. We joked with each other and established a high level of trust among the members of the group. This trust fostered a unique working relationship which proved to be very successful.”

To summarize, the most effective leaders (based upon team members' perceptions) were those who communicated regularly, answered team member questions, provided feedback, gave directions, and approached the members with a cordial yet

assertive tone. Perhaps these findings can best be summed up by Team 11 perceptions of their leader's effectiveness:

“Our project manager was very effective in directing our team's activities. He did a great job of delegating responsibilities to each group member. He was faithful in communicating suggestions to help improve our work. He was very patient with the deadlines he projected, and gave us a clear picture of what he wanted each of us to accomplish. He respected our schedules and other commitments and did a great job of communicating with us.”

Understanding. Throughout this study, a common word used to describe leaders who received high effectiveness ratings was "understanding." This may correspond to the mentoring variable highlighted in the quantitative findings. The leaders receiving praise from their members, did so for being "sensitive to our schedules" and for "caring for all our members" and for "appreciating our opinion and suggestions."

“If we were ever unclear about a topic or meaning, he would research with us to find the answer. This care and concern contributed to his effectiveness.”

“Our virtual team leader established a fair schedule of deadlines for our group. She was more than willing to work with us and our schedules. For example she offered to conduct a virtual team meeting at 2am in the morning to accommodate us.”

Complaints were voiced against leaders who did not exhibit empathy: "to him the topic was easy, but to us it was very complicated and difficult to understand." Low scoring leaders received comments such as "he needed to be more understanding of people in the group who have opposing views and suggestions." Members wanted to know about their leaders and wanted their leaders to express interest in them. Some members bemoaned a leader who "never wanted to know anything about us" or who "didn't tell about herself." One leader received vitriolic comments from members, who felt scorned:

"I think the Americans were looked down upon" "He always said things like "you backstabbing Americans".

Roles. Some team leaders did a better job of clarifying their role, and the roles of the members, than did others. A major complaint against low performing leaders was that they were not authoritative enough, not clear on responsibilities, and not involved with the group. Regarding their virtual team leader, members from Team 8 commented:

“Unfortunately he did not follow up in a good, effective way in guiding the team. He basically just let us work with these first [initial] guidelines which were very broad. He should have given us more specific guidelines on what to cover, and followed it up with even more information throughout the process.”

Evidentially, the team members did not want a distant dictator, but a distant mentor--someone who pointed them in the right direction, who suggested to them where to locate relevant information, who commented on their work, and encouraged their progress. Disappointment was voiced against leaders who "didn't help us with what changes needed to be made", who "gave no feedback on our work" or who "just sent assignments and left us out to dry." Evidently, at least one leader responded to the lack of participation of certain students by merely re-assigning their tasks to performing members. This was not appreciated:

"Demand that everyone do their part. Don't just shove extra work on the people who are doing their job."

The US students frequently complained that the leaders did a poor job of eliciting participation from their Mexican counterparts. The most effective leaders did not assign responsibilities to the Mexican students, once they realized incompatibilities of goals and language. They managed the problem not by reassigning the Mexican member roles to US students, but by assigning the Mexicans a different role, one that they could perform.

Members wanted leaders who were involved in the work itself, not who just delegated and watched:

"Do not tell the team that you are there to help and not do the work."

While the leaders were instructed not to contribute content work, they were welcomed, and encouraged, to comment on the work of the members and provide them suggestions on how to improve the work.

Attitude. Finally, the members were very aware of the leader attitudes. Three teams with low scoring leaders complained that their leader was either too arrogant or too timid. Members complained about a leader who "was not assertive enough," "very distant", or "too bossy". Members wanted clear directives, but also wanted a leader who communicated "to our level." However, they reacted against leaders they perceived as having "a superiority attitude."

"Unfortunately, I cannot say that our group leader was key to our success. He had difficulty bringing things down to our level, and I often had to go to someone else for clarification. I felt as if he slightly snubbed and looked down on us."

