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The Effects of Team Self-Guided Training on Conflict Management in Virtual Teams

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Abstract The aim of this study is to investigate in detail the specific tendencies of conflict management strategies displayed by trained and untrained synchronous computer-mediated communication (CMC) teams over time. A laboratory experiment was carried out with 54 virtual teams of four members each randomly assigned to the two conditions: experimental condition and control condition. In the experimental condition 28 teams received a training program for improving virtual team functioning among session 1 and 2, consisting in a team self-guided training. These results were compared with 26 control teams, who did not receive any training program. Content analysis of the chat was used as research method. Our results showed that trained synchronous CMC teams use more frequently functional conflict management strategies, like open communication and rotating responsibilities, and less dysfunctional conflict management strategies (avoiding) over time. In contrast, untrained synchronous CMC teams tend to use more frequently dysfunctional conflict management strategies (avoiding) and less frequently functional conflict management strategies (rotating responsibility) over time. Our study shows that team self-guided training can be useful for virtual teams. Feedback given to teams about their processes and results improves group conflict management in a virtual context.

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1 Introduction

Conflict management is one of the most important challenges that teams face in virtual settings because it influences individual, team and organizational effectiveness (De Dreu et al. 2001). Virtual teams, whose members use information and communication technologies (ICTs) to interact and carry out their tasks, are inclined toward intragroup conflict (Hinds and Bailey 2003; Wakefield et al. 2008) and have more obstacles in managing this conflict (Griffith et al. 2003; Zornoza et al. 2002). The use of ICT by teams restricts verbal and non-verbal communication (Daft and Lengel 1986) as well as the social presence of team members (Short et al. 1976). These limitations imposed by ICTs make it difficult for teams to realize the existence of conflict; consequently, virtual teams take longer to manage intragroup conflict (Griffith et al. 2003). What is more, they face particular difficulties in handling conflict, due to coordination problems such as time lags and sequencing problems (Hinds and Bailey 2003; Montoya-Weiss et al. 2001).

In this context, the present study focuses on training virtual teams in a manner that enables them to manage conflict more effectively. Specifically, we test the influence of team self-guided training on virtual team conflict management strategies. This kind of training is based on feedback and focuses on enabling team members themselves to diagnose problems and develop effective solutions for them (Cannon-Bowers and Salas 1998; Smith-Jentsch et al. 2008). Through this training, virtual team members may have the opportunity to express themselves, to recognize conflict as soon as possible, and to develop new strategies to handle challenges that arise. Therefore, we expect that team self-guided training will influence the way that virtual teams manage their conflict.

A number of researchers have focused on studying conflict management in virtual teams (Liu et al. 2008; Miranda and Bostrom 1994; Montoya-Weiss et al. 2001; Poole et al. 1991; Zornoza et al. 2002). In general, conflict management is typically measured through self-report (De Dreu et al. 2001). However, the self-report methodology has shown low psychometric quality (Van de Vliert and Kabanoff 1990). In order to overcome this limitation, and in spite of the reliability and validity problems issues associated with qualitative measures, recent research has focused on exploring conflict management through observation methods and interviews (Behfar et al. 2008; Kuhn and Poole 2000; Zornoza et al. 2002).

We propose the study of conflict management using a content analysis technique which is a "research technique for the objective, semantic, and quantitative description of the manifest content of communication" (Berelson 1952, p. 74). Thus, this study combines aspects of qualitative and quantitative measurement and provides the opportunity to examine virtual teamwork by analysing messages shared among teammates and without influence of the researchers (Weber 1990). Methodological diversity becomes necessary to study the human behavior (Baumeister et al. 2007), and more attention needs to be directed at observation of behaviors to capture a detailed picture of the team virtual interaction.

Overall, the purpose of this study is to analyze how the conflict management strategies used by trained synchronous computer-mediated communication (CMC) teams differ from those employed by their untrained counterparts. The particular conflict management strategies examined are functional (consensus, debate, open communication, rotating responsibilities and team rules) and dysfunctional (voting and avoiding) as delineated in a study carried out by Behfar et al. (2008) in a face-to-face context.

The current study is unique in that it focuses on examining these conflict management strategies in a specific synchronous CMC environment, in which team members have to work and manage their differences through real-time written communication. We examine the strategies used by trained and untrained groups before and after training intervention.

1.1 Conflict Management in Teams

Conflict management is one of the most studied issues in the team literature (Callanan et al. 2006). It has been defined as a set of behaviors focused on intensifying, reducing, or resolving the tensions that occur in work teams (De Dreu et al. 1999; DeChurch et al. 2007). It is viewed as a key to determining whether intragroup conflict is beneficial or destructive for team effectiveness (Rahim 2001).

According to the *Dual Concern Theory* (Pruitt and Rubin 1986), two fundamental dimensions impact conflict management: concern for the self and concern for others. Team members' standing on these dimensions combine into the five different ways to manage conflict: competing (high concern for self, low concern for others), collaborating (high concern for self, high concern for others), avoiding (low concern for self, low concern for others), accommodating (low concern for self, high concern for others) and compromising (moderate concern for self, moderate concern for others).

