

Full Length Research Paper

Improved team performance resulting from advancement of technology communication method

Mohammed Zulfikar Jamshed

Department of Business Administration, Faculty of Commerce, Ain Shams University, Cairo, Egypt.
E-mail:jamshed2006@yahoo.com.

Accepted 16 April, 2016

Numerous studies found that teams in organizations which communicate both effectively and successfully results in high team performance and employee satisfaction. This study examines the differences between face-to-face and virtual teams (both via Email and Portal), the impact of specific communication technology in task completion, and the ultimate impact on cohesion, team performance and employee satisfaction. A total of 362 Masters in Business Administration postgraduate students in a European university operating in Egypt participated in a team exercise to accomplish a task. They were randomly assigned via computer software into teams to one of the three specific mediums (Email (virtual), Portal (virtual), or face-to-face) for intra-team communication. Results suggested that the impact of technology usage to facilitate communication amongst teams is significant and that organizations may be detrimentally affecting their teams' performance though the use or the lack of use of certain communication technologies. Results also suggested that all organizations utilizing teams and communication technology, and that strive to enhance performance, should implement the most effective communication practices, as per their culture specificity, that result in the greatest team performance.

Key words: Business Administration, portal, employee satisfaction, team performance.

INTRODUCTION

Organizations have been heavily depending on using virtual teams, for obvious cost saving economical and logistical reasons, which use technology to facilitate their communication. This in turn either positively or negatively impacts their performance and satisfaction. These same organizations are also increasing the use of teams and are beginning to use teams that no longer function in traditional ways. Only recently has literature begun to address differences in performance between face-to-face teams and virtual teams. The literature from the organizational behavior and human resource management fields have addressed the dynamics of the face-to-face work teams regarding personality, team cohesion, team trust, consensus building, and confidence in decision making. However, the literature has not addressed how technology could help or hinder a team

when faced with having only a certain technology for communication. This study attempts to examine the variables that have impact on affected teams through the use or the lack of use of certain communication technologies.

Clearly, as organizations venture into the global economy, it is important that managers identify factors that help teams work in a positive way for the organization. When managers can identify the characteristics of a team that promote successful outcomes, managers can make better decisions in forming teams and providing the technology that will enhance team performance. This research study examines the impact of communication media on team cohesion and team performance in high context cultures such as Egypt. High context cultures assign a high level

of importance on non-verbal communication when they understand messages communicated to them. Communication media may or may not hinder the non-verbal communications relayed during the communication process. This research attempts to identify which communication media channels are most suitable to be used in high context cultures to ensure that complete comprehension of the message is successfully both communicated and understood.

There are contradicting results as to the success technology had in helping organizations to improve communication between its members, organizational decision making, and employee productivity. Several studies have reported beneficial Returns on Investment (ROI) with the implementation of technology (Bourquard, 2004). However, research also seems to suggest that technology can potentially sink an organization when IT is not in alignment with the strategic goals of the organization (Arlotto and Oakes, 2003). In addition, the marketplace has been turning to global expansion, becoming more demographically diverse, and relying more on the use of teams (Stough et al., 2000). These teams historically have performed in homogenous settings and have met primarily face-to-face. These teams typically used little technology to interact. Considering the advances in communication media over the past twenty years, IT has become a part of the everyday operations of nearly all businesses.

Most apparent in the differences between face-to-face teams and virtual teams, as noted by Lipnack and Stamps (1997), is the physical and geographical proximity. Face-to-face team members have the luxury of being able to meet face-to-face in the same location. Communication is rich and in-person, providing a vast array of feedback in verbal (tone, speed, and volume), and non-verbal languages (body language), and in the environmental situation. In virtual teams, however, communication is accomplished almost completely through the use of some type of technology. There is a greater chance for misinterpretation of the message and a loss of feedback time. Virtual teams many times find themselves in different places at different times, not receiving any additional communication other than the words on a screen. Additionally, virtual teams, due to the globally expanding organization, deal with the dynamics of different national cultures. These differences in message encoding and decoding, loss of time between the source of the message and the response by the receiver may cause significant losses in the communication feedback loop, potentially resulting in a loss in productivity or performance.