At the same time, team members also wanted to be challenged to excel:

"I didn't feel like I was being pushed to do well. "I must admit I didn't do my best because I didn't feel encouraged and pushed along".

There can be a fine line between assertiveness and bossiness. The importance of attitude is perhaps best illustrated in the case of one team member who stated:

"[He] asked for an outline/draft of our part of the paper. Some actually submitted the entire full copy. When we had our Pow-Wow meeting, he gave me a hard time for not submitting my entire paper even though I was following his instructions."

While the leader might not have intended to scold the member, the member felt a lasting sting from the event. Since the virtual environment may hinder the awareness of such misunderstandings, this increases the need to be vigilant of one's attitude.

These qualitative results corroborate the findings from our analysis of the surveys and suggest that virtual team leader effectiveness may be related to a variety of underlying factors including: the ability to communicate, leader understanding (empathy), role clarity (definition), and leader attitude towards team members. These overall findings are summarized in Table 4

Table 4: Characteristics of Effective Virtual Team Leaders.

Dimension of Effective Leadership	Description of An Effective Virtual Team Leader
Communication	<ul style="list-style-type: none"> • Provides continuous feedback • Engages in regular, prompt communication • Provides a clear, detailed “picture” of tasks
Understanding	<ul style="list-style-type: none"> • Sensitive to schedules of team members • Appreciative of team member opinions & suggestions • Exhibits care & concern over team member problems • Expresses a personal interest in team members • Gets to know other team members
Role Clarity	<ul style="list-style-type: none"> • Clearly defines responsibilities of all team members • Able to exercise authority to insure follow through on assigned responsibilities • Able to mentor virtual team members in a “hands-on” fashion
Leadership Attitude	<ul style="list-style-type: none"> • Assertive-- yet not overbearing or “bossy” • Caring-- yet not timid • Ability to relate to team members at their own level • Consistency over the life of the project

Leadership Effectiveness- The Leaders' Perspective

From the leaders' perspectives, the primary problems with the teams centered around member motivation and behavior, lack of control mechanisms, and technology problems. The only commonality between leader and member comments relates to communication: members complained of poor patterns of leader communication while leaders attributed poor member communication to a lack of motivation. Leaders described members who didn't respond to messages, refused to comply with deadlines, lacked basic team skills, were "insufficiently open-minded", and who had no common goals. Leaders varied in their ability to cope with these challenges. For example, less effective leaders would generally delay a given action or decision until all team member responses had been received. Although they were not obliged to retain non-participating members as part of the team, leaders who allowed these students to delay progress and impede team spirit never fully got the team together.

Leaders also complained about lack of response to their emails. The leaders believed that they sent "enthusiastic warm welcome" messages, "explicit expectations" and "motivating feedback and direction," to which they encountered "lack of engagement," "poor feedback", and "passive style" from their team members which resulted, in their opinions, in "an unstable process," and "mediocre performance." Leaders clearly had a higher standard of quality to which they were accustomed, and most were unable to elicit a higher quality from the team members than the team members were accustomed. Team 4, the highest scoring team, seemingly had a good experience. The leader reports that they began with "a lot of fun and optimism" and he immediately scheduled an online chat to get the team moving together. They had "constructive"

weekly chats and used the website "to exchange documents and to make it easy for anyone to join us at any time." This leader structured the communication patterns, produced the "team agendas, outlined the draft report, and provided a detailed work plan." This leader also had problems with the participation of the Mexican students, but he responded by explaining to the US students that it was a language and technology problem and that they needed to exercise patience and understanding. He stated: "our efforts to keep them involved were hard but did end up in them writing the first important chapters of the end report."