Two surveys are frequently used to measure these conflict management behaviors: the Organizational Conflict Inventory (ROCI-II, Rahim 1983) and Conflict Mode Instrument (MODE, Thomas and Kilmann 1974). Both have shown questionable psychometric quality (De Dreu et al. 2001). Specifically, Van de Vliert and Kabanoff (1990) demonstrated that the validity of these self reports measures has several shortcomings. ROCI-II does not discriminate between the collaborating and compromising forms of managing conflict, whereas MODE discriminates poorly between the competing and collaborating conflict management types. Therefore, it seems that more accurate techniques are needed to study conflict management behaviors.

In order to overcome these limitations, some researchers have used other types of instruments or have developed new measures to assess conflict management in teams (Behfar et al. 2008; Kuhn and Poole 2000; Zornoza et al. 2002). Recently, Tekleab et al. (2009) developed a survey which focused on evaluating functional conflict management. Specifically, they examined whether face-to-face (FTF) teams are prepared to deal with conflict and whether their members openly discuss conflict. The results revealed that conflict management enhances team cohesion and moderates the relationship between intragroup conflict (task conflict and relationship conflict) and team results (perceived team performance, team satisfaction, and team viability).

The use of qualitative techniques for studying conflict management has been suggested as well. Kuhn and Poole (2000) proposed observational methods to analyze group conflict management styles. They found four different styles of conflict management in FTF teams: integrative style, distributive style, avoiding style, and mixed style. Their results showed that only teams that employ an integrative conflict management style achieve high decision making effectiveness. More recently, Behfar et al. (2008) focused on analyzing conflict management through observation and interviews. In addition, they studied conflict management not as a set of individual behaviors but as team strategies. Particularly, they found seven categories of conflict resolution strategies (debate/discuss, open communication, consensus/compromise, rotating responsibilities, voting, avoiding/ignoring, and idiosyncratic solutions) that FTF teams use to resolve their conflicts. Moreover, they showed that when a work team manages adequately conflict resolution, its members get and keep the best results over time.

As Behfar et al. (2008) indicated, functional strategies promote team effectiveness because they facilitate the open and explicit discussion of the different viewpoints about the task before to get a consensus and the assignments of the work to adequate team members. Conversely, dysfunctional strategies like voting and avoiding, may trigger misunderstanding, confusion, and disorientation among team members, stifling or ignoring conflict through the use of rules and a disproportionate focus on maintaining a good team climate rather than achieving the task.

In accordance with recent research, functional or collaboration strategies are most beneficial but more difficult in CMC than in conventional groups (Liu et al. 2008; Montoya-Weiss et al. 2001). CMC restricts contextual and social cues and presents more communication difficulties than FtF does. Moreover, group interaction styles appear to be dependent on the communication context. In fact, it has been found that CMC teams tend to use more frequently passive style and aggressive style while low levels of virtuality teams opt for a more constructive style (González-Navarro et al. 2010). That is, when CMC team members are involved in a conflict situation, they prefer to be conformist or impartial in this context or to have a directive mode in which they try to persuade the other members, instead of offering mutual support among virtual team members.Thus, it is necessary to capture the specific behaviors related to conflict management strategies that are important in virtual team context.

1.2 A Team Training Intervention to Manage Conflict in Synchronous CMC Teams

While prior research offers useful insights into team conflict management strategies, much of it has been conducted in a face-to-face team context. The use and consequences of these strategies could be different in teams that work in "virtual" contexts, without social presence or other communication characteristics. To date, researchers have paid inadequate attention to conflict management in virtual settings, even though findings have revealed that conflict management in virtual teams is critical for effective group functioning (Hinds and Bailey 2003; Montoya-Weiss et al. 2001).

Prior work examining virtual team conflict has shown that the effectiveness of synchronous CMC teams is threatened by the expression of more negative than positive conflict management tendencies (Zornoza et al. 2002). Negative or dysfunctional

conflict management refers to "I win you lose" dominance activities or avoiding the discussion of teammates' arguments. When teammates focus on managing their conflict negatively using voting, idiosyncratic rules or avoiding strategies, they tend to develop dysfunctional behaviors (Putnam 1986) and their team productivity and performance is reduced (Zornoza et al. 2002). Conversely, positive or functional conflict management involves actively handling conflict in such a way that team members debate and explore their different viewpoints (Bottger and Yetton 1988). When teams use predominantly functional conflict management strategies like debate, open communication, consensus and rotating responsibilities, their members feel more cohesive (Tekleab et al. 2009), achieve higher decision quality (Putnam 1986) and perform better (Bottger and Yetton 1988).

In this context, the *Cues Filtered Out Perspective* (Culnan and Markus 1987) has suggested several explanations for why effective conflict management in synchronous CMC teams may be more difficult than it is in FTF teams. This perspective has indicated that synchronous CMC has two main obstacles: it does not allow social presence awareness and the information richness available through the virtual communication medium is reduced. Social presence is defined as the ability of a communication medium to transmit an awareness of the presence of the team members as well as the feeling that they are part of a mutual communicative interaction (Short et al. 1976). Information richness refers to "the ability of information to change understanding within a time interval" (Daft and Lengel 1986, p. 560). Specifically, the *Cues Filtered Out Perspective* proposes that relative to their FTF counterparts, synchronous CMC team members need more time to achieve understanding because they are less able to convey audio and visual cues.