The researcher argues in this paper that there is a higher probability for team's performance to increase when using technology communication methods that operate in low context cultures. Vice versa, there is lower probability for team's performance to increase when using technology communication methods that operate in

high context cultures. The logic behind the previous statements is that high context cultures, such as Egypt, do not operate under good faith concept. The good faith concept depends on trust, openness, transparency, and straight forwardness, which is lacked in high context cultures. Thus, these types of cultures rely on encoding and decoding the messages they both send and receive respectively based on non-verbal communication more than verbal ones, which is normally not obvious via technologically aided communication methods.

LITERATURE REVIEW

Through a meta-analysis of the team dynamics literature, Forsyth (1990, 1999) suggested that the key to team processes was cohesion. In these two studies, Forsyth noted that cohesion was the "glue" that holds a team together and that cohesion was the "strength" that bonds and links teams together. Forsyth (1999) further suggested that cohesive teams have the common characteristics of cooperation, satisfaction, and enjoyment. Another meta-analysis by Bettenhausen (1991) suggested that team cohesion was one of the most studied constructs in team literature between 1986 and 1990 and that a consensus on the definition of cohesion was not found. Authors seemed to identify cohesion in terms that best fit their relevant study. For example, Frank (1997) and Langfred (1998) defined cohesion as an individual's feeling of belongingness to a team or the amount that members of a team like each other. Festinger et al. (1950) stated that cohesion was the degree to which team members support each other and are motivated to remain together as a team. According to Murdock (1989) and his review of literature, cohesiveness is simply attraction-to-team, while Evans and Dion (1991) interpreted cohesion as an individual's desire to remain in the team. Or as Tuckman and Jensen (1997) suggested, cohesion is an outcome of the team development process.

There are numerous studies that identify the positive aspects of cohesion on team dynamics. Wech et al. (1998) identified the fact that teams with higher collective cohesion had significant improvements in communication among team members. Rempel and Fisher (1997) reported higher problem solving capabilities with teams that attained higher levels of cohesion, while teams with increased quality and quantity of output were also found to be higher in cohesion (Langfred, 1998). Although cohesion has been identified as an influence on team performance (Steiner, 1972) and cohesion may be affected by team interaction frequency and interaction quality (Wood et al., 1998), to date, there are very few studies considering cohesion in virtual teams. Clearly, there are benefits to being cohesive, and the need exists to continue the identification of how a cohesive team will perform in specific situational settings (that is, virtual teams). Treadwell et al. (2001) identified that cohesion

changes over time and alluded that interaction method may moderate cohesion development.

Kacmar et al. (2003) tested the hypothesis that communication frequency moderates the relationship between a leader and a team member. The study found that communication was more strongly related to performance among teamed individuals reporting frequent and duration of communication than among those reporting infrequent communication. Lester et al. (2002) looked at teams in an education setting and suggested that teams must communicate and that the internal processes of team communication and cooperation could lead to greater performance. Lester et al. (2002) further suggested that high levels of communication and cooperation confirm team processes and have a positive effect in team effectiveness. Although they proposed that more effective internal processes (greater communication frequency, duration, and intra-team cooperation) would positively affect changes in team effectiveness over time; they did not specify whether these processes would actually improve team outcomes. Other studies regarding communication, specifically in team decision support systems research, have looked at communication patterns (Lam, 1997), communication technologies (Cohen, 1991) and proximity of team members using technology (Townsend and DeMarie, 1998). Other studies have provided theories such as Bandura's (1977) verbal persuasion as a determinate of efficacy; however, these studies have looked at individuals or teams in terms of task performance, technology use, proximity or richness of communication and not on the outcome of team satisfaction.

THEORY DRIVING THE STUDY

The transfer of information from one individual to another has social value that provides a perception of presence. Social presence theory (Short et al., 1976) argues that particular communication media that transmit more cues can lead to a greater degree of social presence. In other words, communication media that can communicate more socio-emotional cues can be perceived as personal, warm and sociable (Yoo and Alavi, 2001). Short et al. (1976) suggested that social presence is an important variable in mediated communication. Social presence is extrapolated by Kreijns et al. (2004) to mean the degree of illusion that occurs when the other communicator in the communication appears to be a "real" physical person. Social presence, therefore, can affect the degree of social interaction taking place in virtual team environments.