Most leaders felt that had they had more direct control of rewards (i.e., grades), they could have better motivated the students. However, they were requested to rate each student on the project and their assessment was to count in the assignment of the members' project grades. Nevertheless, the leaders felt powerless to motivate without the potential for reward and punishment. Likewise, the leaders felt hampered by email technology. Several coped by developing web sites and having web-based chat sessions, both of which were well-received by team members. Others continued with email only, although they recognized this to be a limitation and blamed their own weak performance on the technology.

The team leaders had high performance expectations and all but two (Team 4 and Team 5) expressed disappointment with the quality of their teams' project. The leaders tended to blame the students and the structure rather than themselves. Indeed, in all thirteen reports submitted by the leaders reflecting on their experiences, only one suggested things he could have done differently--"maybe I could have improved my effectiveness by exercising more pressure on the responsible teachers in the US and

Mexico. In a professional setting, I would have done it." It is telling that the leaders saw themselves as helpless, powerless, and yet flawless.

The problems experienced by the team leaders are not unusual for matrix structures in a virtual environment. Where team leaders are required to manage members who do not report directly to them in terms of promotion, motivation can be challenging. Where standards of quality and norms of teamwork vary (as they often do across cultures and disciplines), establishing common goals and expectations is difficult. However, the creative leader finds mechanisms to address these challenges, rather than abandoning a team to itself.

Limitations and Conclusions

Since our findings are based upon a limited sample, this may restrict our ability to generalize these results to other settings. Secondly, these findings may only be applicable to cultures similar to those represented by the subjects of this study (e.g. American, Mexican, European). Had our study included members from other cultures (e.g. Asian), significantly different findings may have occurred. Future studies should seek to identify how the characteristics of virtual team leadership may vary across a variety of cultures. Concurrently, future research should also seek to identify those underlying factors of virtual team leadership that are universal in nature and seem to transcend culture.

In spite of these limitations, valuable findings have emerged from this research. The answer to our original question-- "*What factors contribute to effective leadership in virtual team environments?*"—has yielded some interesting results. It is clear that effective leaders were perceived by team members as those able to effectively mentor their subordinates. First and foremost, team members wanted a mentor--someone to guide, to

encourage, to challenge, and to motivate them to excellence. In contrast, leaders seemed to want more independent members who did not require “hand holding” and who could be assigned tasks and then left to act independently.

In spite of these perceptual differences between team members and leaders, a common theme has emerged; effective leaders are highly involved with team members (as opposed to being “distant dictators”), providing constant feedback, guidance, suggestions, coaching, and understanding relative to a wide range of virtual team issues. While traditional leadership is seen as an art of charisma and multiple roles, virtual leadership must be kept simple with consistent communication, detailed instructions, rapid feedback, and most importantly, an understanding disposition. Additionally, our evidence suggests that this mentoring capability is reflected in the leader’s ability to build healthy social climates for team members to interact with each other. In contrast, ineffective leaders were generally perceived to lack empathy and to be detached from the management process.

Those virtual team leaders perceived to be highly effective expressed care, concern, and understanding towards team members, yet, at the same time, they were able to assert their authority to achieve team goals. Additionally, effective leaders were able to engage team members in a very personal, collaborative fashion and to simultaneously maintain their “distance” as authority figures. These examples suggest that effective team leaders demonstrated the ability to engage in multiple roles in the virtual environment. Effective leaders demonstrated key aspects of both cognitive and social complexity. Effective leaders evidenced high levels of cognitive diversity as indicated by their efficient patterns of communication, the ability to assess information and provide meaningful feedback, and their propensity to exercise flexibility in adapting to changing task

demands. Likewise, effective leaders demonstrated high levels of social complexity as evidenced by their ability to assess social situations and to develop meaningful social relationships among themselves and team members. These findings reflect more current views on leadership that suggest leadership is a function of behavioral complexity or the ability demonstrate a more varied and complex set of behavioral repertoires in response to complex organizational circumstances.