Recent advances in ICTs required a re-conceptualization of media functionalities, since they can vary in their levels of complexity and goes beyond technology itself and/or subjective perception from users, and therefore the extent to which each medium enables synchronous collaboration (Maruping and Agarwal 2004). In this vein, *Media Synchronicity Theory* (MST; Dennis and Valacich 1999; Dennis et al. 2008) provides a more complex picture and emphasizes the need to pay attention not only to the media capabilities (e.g. immediacy of feedback, symbol variety, parallelism, rehearsability and reprocessability), but also to take into account contextual factors (e.g. familiarity, training, past experience or social norms) and communication processes relevant to develop shared understanding. This conceptual model is particularly useful to analyze managing of interpersonal processes in virtual teams (Maruping and Agarwal 2004) and to analyze how team members are be able to appropriate technology through training.

In the present study, teams worked through synchronous CMC. From a classical theoretical perspective, CMC is classified as "lean medium" and it could refer low media richness, but according MST, it could vary in certain functionalities of ICTs depending on the situation. In any case, it has been shown that given adequate resources (e.g. time, work procedures, information related to the progress of work…) virtual teams manage their interactions effectively, exchange enough social and relational information to enhance communication processes (Walther 1996; Beranek and Martz 2005), and their results are far from unequivocal. Therefore, the *best medium* will be

that allows the fit between the capabilities of media and communication needs to solve the task.

In this context, one intervention strategy worth considering is *group training*. Though a number of different types of training exist, only few have shown good results (Salas et al. 2007). *Team self-guided training* is one of those. It has been defined as a team debriefing strategy in which members have to identify and solve their performance problems with the support of an instructor who gives them process and outcome feedback and guides them in the discussion topics (Brown 2003; Cannon-Bowers and Salas 1998; Salas et al. 2007; Smith-Jentsch et al. 2008). Team self-guided training provides teams more reflexivity as mechanism for directing attention and effort to manage the team interaction process. When a task is not routine, evaluating and reflecting on methods (e.g. coordination, planning and communication) and task-related issues (e.g. finished task results) are required of team members for effective performance (Schippers et al. 2003). So, the proposed intervention in this article could help to increase team reflexivity, since it refers to how things can be improved within the group (West 2002).

Previous research has revealed that team self-guided training facilitates the development of accurate mental models of teamwork (Smith-Jentsch et al. 2008), fosters collective efficacy (Brown 2003) and improves team performance (Brown 2003; Salas et al. 2007; Smith-Jentsch et al. 2008). It is noteworthy that these studies have been carried out in the FTF context and that little is known about the effects of team self-guided training on virtual team processes and results. However, have been showed so far, feedback given to teams can improve interpersonal processes (e.g. motivation, satisfaction, cohesion) and team outcomes (performance) in virtual contexts (Beranek and Martz 2005; Geister et al. 2006; Jung et al. 2010).

Thus, our study aims to contribute to the literature by testing whether a team self-guided training program is an effective intervention to improve conflict management in synchronous CMC teams. Specifically, an integrative conflict management requires important effort to ground communication and reach common understanding (e.g. objectives and methods), but, with training, people became more conscious to choose and adapt appropriate strategies according to performance criteria in each case. So, we suggest that team self-guided training, which is based on process and outcome feedback, may encourage the use of functional conflict management strategies (debate, consensus, open communication, rotating responsibilities, and team rules) and reduce dysfunctional ones (voting and avoiding). Therefore, we expect that:

H1 Team self-guided training will increase the degree to which CMC teams use functional conflict management, operationalized as debate, consensus, open communication, rotating responsibilities, and team rules.

H2 Team self-guided training will decrease the degree to which CMC teams use dysfunctional conflict management strategies, operationalized as voting and avoiding.

H3 Differences will be expected in how teams manage their conflicts in post-intervention session. Specifically, there will be a more functional strategies in trained teams than untrained teams, and more dysfunctional strategies in untrained teams in comparison with trained teams.

2 Methods

2.1 Participants

Two hundred and twelve ($N = 212$) undergraduate psychology students at the University of Valencia (Spain) participated in this study for course credit. The mean age of the sample was 24 years ($SD = 4.40$). The sample was composed of 80 % women ($N = 169$) and 20 % men ($N = 43$), who were distributed into 54 teams of three or four members. These percentages were similar to those observed among the students in the School of Psychology. The gender composition of the teams was controlled by assigning each man to a different team, and then randomly assigning the women to teams after that.

2.2 Design and Procedure

This study utilized a 2 (team self-guided training: untrained, trained) × 2 (time of measurement: session I, session II) mixed factorial design. Training was a between-subjects variable, with teams randomly assigned to the control or training condition. Time of measurement was a within-subjects variable. This experimental study used a *randomized pre-post test design with a control group method* to test if the training used is really effective on conflict management in virtual teams.