Social presence influences not only the way team members perceive media, but also the recipients of their messages and communication. Additionally, the amount of social presence that can be perceived can vary among each type of medium (Daft and Lengel, 1984). Because

of the lack of nonverbal cues, computer mediated technologies would seem to have less social presence than other media (Papacharissi and Rubin, 2000). Social presence was expanded by Rice and Love (1987) to include the use of different media for sending and receiving different types of messages.

Media richness theory is built upon the social presence theory. Daft and Lengel's (1984: 184) media richness theory posits that a given medium has the ability to convey a level of information, and "organizational success is based on the organization's ability to process information of appropriate richness to reduce uncertainty and clarify ambiguity". Additionally, Daft and Lengel (1984) proposed that communication media have varying abilities for resolving uncertainty, negotiating varying interpretations, and bringing about understanding between communicators. According to the theory, the amount of closeness (social presence) that can be sent over the medium depends on the medium itself and on the corresponding richness. Defined by O'Hair et al. (1998: 85) media richness is "the ability of a communication channel to handle information or convey the meaning contained in a message". Seemingly, both social presence and media richness theories suggest that certain media are more appropriate for certain types of communication.

Flaherty (1998) found that face-to-face communication was chosen over computer-mediated communication for all social motives except for pleasure. Accordingly, the amount of information a media type is able to transmit helps explain the decision-making process for choosing one form of media over another. Rice and Love (1987) reported that all computer-mediated communication is lower in social presence than face-to-face communication, while Walther (1992) suggested that most computer-mediated communication is lean in media richness. Therefore, if richer information needs to be conveyed, a richer media type may need to be selected.

Individuals have varying needs for different social interactions. Katz et al. (1974) posited the choice of communication media in terms of the satisfaction of recognized needs and desires. These varying needs for social interaction may be biased toward certain communication media that satisfy the need. As described by Dennis and Kinney (1998), face-to-face is considered to be the richest form of communication available because it offers the most channels for carrying information. Because of the richness of face-to face communication, most types of communication are compared to face-to-face communication. In many ways, computer-mediated communication types are modeled to be more like face-to-face communication. Yet, the technology has not matched the level of richness that face-to-face provides.

Using four criteria, Daft and Lengel (1984) present a media richness hierarchy, set from low to high in the degrees of richness, to demonstrate the ability of media

types to process vague or uncertain communication in organizations. The criterion they describe as the signification of a level of richness include: the availability of instant feedback; the capacity of the medium to convey many cues, such as body language, voice tone, and inflection; the use of ordinary language; and the personal focus of the medium.

Face-to-face communication is the richest communication medium in the hierarchy, followed by telephone, electronic mail, letter, note, memo, special report, and finally, flier and bulletin. The media richness theory proposes that effective managers make rational choices and that these rational choices will match a particular communication medium to a specific task, depending on the level of richness required by that task. Trevino (1990) identified that media choice in organizations was influenced by ambiguity of the message, richness of the media, and symbolic cues in the medium and situational determinants.

HYPOTHESES

There are five main research questions that this study answers:

- Research question 1: How does a specific communication medium influence team cohesion?
- Research question 2: How does cohesion influence media use (frequency) in team communication?
- Research question 3: How does cohesion influence media use (duration) in team communication?
- Research question 4: Does the communication media used affect the level of satisfaction an individual experiences in a team?
- Research question 5: How does a team's cohesion influences performance?

There is a significant absence of research, for both face-to-face and virtual teams, between the theories of cohesion, collaboration, social context, and media richness. Media richness theory stipulates that the higher the media richness the more information that can be exchanged. Team collaboration stipulates that information exchange is necessary for shared goals and collaboration. Social presence theory stipulates that the more presence interaction has, the greater the exchange of information. Cohesion theory looks at the development of cohesion and the antecedents which help or hinder cohesion development. Therefore, the following hypotheses are presented:

- H1a:** Teams using rich media (face-to-face) will have increased final team cohesion.
- H1b:** Teams using semi-rich media (Portal) will not have increased final team cohesion.
- H1c:** Teams using lean media (Email) will have decreased final team cohesion.