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Appendix A

Virtual Team Topics

Team 1: "Strategic use of Internet"

Team 2: "The Strategic Impact of the Internet in the Textile Sector"

Team 3: "Quality-Based IS Development"

Team 4: "Use of EIS in the Management of Universities"

Team 5: "Strength and Weaknesses of Virtual Teams"

Team 6: "Integration of DSS , EIS and ES/KBS"

Team 7: "Potential of Electronic Commerce "

Team 8: "Use of Expert Systems in the Financial Sector "

Team 9: "Relevance of DSS and EIS in Decision-Making"

Team 10: "Requirements Specification of a DSS/EIS"

Team 11: "Role of Intranets in the organizations"

Team 12: "Strategic Planning of IS/IT in the government sector"

Appendix B
Virtual Team Member Survey

Topic _____ **Team #** _____

Instructions: The intent of this survey is to provide feedback that will be useful in determining ways to improve the effectiveness of virtual teams. Nothing that you say in this survey will be used to evaluate either your Mexican team members or your team leader. The survey may be completed anonymously, or you may provide your name if you prefer. We do ask that you provide the name of your team leader, as the team leaders are interested in your feedback (your name will not be available to them with the feedback).

When responding to the following questions, please think about your virtual team leader and those characteristics that have made him/her most effective. In the following questions dealing with your virtual team, the abbreviation VTL will be used for your virtual team leader. Unless otherwise indicated please circle the response that best indicates your opinion. Thank you for taking the time to provide your opinions.

Please give your virtual project team leader's name _____

1. How well would say you know your VTL?

1 _____ 2 _____ 3 _____ 4 _____ 5 _____

As a distant colleague <-----> As a close colleague and personal friend

2. In terms of the overall quantity of communication between yourself and your VTL, how would rate this in terms of quantity?

1 _____ 2 _____ 3 _____ 4 _____ 5 _____

Far too little <-----Just Right-----> Far too much

3. When you have required important information about the virtual team project, your VTL has communicated this information?

1 _____ 2 _____ 3 _____ 4 _____ 5 _____

Not at all <-----In too little detail-----Just Right-----In too much detail----->

4. In terms of the regularity of communication with your VTL, how would you rate this?

1 _____ 2 _____ 3 _____ 4 _____ 5 _____

Highly Irregular <-----Somewhat Regular-----> Very Regular

5. In terms of the quality of the communication between you and your VTL, how would you rate this?

1_____2_____3_____4_____5

Not very good <-----> Extremely Good

6. When there are important changes/news concerning the project, your VTL communicated these changes:

1_____2_____3_____4_____5

Not at all <-----> Very Clearly

7. When you had important questions about the project, your VTL responded:

1_____2_____3_____4_____5

Not at all <-----Very Late-----Late-----Promptly----->Very Promptly

8. For the following questions, please write in your response in front of the question using the following scale:

Strongly Disagree Neutral Agree Strongly Disagree Agree
a. I feel very confident about the skills 1 2 3 4 5

of my VTL

b. My VTL had much knowledge about 1 2 3 4 5

the team project

c. My VTL has specialized 1 2 3 4

5

capabilities that helped increase our performance*

*If you responded with a 4 or a 5 to c, please indicate what are these specialized capabilities?

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
d. My VTL is well qualified	1	2	3	4	5
e. My VTL was very capable of performing his/her tasks	1	2	3	4	5
f. My VTL showed a great deal of integrity	1	2	3	4	5
g. I could rely on my VTL	1	2	3	4	5
h. Overall, my VTL was very trustworthy	1	2	3	4	5
i. My VTL was usually considerate of my opinions and ideas	1	2	3	4	5
j. My VTL was friendly	1	2	3	4	5
k. I have confidence in my VTL	1	2	3	4	5
l. My VTL was usually considerate of my feelings	1	2	3	4	5

9. To what extent were you satisfied with each of the following

	Very Dissatisfied	Dissatisfied	Neutral	Satisfied
a. Your ability to find out about changes or news that affected your virtual team	1	2	3	4
b. Your ability to get help on virtual team related problems	1	2	3	4
c. Your sense of belonging to the virtual team**	1	2	3	4