All teams worked in a synchronous CMC setting. In both conditions and sessions, team members interacted using Microsoft Office Groove 2007. This program has several tools (chat, notepad, and a shared work space) that allow teammates to work together and exchange information through the computer. Participants were briefly instructed in the use of this specific technology for 15 min. After that, teams worked on the task.

Teams completed intellective tasks (Argote and McGrath 1993) in both work sessions. Specifically, they solved a problem-solving task called "Lost in the sea" (Gordon 2003) during their first work session and "Forest fire" (Human Synergistics 2003) during the second work session. In the experimental condition, the later session correspond to the post-intervention session, after the training had taken place. These kinds of tasks are used in a real-word in those situations in which a computer-mediated team requires that its members have to agree upon in which answer is the correct one, like in risky shift or choice shift decided by globally distributed virtual team members.

In any case, both tasks consisted of survival situations in which team had to rank 10 items related to their importance for these contexts. They must rank them first individually for 20 min prior to the group work. Then, they had limited time to solve the task (35 min) and provide the best possible consensus. These tasks have definitive solution. The scores were calculated according to experts' rank and rationale on a scoring grid. The fundamental requirement to solve this task type consists of analyzing the situation, combining the individual contributions and developing an effective communication process. Moreover, intellective task provide the possibility of calculate individual and team performance since comparisons between individual or team solutions and the experts' solution. Finally, after working together all participants had to fill a questionnaire regarding demographic data using a computer.

2.3 Training Program

After completing the first intellective task during the session I, teams in the untrained control group condition were dismissed. Those that had been randomly assigned to the training condition received the team self-guided training program after a short break. It makes possible a team debriefing strategy in which members are given process feedback and outcome feedback that enable them to discuss constructively how to improve their results on a team level. This training consisted of one session between 60 and 90 min duration.

In the training session one researcher acted as instructor to lead act group who provide constructive and development feedback to participants related to team process and outcomes. On one hand, *process feedback* was provided through a graph which represented the levels of group process perception reached on a five point scale. So, team members were asked to complete an online questionnaire consisting of team members' perceptions about their team's processes and interactions. Based on Warketin and Beranek's (1999) and Beranek and Martz's (2005) studies, our training was focused on analyzing the following processes critical for the effective functioning of virtual teams: (a) trust (e.g. "Team members use their own names during work session"), (b) planning (e.g. "Before starting the group task, the members of my team have spent time specifying the steps required to perform the task"), (c) coordination strategies (e.g. "In my team, talking turns have been established"), (d) written communication strategies (e.g. "Members of my team have used short, direct sentences to express themselves") and (e) shared information management (e.g. "Members of my team have asked for clarification when misunderstandings have occurred during the intervention"). Results of reliability test performed on the scales indicated good reliability levels (all of the Cronbach's alphas were *above .70*). These processes were analyzed by researchers, and after that the information was provided to team members using graphical representation of the processes.

On the other hand, teams also received *feedback on the outcomes* of the intellective task. Participants received information about the decision quality reached by each individual team member during the individual portion of the task and by the team overall during the team portion of the task. Thus, outcome feedback that group members received could facilitate the shared understanding, optimize resources, and increase in the effort between members.

Then, teams had to analyze together the information they received regarding their team processes and outcomes with the support of several guide questions provided by the instructor who participated as facilitator of this training process. Finally, teams discussed with the instructor their particular problems. Later, they were required to suggest independently three ways to improve their functioning in the second session. Thus, feedback allowed the group to become more fully integrated to assess, select and adapt appropriate strategies to group functioning. The interval between pre-intervention session and post-intervention session was one week. This gap was estimated by carrying out a pilot study in which student teams were assigned to control condition and experimental condition respectively to develop an intellective task.

Before to start post-intervention session, each team received in their computers a reminder with the principal points revised and agreed during training session.

2.4 Measures

2.4.1 Conflict Management Strategies

A content analysis of the teams' chat communications developed to solve the two intellective tasks was performed, using all of the categories of the Behfar et al. (2008) classification described previously as a starting point. These strategies have been adapted to our research context in virtual teams. Thus, debate, open communication, consensus, rotating responsibilities and team rules strategies were considered functional conflict management strategies, while voting, and avoiding strategies were considered dysfunctional conflict management strategies.