H2: Initial team cohesion is an indicator of the frequency and duration with which a team communicates in a given media.

H3: Teams with higher final team cohesion will have higher performance.

H4: Teams with higher final team cohesion will have higher team satisfaction.

H5a: Higher Decision Quality (performance) before feedback will positively impact satisfaction.

H5b: Higher Decision Quality (performance) after feedback will positively impact satisfaction.

H6a: Higher ending team cohesion is positively correlated to frequency of communication.

H6b: Higher ending team cohesion is positively correlated to amount (duration) of communication.

METHODOLOGY

This research study has a dual purpose. Firstly, it examines the impact of communication media on team cohesion and team performance in high context cultures such as Egypt. Secondly, it examines the variables that have impact on affected work teams through the use or lack of use of certain communication technologies. The hypotheses of this study were tested using an experimental design, utilized in Business Administration postgraduate students in a European university in Egypt. The students participated in a team exercise during the course of normal classroom activities. Initially, students were randomly assigned by computer into teams (Email and Portal (virtual), face-to-face) in which students were assigned a task. This study has one independent variable (initial cohesion), four dependent variables (ending cohesion, satisfaction, decision quality (performance), and satisfaction after feedback) and both experimental and control teams. Therefore, the study utilizes the classic pretest-posttest control team design (before-after with control team). Teams were assigned to specific medium (Email, Portal, face-to-face) for intra-team communication.

To ensure teams only communicate using the assigned medium, protocols were developed. These protocols included controls for portal teams, email controls for email teams, and face-to-face controls for face-to-face teams. Email teams were provided with unique user name and password to access Portal. To ensure that these teams stay virtual and do not "meet" in a face-to-face environment, these teams were instructed not to exchange personal information regarding contact information. And additionally, these teams were informed that emails and interactions on Portal were to be recorded and reviewed for adherence to this instruction. Face-to-face teams were instructed to communicate only in face-to-face settings for exchange of information. Personal information exchange was acceptable and time was provided during normal class time to facilitate face-to-face team communication needs. To control for

communication outside the assigned medium, students assigned to virtual teams came from different classes, did not have face-to-face interaction at anytime and utilized Portal software for communication.

Data were collected using established scales from a convenience sample that included participants registered in courses requiring student team assignments and that required computer mediated communication. The placement of students into three person teams was accomplished by computer randomization. Two types of tasks are chosen for this study, an intellectual task and a preference task.

RESULTS

A total of 392 students volunteered to participate in the study in exchange for extra credit points. After removing the 13 incomplete responses from the data, teams were identified that did not have full member participation. These teams (5 Portal teams) were eliminated from the study. A second screening was conducted to ensure that participants communicated using the assigned medium. A review of the Portal data strings revealed that 2 Portal teams met face-to-face. A review of the email accounts for teams assigned to email only revealed that 3 teams mentioned meeting face-to-face. And a review of the face-to-face contact journals revealed that 8 teams participated using email. These teams that violated media restrictions were eliminated from the study. As a result, 362 responses were used in this study.

Confirmatory factor analysis - Cohesion

During the confirmatory factor analysis, two sampling indices were examined. These were Kaiser-Meyer-Olkin (KMO) and the Bartlett's Test of Sphericity. The KMO for the cohesion scale was 0.922, and the approximate R-square value of the Bartlett's Test of Sphericity was 4163 with 300 degrees of freedom, which is significant at $P < 0.001$. The confirmatory factor analysis was conducted using Principal Component Analysis and a Varimax orthogonal rotation.

Confirmatory factor analysis - Satisfaction

A confirmatory factor analysis was conducted for satisfaction and the two sampling indices: the Kaiser-Meyer-Olkin (KMO) and the Bartlett's Test of Sphericity were also examined. For the four questions used to ascertain satisfaction, the KMO was 0.821, and the approximate R-square value of the Bartlett's Test of Sphericity was 984.60 with 6 degrees of freedom, which is reported as significant at $P < 0.001$. A Principal Component Analysis was conducted. As stated previously, the established guideline to obtain a power level of 80% at a 0.05 significance level with 350 observations is a factor loading of 0.30.