** If you responded 1 or 2, please specify why you were not satisfied?

5 d. Your virtual team leader's ability to evaluate your performance**

1 2 3 4

** If you responded 1 or 2, please specify why you were not satisfied?

10. To what extent were the following means of communication employed on this global project?

	Never	To a Small	Fairly	Very	To a Great
	1	2	3	4	5
	Extent		Often	Often	Extent
Fax	1	2	3	4	5
Email	1	2	3	4	5
Face-to-Face meetings	1	2	3	4	5
Telephone	1	2	3	4	5
Voice Mail	1	2	3	4	5
Video Conferencing	1	2	3	4	5
Conference Calls	1	2	3	4	5
Web Collaboration Tools	1	2	3	4	5

** If your team used a web collaboration tool, please list below the type(s) and names of technologies used:

11. To what extent do you agree with the following statements :

	Strongly	Disagree	Neutral	Agree	
Strongly					
	Disagree			Agree	
5	a. I felt certain about how much authority I had on this virtual team	1	2	3	4
5	b. I knew what my responsibilities were on this virtual team	1	2	3	4
5	c. I knew what was expected of me on this virtual team	1	2	3	4
5	d. I felt that I had sufficient time to perform my responsibilities on this virtual team	1	2	3	4

12. To what extent did your VTL exhibit the following characteristics:

	Almost	Very	Occasionally	Frequently	
Almost					
Always	Never	Seldom			
5	a. he/she came up with inventive ideas	1	2	3	4
5	b. he/she experimented with new concepts and ideas	1	2	3	4
5	c. he/she exerted influence in the virtual team	1	2	3	4
5	d. he/she ensured that I met short-term stated goals	1	2	3	4
5	e. he/she ensured that I met long-term stated goals	1	2	3	4
5	f. he/she made my role very clear	1	2	3	4
5	g. he/she clarified my priorities and directions	1	2	3	4

5	h. he/she anticipated workflow problems	1	2	3	4
	and avoided crisis				
5	i. he/she brought a sense of order into my work	1	2	3	4
5	j. he/she was in control of his/her work	1	2	3	4
5	k. he/she compared records, reports, and so on to detect any potential problems	1	2	3	4
5	l. he/she surfaced key differences among team members and then worked participatively to resolve them	1	2	3	4
5	m. he/she encouraged participative decision making	1	2	3	4
5	n. he/she showed empathy and concern in dealing with me	1	2	3	4
5	o. he/she treated me in a sensitive caring way	1	2	3	4

13. Finally, we would like to know your general overall assessment of the person as a managerial leader:

a. My virtual team project leader's performance was:

	Poor					Excellent
1	2	3	4	5		

b. Compared to other leaders under whom I have worked, my virtual team leader's performance was:

	Poor					Excellent
1	2	3	4	5		

c. My virtual team project leader's performance as a role model was:

	Poor					Excellent
1	2	3	4	5		

d. My assessment of my project leader's managerial success is:

	Failure					Success
1	2	3	4	5		

	Ineffective			Effective	
e. I would rate the overall managerial effectiveness of my virtual team project leader as:	1	2	3	4	5

Open ended questions:

1. If you were asked to give advice to your VTL on how to improve, what would you suggest?

2. Please describe any characteristics that made your VTL ineffective. Please describe the behavior, personality, and or other characteristics that hindered his/her effectiveness.

3. Is there a specific instance you can recount of when your VTL was particularly ineffective? If so, please describe this instance.

4. What in your opinion characterizes an effective global virtual team?

5. Describe how cultural differences (e.g. language, customs) among team members influenced your team's ability to function effectively.

5. Optional:

If you would like, you may indicate your name. This will be deleted though before any feedback is given to the Team Leader.

Your Name _____

Please feel free in the space below to write any other comments.