Debate/discuss strategy The original categorization described by Behfar et al. (2008) defines this category as a discussion about teammates' arguments. It includes task-related and procedure-related communications. In the context of the present study, this manifested itself as substantive task debate, such as considering different alternatives. For example:
Team 35:

Teammate 3: 3 mirror…to dazzle and ask for help or to break it and use it to cut
Teammate 1: FIRST THE RECEIVER
Teammate 2: Really??
Teammate 2: the mirror??
Teammate 1: in that way we can say approximately our position
Teammate 1: the mirror is something primitive in comparison with the radio
Teammate 3: the receiver is a music radio
Teammate 3: it doesn't work for anything else, it's only to listen if someone is looking for us in the news

Open communication strategy Originally, this strategy was defined as evidences about the affective tone of the discussion (Behfar et al. 2008). In the present study it includes the emotional and positive use of messages to advance the task, and to achieve receptivity of team members to complete the collective goal. For example, some sentences with explicit expressions are:
Team 14:

Teammate 2: this team has good vibes, isn't it?
Teammate 1: then, some virtual beers?
Teammate 2: jajaja nice

Consensus/compromise strategy Behfar et al. (2008) defines this strategy as "ideas about how to reach a team agreement" (p. 178). It includes ideas about using compromise to maintain relationships or reach a group settlement. In this study, we have focused on the messages in which team members express their agreement with the proposals about task and procedure. Example:
Team 3:

Teammate 2: ☺, all agree with the map issue????
Teammate 1: all agree
Teammate 2: ok

Teammate 4: yes
Teammate 4: ok

Rotating responsibilities strategy This strategy includes communication about assigning tasks and team responsibilities to manage conflict. For example:
Team 54:

Teammate 4: who wants to do notepad?
Teammate 1: I write in the Excel if you want
Teammate 2: ok
Teammate 2: if you want I write in the notepad
Teammate 4: and who fills out the document and saves it in the folder of the shared use?
Teammate 4: ok
Teammate 1: I do

Team rules This category, previously named *idiosyncratic solutions* by Behfar et al. (2008), involved information related to rules establishment to punish some behaviors or correct problems in group. In this study, this strategy is quite different because virtual teams need to create work procedures that allow them to be functional. Thus, it involved messages related to team coordination and planning as a functional way of managing the conflict that emerged. For example:
Team 2:

Teammate 2: the body uses its resources to compensate the lack of energy… but the water?…you become dehydrated…
Teammate 1: we have chosen water and food as the first option, two persons in each option.
Teammate 1: a coin toss decides it and that's all.

Voting strategy. This category contains statements about using voting to handle process problems and resolve stalemates on task discussion. For example:

Team 26:

Teammate 2: well, diesel oil or food: votes?
Teammate 3: food
Teammate 4: diesel oil
Teammate 1: diesel oil
Teammate 2: food

Avoiding/ignoring strategy This category was defined by Behfar et al. (2008) as "prevention or avoiding conflict" In the context of the current study, this strategy this strategy pertained to the escalation of conflict, which was not dealt with. Specifically, we focused on messages where open conflict was ignored. For example:
Team 29:

Teammate 2: sure, do we all agree?
Teammate 3: EXCEPT 4
Teammate 4: put what you want
Teammate 4: it's the fifth time that I say you the same, it doesn't matter

The synchronous CMC teams' conversations were coded by two trained judges. Each communication exchange was defined as a message. After expert judges analyzed the 20 % of the chat content, coding the messages into the seven conflict management strategy categories described above, the κ coefficient with the omission calculation (κ_{woc}) was used to measure judge agreement. In the pre-training teamwork session, κ_{woc} was .94; in the post-training session, it was .93. According to the indications given by Landis and Koch (1977) to interpret Cohen's κ values, this result can be considered an almost substantial agreement. Once the agreement indices were calculated, the judges coded separately the remaining of the electronic messages (80 % of the chat content). After that, the relative frequency with which each team used each of the seven conflict management strategies was calculated.

3 Results

3.1 Descriptive Data

Means and standard deviation of the dependent variables are shown in Table 1. The numbers in the table represents different means and standard deviations for both experimental conditions. As can be seen, debate and consensus were the most frequently used conflict management strategies by the synchronous CMC teams included in this study, whereas rotating responsibilities and avoiding were the least frequent.

3.2 Hypotheses Testing

To examine whether synchronous CMC teams in the two conditions (trained and untrained) differentially changed their conflict management strategies over time (H1 and H2), repeated-measures ANOVAs were carried out, with a focus on the interaction effects between training and time. The results revealed no significant interaction terms for the use of debate ($F(1, 51) = 2.38$, $p = .13$, $\eta_p^2 = .04$), consensus ($F(1, 51) = .12$, $p = .73$, $\eta_p^2 = .01$), and team rules strategies $F(1, 51) = .88$, $p = .35$, $\eta_p^2 = .02$), suggesting that trained and untrained teams did not differentially change their use of these strategies over time.

Significant interaction terms were found for the use of the open communication, $F(1, 51) = 3.21$, $p = .08$, $\eta_p^2 = .06$, and rotating responsibilities strategies, $F(1, 51) = 5.77$, $p = .02$, $\eta_p^2 = .10$. Given the newness of this research stream and the corresponding consequences of a missing an effect worthy of further exploration in future research, a cut-off of $p = .10$ was used in order to reduce the probability of a Type II error (Champoux and Peters 1987; Lira et al. 2008; Rodríguez et al. 2001).