Analysis of the variance (ANOVA) - Cohesion

It was previously stated that teams would be assigned to a specific communication medium and that these teams using specific mediums to communicate would have an effect on the team's cohesion. To identify these hypothesized differences (Hypotheses 1a, 1b, 1c and 2), an ANOVA was conducted. Before conducting the ANOVA, the cohesion scale at time one (Ct 1) and time two (Ct 2) were summated for each observation. A change in overall cohesion was calculated (Ct 2 - Ct 1) and recorded. The results of the ANOVA, indicates that email teams reported the lowest mean cohesion of 73.45 at the start of the task, followed by Portal teams with 74.32 and Face-to-Face teams with a mean cohesion of 76.23. The ending mean cohesion reported by email teams dropped from 1.96 to 71.48, ending mean cohesion for Portal team increased from 1.61 to 75.93, and face-to-face teams reported an increase in cohesion from 2.04 to 78.28.

Verification of overall ANOVA

The researcher reran the ANOVA again looking for differences between specific media teams: Portal/Email, Email/Face-to-face, and Portal/Face-to-face. The first one-way ANOVA was conducted between the Portal teams and Email teams. It was found that Email ($M = 73.45$) and Portal ($M = 74.32$) teams were not significantly different and could be considered similar for starting cohesion. However, Email ($M = 71.46$) and Portal ($M = 75.93$) teams were found to be significantly different from one another in their ending cohesion. Lastly, the overall change in cohesion was significantly different ($p = 0.016$, $F = 5.940$) between Email ($M = -1.96$) and Portal ($M = 1.61$) teams. The second one-way ANOVA addressed differences between Email teams and face-to-face teams. It was found that Email ($M = 73.45$) and Face-to-face ($M = 76.23$) teams were significantly different. Additionally, Email ($M = 71.46$) and Face-to-face ($M = 78.28$) teams did report significant differences in the ending cohesion. Lastly, the overall change in cohesion was significantly different ($p = 0.005$, $F = 8.041$) between Email ($M = -1.96$) and Face-to-face ($M = 2.04$) teams. Therefore, it is concluded that hypotheses 1a, 1c and 2 are supported, whereas hypothesis 1b is not supported.

Performance (Decision quality and satisfaction)

The face-to-face teams achieved the highest decision quality with a mean grade score of 87.93, Portal teams achieved the second highest decision quality with a mean grade score of 86.74, and Email teams achieved the poorest decision quality with a mean grade score of 85.60. An ANOVA was run between the teams to identify if the grades assigned were significantly different between

the media teams. The results indicated that the differences between media teams are not significant at the 0.05 level. However, the results of the Least Significant Difference (LSD) Post hoc test suggest that the mean difference between the grades assigned to the Email team and grades assigned to the face-to-face team are actually significantly different ($p=0.035$). Hypothesis 3 required an examination of both the ending cohesion and the results of the LSD test for decision quality. The teams with higher cohesion had higher decision quality. A correlation analysis was then conducted between ending cohesion and decision quality which resulted in significant correlations ($p>0.05$) explaining 11.6% of the relationship. Therefore, based on this finding, hypothesis 3 is supported.

Analysis of the variance (ANOVA) - Satisfaction

Hypothesis 4 required an examination of both the ending cohesion and the levels of satisfaction. Additionally, the hypothesized differences between the teams for decision quality (Hypothesis 5a) and satisfaction (Hypothesis 5b) before and after feedback required an ANOVA test. The face-to-face teams reported the highest satisfaction for decision quality before feedback (16.60), the Portal teams reported the next highest satisfaction before feedback (15.56), and the Email teams reported the lowest satisfaction before feedback (14.85). Further the teams with higher cohesion had higher satisfaction.

ANOVA descriptive - Satisfaction

Satisfaction with decision quality increased for all teams after feedback. The email teams reported the smallest increase in satisfaction (0.45) to a final satisfaction of 15.30. The ending satisfaction for the face-to-face team increased from 0.74 to 17.34, and Portal teams reported the greatest increase in satisfaction from 1.13 to 16.69. The ANOVA results revealed significant differences between media teams on satisfaction before feedback ($p=0.001$, $F=7.194$), and satisfaction after feedback ($p<0.001$, $F=10.023$). However, the overall change in satisfaction between the media teams was not significant ($p=0.54$, $F=0.609$). The researcher conducted an LSD Post Hoc Test to identify which teams were contributing to the significance of the ANOVA. The results of this post hoc test support the findings of the initial ANOVA and provide further evidence that face-to-face teams are significantly different from the Email teams for satisfaction before feedback ($p<0.001$) and after feedback ($p<0.001$). Additionally, face-to-face teams are significantly different from the Portal teams for satisfaction before feedback ($p=0.029$); however after feedback, there is no longer significant differences in satisfaction ($p=0.172$). Email teams before feedback were not significantly different in satisfaction from Portal teams ($p=0.132$), however, after feedback, email teams are found to be significantly

different than Portal teams in satisfaction ($p=0.004$). The results of the post hoc LSD test did not reveal significant differences in the change in satisfaction between any of the teams. Therefore, based on these results, it is concluded that hypotheses 4, 5a and 5b are supported.

Frequency and duration of communication

An analysis of descriptive statistics revealed that Email teams reported the most contacts ($M. = 9.73$), followed by face-to-face teams ($M. = 3.19$), and Portal ($M. = 2.69$). However, Email teams reported the lowest duration of contact time ($M. = 14.21$ min), followed by Portal teams ($M. = 93.00$ min) and face-to-face teams. The outcome of LSD test supported the findings of the initial ANOVA for communication frequency and provided further evidence that face-to-face teams are significantly different from the Email teams for communication frequency 100 ($p<0.001$) and communication duration ($p<0.001$). Additionally, face-to-face teams are not significantly different from the Portal teams for frequency of communication ($p=0.311$); however, the duration of communication between these media teams is significantly different ($p=0.035$). Email teams were significantly different than Portal teams in both frequency ($p<0.001$) and duration of communication ($p<0.001$).

To identify the hypothesized relationship (Hypotheses 6a and 6b) between cohesion and a team's frequency and duration of communication, a correlation analysis was completed. There were no significant correlations between starting cohesion, frequency (0.246) and duration (0.105). However, there were significant correlations related to ending cohesion ($r=0.133$ sig=0.011) and the overall change in cohesion ($r=0.180$ sig=0.001) and the duration of communication. Therefore, based on these results, it is concluded that hypothesis 6a is not supported and hypothesis 6b is supported. Thus, hypotheses H1a, H1c, H2, H3, H4, H5a, H5b and H6b were supported while H1b and H6a were not supported.

DISCUSSION

This research paper explored the relationships between teams using different communication technologies while completing a specific task to better understand the impact of media richness on team cohesion, while identifying the differences between teams in the outcomes of team member satisfaction and performance. This study has one independent variable (initial cohesion), four dependent variables (ending cohesion, satisfaction, decision quality (performance), and satisfaction after feedback) and both experimental and control teams. The findings imply that a communication medium does have an impact on a team's cohesion. Specifically, cohesion development seems to be greatest in teams that communicate via a face-to-face medium, while cohesion development seems to decline in teams that communicate

exclusively by Email. Teams using Portal showed an improvement in cohesion, but not as great as the development found in face-to-face teams.

These findings have two important implications. First, when organizations are seeking to develop teams, the use of technology for communication needs should be considered carefully. It is believed that organizations should not restrict newly formed teams to the use of a specific communication technology, but provide media options for communication needs that are rich as solely relying on a specific technology for communication will have a negative effect on the newly formed team and ultimately affect the organization through the loss of cohesion. Secondly, the use of a richer communication medium for teams has a positive relationship to a team's cohesion over time. The findings suggest that in a given period of time, Portal teams experienced greatest positive change in cohesion of all team types. Additionally, Email teams experienced a loss in cohesion. The researcher contends that the awareness and understanding of how communication media affect teams is critical for the decision making bodies of an organization. Additionally, it is suggested that individuals in the position of assigning members to a team should understand the implications of communication media and how they will affect team cohesion over time. Through this understanding, they can provide the appropriate level of media and maximize the cohesion teams can achieve. Findings revealed an inverse relationship between initial cohesion and frequency of communication for all team types. Specifically, it was found that the greater the initial cohesion, the less frequently a team communicated during a project (that is, face-to-face teams reported the greatest initial cohesion and the lowest frequency of communication, while Email teams reported the lowest initial cohesion and the greatest frequency of communication).