Figures 1 and 2 graphically represent the interaction effects pertaining to functional conflict management strategies discovered in this research. As shown in Fig. 1, trained teams increased their use of the open communication conflict management strategy over time more when compared to their untrained counterparts. Figure 2 illustrates that trained teams tended to use more rotating responsibilities in the post-training session than they did in the pre-training session, while untrained teams' use of rotating

Table 1 Means, standard deviation and confidence intervals of the conflict management strategies in pre and post-intervention sessions

Dependent variables	Condition	Pre-intervention session	Post-intervention session	Total row	95 % CI	
					Lower	Upper
Debate	Trained CMC teams	19.62 (8.11)	19.82 (6.56)	19.72 (7.33)	17.46	21.97
	Untrained CMC teams	18.63 (5.47)	22.65 (8.46)	20.64 (6.96)	18.39	23.17
Open communication	Trained CMC teams	2.67 (1.85)	5.03 (2.79)	3.85 (2.32)	3.15	4.54
	Untrained CMC teams	2.57 (2.38)	3.49 (2.08)	3.03 (2.23)	2.27	3.74
Consensus	Trained CMC teams	7.27 (5.29)	9.59 (3.81)	8.43 (4.55)	7.13	9.73
	Untrained CMC teams	5.69 (3.19)	8.45 (4.84)	7.07 (4.02)	5.66	8.41
Rotating responsibilities	Trained CMC teams	2.85 (1.83)	3.83 (2.00)	3.34 (1.91)	2.89	3.80
	Untrained CMC teams	2.76 (1.45)	2.15 (1.26)	2.45 (1.35)	1.96	2.92
Team rules	Trained CMC teams	5.21 (3.54)	6.01 (2.25)	5.61 (2.89)	3.98	5.72
	Untrained CMC teams	4.91 (2.75)	4.78 (2.46)	4.84 (2.60)	4.79	6.43
Voting	Trained CMC teams	2.65 (2.32)	3.00 (2.40)	2.83 (2.36)	1.93	3.73
	Untrained CMC teams	3.24 (3.54)	5.23 (4.28)	4.23 (3.91)	3.35	5.73
Avoiding	Trained CMC teams	2.26 (1.33)	2.16 (1.30)	2.21 (1.31)	1.79	2.63
	Untrained CMC teams	2.09 (1.16)	2.77 (1.71)	2.65 (1.56)	2.24	3.14

The data of the table is the mean of messages obtained by teams in each experimental condition. Standard deviations are in parentheses. Total row is an average across pre and post intervention

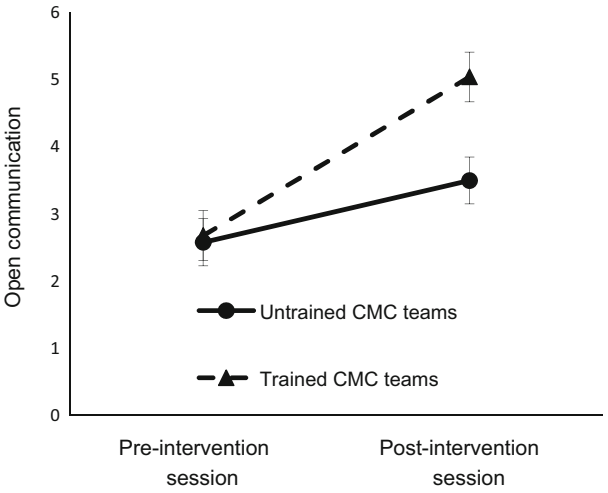

Fig. 1 Open communication as a function of training condition and time

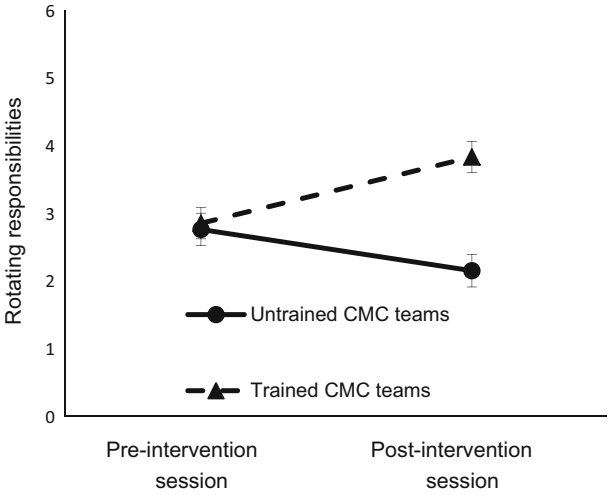

Fig. 2 Rotating responsibilities as a function of training condition and time

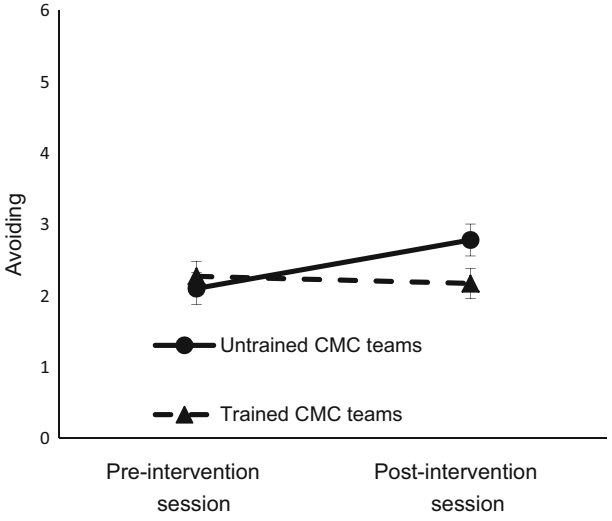

Fig. 3 Avoiding conflict management strategy as a function of training condition and time

responsibilities strategy seemed to decrease over time. Thus, H1 is partially supported by the data.