Furthermore, findings indicated a positive relationship between cohesion and duration of communication for all team types. It was found that the greater the cohesion, the greater duration a team will communicate during a project (that is, face-to-face teams reported the greatest initial cohesion and the highest duration of communication, while Email teams reported the lowest initial cohesion and the lowest duration of communication). Findings showed that the amount of information being exchanged between members from more than just verbal, or written means, but by the use of body language and the immediate capability to provide feedback and discussion.

In addition, findings highlighted a relationship between the level of media richness used for communication and satisfaction for all team types. Specifically, it was found that the individuals assigned to face-to-face teams reported the greatest satisfaction with the team process, while individuals assigned to email teams reported the lowest satisfaction. Portal teams reported satisfaction

level between the Face-to-face and Email team levels. It is believed that Portal teams had a semi-rich medium to communicate between team members. Research findings suggested that a team's cohesion is affected by the richness of the medium used to communicate and that both cohesion and media impact the satisfaction of a team member.

Findings showed that the greater the final team cohesion, the better a team will perform on a given project (that is, face-to-face teams reported the greatest ending cohesion and achieved the highest performance, while Email teams reported the lowest ending cohesion and achieved the lowest performance). Although the differences between Face-to-face and Email teams were significant, the differences between Portal and Face-to-face teams were not significant. These findings have important implications. First, cohesion is directly correlated to performance. While organizations are continuing a quest to increase individual and organizational performance, it would seem clear that organizations should provide organizational work teams opportunities to become more cohesive. As stated earlier, one way to help teams to become more cohesive would be to provide the opportunity to communicate more frequently via a richer medium.

Based on the theories of team cohesion and media richness, this study suggests that organizations implementing teams and using technology for significant portions of team communication may find a negative impact on team member performance. This suggests that organizations should provide teams the opportunity to meet in a media rich environment (face-to-face). Organizations that primarily use email for team communications may be experiencing a loss in team cohesion and a resulting loss in employee satisfaction and performance. A suggestion for organizations primarily utilizing only technology-based communication would be to ascertain the return on investing in a richer type of communication technology that provides great media richness or social presence.

REFERENCES

- Arlotto P, Oakes J (2003). Return on investment: Maximizing the value of healthcare information technology. Chicago: Healthcare Inform. Manage. Syst. Soc.
- Bandura A (1977). Self -Efficacy: Toward a unifying theory of behavioral change. *Psychol. Rev.*, 84. 191.
- Bettenhausen KL (1991). Five years of teams research: What we have learned and what needs to be addressed. *J. Manage.*, 17, 345-381.
- Bourquard J (2004). I.T. -- Big Investment, Bigger Returns. *State Legislatures*, 30:4, 18-22.
- Cohen AM (1991). A guide to networking. San Francisco: Boyd & Fraser Publishing.
- Daft RL, Lengel RH (1984). Information richness: A new