With regard to the dysfunctional conflict management strategies (H2), no significant interaction effects of training and time on the use of the voting strategy, $F(1, 51) = 1.64$, $p = .21$, $\eta_p^2 x = .03$, was found. However, a significant interaction term ($F(1, 51) = 7.70$, $p = .01$, $\eta_p^2 = .13$) was found for the avoiding conflict management strategy. In accordance with H2 and as Fig. 3 shows, untrained CMC teams were less likely to decrease their use of the avoiding conflict management strategy

when compared to their trained counterparts. Thus, H2 is partially supported by the data.

In order to examine the effect of team self-guided training on the use of functional and dysfunctional conflict management strategies by synchronous CMC teams during the post-intervention session, *t* tests were conducted (H3). Results indicated significant differences between trained and untrained teams in open communication, $t(51) = -2.29$; $p = .03$, rotating responsibilities, $t(51) = -3.69$; $p = .01$, voting, $t(51) = 2.37$; $p = .02$, and avoiding, $t(51) = 2.55$; $p = .01$.

H3 predicted that trained CMC teams will use more frequently functional strategies (debate, consensus, open communication, rotating responsibilities and team rules strategies) compared to untrained CMC teams in post-intervention session. Our results only supported the H3 in the case of the open communication strategy (trained CMC teams $M = 5.03, SD = 2.79$; untrained CMC teams, $M = 3.49, SD = 2.08$) and rotating responsibilities strategy (trained CMC teams $M = 3.83, SD = 2.00$; untrained CMC teams, $M = 2.15, SD = 1.26$).

Moreover, it is expected that trained CMC teams will decrease the use voting and avoiding strategies compared to untrained CMC teams in post-intervention session. Results showed that trained CMC teams were less likely to use the voting strategy (trained CMC teams $M = 3.00, SD = 2.40$; untrained CMC teams, $M = 5.23, SD = 4.28$) and avoiding strategy (trained CMC teams $M = 2.15, SD = 1.29$; untrained CMC teams, $M = 3.38, SD = 2.13$) than untrained CMC teams in the post-intervention session. Therefore, H3 was partially supported by the data.

4 Discussion

The aim of the present study was to examine deeply the specific tendencies of conflict management strategies developed by trained and untrained synchronous CMC teams. Our study uses Behfar et al.'s (2008) taxonomy to categorize conflict management strategies and extends the findings to a virtual context, synchronous CMC. This study determines the role of team self-guided training in the use and development of conflict management strategies in a synchronous CMC context. It establishes that there are several notable differences in how trained and untrained synchronous CMC teams manage their conflict.

Our findings reveal that team self-guided training is a useful tool to achieve effective virtual teams, because to some extent it helps virtual teammates handle conflict constructively rather than using dysfunctional conflict strategies. Team self-guided training appears to promote the use of the open communication and rotating responsibilities in synchronous CMC teams. Prior research has shown that CMC enhances open communication when teammates feel secure and anonymous (Baltes et al. 2002). Our study showed that team self-guided training may further boost the use of the open communication by creating a space for dialogue and understand about the way of acting of team members. Such dialogue also provides an opportunity to clarify the tasks and roles of teammates, by encouraging the use of rotating responsibilities. This is especially important in a virtual context, because virtual teams are at risk for task,

role, and responsibility ambiguity due to their spatial and temporal dispersion (Shin 2005).

Contrary to our expectations, team self-guided training did not affect the degree to which synchronous CMC teams used team rules as a conflict management strategy. A possible explanation for this finding pertains to the nature of the intellective tasks used in this study, which was inherently quite structured. Perhaps team rules are more frequently used to prevent the chaotic flow typical of less structured synchronous CMC (McGrath 1991). Future research could investigate this possibility and examine other possible moderators determining when team self-guided training does and does not influence the use of team rules for synchronous CMC teams.

It is also worth pointing out that team self-guided training decreases the use of voting and avoiding strategies in synchronous CMC teams. In accordance with previous research (Poole et al. 1991), synchronous CMC teams tend to use voting and avoiding strategies to solve their conflicts. One explanation could be that virtual teams have coordination problems (Hinds and Bailey 2003). Consequently, team members may choose for an easy strategy like voting which allows them to clarify and structure their work without further complications. Similarly, avoiding is also an effortless strategy that virtual teams may use. However, when a teammate uses an avoiding strategy, other members may perceive that he or she lacks involvement in the task; information gaps in the team debate can ensue (Montoya-Weiss et al. 2001). Team self-guided training helps virtual team members gain greater awareness of the strategies effects used besides its influence on perceptions of others and encourages them to engage in a constructive debate in synchronous CMC context.

In addition, this study suggests that debate and consensus are the strategies upon which short-term, synchronous CMC project teams most frequently rely. Short-term project teams tend to task-focused (Andriessen 2003), have limited coherence and mutual understanding (Cornelius and Boos 2003), and take a relatively long time to understand differing viewpoints and arrive at a team decision (Siegel et al. 1986). Consequently, synchronous CMC teams working on short-term project work seem to require debate and consensus strategies to achieve their goals. It appears that team self-guided training as operationalized in the current study does not alter the use of debate and consensus strategies among such teams. However, future researchers should investigate whether team self-guided training influences how and when these strategies are used by synchronous CMC teams. Perhaps trained virtual teammates discuss the arguments and then reach consensus, while untrained virtual teams may quickly reach a consensus and subsequently debate whether their decision is correct.

4.1 Theoretical and Practical Implications

The findings of this study have important theoretical and practical implications for virtual teams. First, our study reveals that teaching team members to reflect on their team processes and constructively analyze how members work together can improve teamwork, using divergence management. Teams may combine affective issues with those focused on the procedure and structure of the work. As a result, their members

may exchange a lot of information and profit from the resources of all members. Therefore, their decision making process can improve.

Second, this study indicates that team self-guided training may be a viable intervention for virtual teams. Team leaders and managers should therefore consider giving process and outcome feedback to their teams, and teaching them to use this information through training and guidelines. In this way, teams may more readily recognize their mistakes and misunderstandings. As a consequence, teams may find new and positive ways to face their conflicts, thus improving their functioning.

Third, the present study clarifies what kind of conflict management strategies synchronous CMC teams tend to use to face their conflict as a group. This extends previous findings obtained in FTF teams to a virtual context. The study conducted by Behfar et al. (2008) examined seven conflict management strategies in FTF student teams of three or four members, revealing that some of them are functional and others dysfunctional for effective teamwork. Our study analyzes these conflict management strategies but in a synchronous CMC team context and provides a detailed, quantitative analysis of the Behfar et al. (2008) categorization. This offers to the literature a more fine-grained look at team conflict management specific to a virtual context. Previous studies in CMC settings have focused on the summary of individual behaviors of team members (e.g. Montoya-Weiss et al. 2001; Poole et al. 1991) and not on the strategies chosen by the team as a whole.

Finally, our findings highlights the importance of team members take their own decisions about what is best to tackle their problems. Positive effects of self-guided training have been found for virtual team. This result is similar to interest-based third parties proposed by Jehn and Bendersky (2003). This type of dispute resolution approach is based on an intervention in which a person supports teammates on the conflict resolution process and gives them the responsibility to decide how to resolve the conflict at hand (Carnevale and Pruitt 1992). These authors have suggested that the interest-based third parties intervention moderates the relationship between intragroup conflict and team outcomes because it can increase the positive effects of conflict and reduce negatives one.

4.2 Limitations and Future Directions

Our study has several limitations that should be considered in order to assess its generalizability to other samples and contexts. First, the present study was carried out in a laboratory setting using student teams as a sample and an intellective task as a team task. To facilitate the generalization of our findings, future research should seek to replicate our results in a field setting and using a complex task like in a real work environment. Second, this study focused on ad hoc teams, and thus more research is needed to specify which are the conflict management strategies used by mature, ongoing teams. Third, conflict management strategies were studied here only by content analysis. Future investigations could combine more than one methodology, like self-reports, observations, and interviews, to study conflict management strategies. Finally, our study focused on conflict management strategies in a virtual context instead of under which conflicts are used which strategies. That is, some strategies may be

more beneficial for virtual teams when they are experiencing task related conflicts, while others when they have relationship conflicts or process conflicts. Future research should attempt which are the most effective conflict strategies for different intragroup conflict types in virtual contexts, even if they are conceptualize as micro-conflicts or "minute behaviors" in team discussions (Paletz et al. 2011).

Despite the limitations of our study, we offer some directions for future research and for practice. Regarding conflict management, it is necessary to identify the effects of conflict management strategies on synchronous CMC team processes and outcomes. Moreover, researchers should explore the use of conflict management strategies by other kind of virtual teams, such as videoconference teams. Concerning the topic of training, future research should analyze the effects of team self-guided training on other team processes and results in order to get a better understanding of the advantages of its use. At last, our findings suggest some practical implications. Human resource managers could use this kind of training program to develop and to teach team members make a more appropriate use of conflict management strategies to solve their conflict. It would be specially interesting to provide guidelines to team leaders giving feedback to teams and coaching (rewarding) their teams to use a self-guided training framework to analyze their processes.This study has offered a more comprehensive view of the strategies to manage the conflict inherent in synchronous CMC teamwork by drawing on literatures in the areas of conflict management and training. Likewise, our findings open up new possibilities for effective conflict management, demonstrating that team self-guided training could be a viable tool.

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