- approach to manager information processing and organizational design. In B. Staw and L.L. Cummings (eds), *Research in organizational behaviour*. Greenwich, CT: JAI Press.
- Dennis A, Kinney S (1998). Testing media richness theory in the new media: The effects of cues, feedback, and task equivocality. *Inform. Syst. Res.*, 9:3, 256.
- Evans S, Dion K (1991). Team cohesion and performance – A meta analysis. *Small Team Res.*, 22, 175-186.
- Festinger L, Schachter S, Back K (1950). *Social pressures in informal teams*. Stanford, CA: Stanford University Press.
- Flaherty L (1998). Internet and face-to-face communication: not functional alternatives. *Commun. Q.*, 46: 3, 250-268.
- Forsyth D (1990). *Team Dynamics* (2nd Ed). Pacific Grove, CA: Brook/Cole Publishing .
- Forsyth D (1999). *Team Dynamics* (3rd ed.). Pacific Grove, CA: Brook/Cole Publishing.
- Frank JD (1997). Some determinants, manifestations, and effects on cohesiveness in therapy teams. *The J. Psychother. Pract. Res.*, 6:1, 59-70.
- Kacmar KM, Zivnuska S, Witt LA, Gully SM (2003). The interactive effect of leader-member exchange and communication frequency on performance ratings. *J. Appl. Psychol.*, 88: 4, 764.
- Katz E, Blumler JG, Gurevitch M (1974). Utilization of mass communication by the individual. In J. G. Blumler and E. Katz (eds.), *The Uses of Mass Communication* (pp.19-32). Newbury Park, CA: Sage.
- Kreijns K, Kirschner P, Jochems W, VanBuuren H (2004). Measuring perceived quality of social space in distributed learning teams. *Comput. in Human Behav.*, 20: 5, 607.
- Lam S (1997). The effects of team decision support systems and task structures on team communication and decision quality. *J. Manage. Inform. Syst.*, 13:4, 193-215.
- Langfred CW (1998). Is team cohesiveness a double-edged sword? An investigation of the effects of cohesion on performance. *Small Team Res.*, 29:1, 124.
- Lester SW, Meglino BM, Korsgaard MA (2002). The antecedents and consequences of team potency: A longitudinal investigation of newly formed work teams. *Acad. Manage. J.*, 45, 352-369.
- Lipnack J, Stamps J (1997). *Virtual Teams: Reaching Across Space, Time, and Organizations with Technology*. New York: John Wiley & Sons, Inc.
- Murdack G (1989). Defining team cohesiveness: A legacy of confusion? *Small Team Behavior*, 20, 37-49.
- O'Hair D, Friedrich GW, Shaver LD (1998). *Strategic communication in business and the professions*. Boston: Houghton Mifflin.
- Papacharissi Z, Rubin AM (2000). Predictors of Internet use. *J. Broadcast. Electron. Media*, 4 (2), 175-196.
- Rempel M, Fisher R (1997). Perceived threat, cohesion, and team problem solving in interteam conflict. *Int. J. Conflict Manage.*, 8: 3, 216.
- Rice RE, Love G (1987). Electronic emotion: Socio-emotional content in a computer-mediated communication network. *Communication Res.*, 14, 85-108.
- Short JA, Williams E, Christie B (1976). *The social psychology of telecommunications*. New York: John Wiley and Sons.
- Steiner ID (1972). *Team processes and productivity*. New York: Academic Press.
- Stough S, Eom S, Buckenmyer J (2000). Virtual teaming: A strategy for moving your organization into the new millennium. *Industrial Manage. Data Syst.*, 100:8, 370-378.
- Treadwell T, Lavertue N, Kumar VK, Veeraraghavan V (2001). The team cohesion scale-revisited: Reliability and validity. *Action Methods* 3.
- Trevino LK (1990). Media symbolism, media richness, and media choice in organizations. *Commun. Res.*, 14, 553-574.
- Tuckman BW, Jensen MAC (1997). Stages of small team development revisited. *Team and Organizational Studies*, 2, 419-427.
- Townsend A, DeMarie S (1998). Virtual teams: Technology and the workplace of the future. *Acad. Manage. Rev.*, 12:3.
- Walther JB (1992). Interpersonal effects in computer-mediated interaction: A relational perspective. *Communication Res.*, 19, 52-90.
- Wech B, Mossholder K, Steel R, Bennett N (1998). Does work team cohesiveness affect individuals? *Small Team Res.*, 29: 4, 472.
- Wood D, Kumar V, Treadwell T, Leach E (1998). Perceived cohesiveness and sociometric choice in ongoing teams. *Int. J. Action Methods*, 51: 3, 122.
- Yoo Y, Alavi M (2001). Media and team cohesion: Relative influences on social presence, task participation, and team consensus. *MIS Quarterly*, 25: 3, 371-390.