



How team feedback and team trust influence information processing and learning in virtual teams: A moderated mediation model



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ABSTRACT

This study examines a moderated mediation model in which team trust moderates the indirect effect of team feedback on team learning through group information elaboration in virtual teams. An experimental study in a laboratory was conducted with 54 teams randomly assigned to a team feedback condition or a control condition. Results provided empirical support to the moderated mediation model. We found that the indirect effect of team feedback on team learning via group information elaboration occurred in virtual teams with a high level of team trust. However, this indirect effect was not statistically significant in virtual teams with lower levels of team trust. Additionally, we also found that group information elaboration and team learning were positively related in virtual teams. Therefore, our findings suggest that team feedback is effective to improve group information elaboration and learning in virtual teams when team trust is high.

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1. Introduction

Globalization and the availability of computer-mediated communication have increased the use of virtual teams (Cramton & Webber, 2005). Virtual teams are two or more persons who are generally geographically dispersed and work interdependently toward common goals using technology to communicate and collaborate across time and space (Hertel, Geister, & Konradt, 2005).

Using teams over individuals in current organizations aims to facilitate an integration of information that results in more informed decisions and more coordinated effort that can improve performance (Deeter-Schmeltz & Ramsey, 2003). Teams are viewed as information processors that process relevant and available information to perform a variety of cognitive tasks such as problem solving, judgment, inference, and decision-making (Hinsz, Tindale, & Vollrath, 1997). According to these authors, information processing at group level involves information, ideas, and cognitive structures that are shared, and are being shared, among the team members, and how this sharing of information affects both individual- and

team-level outputs. In this process, it is not only important the information already shared among team members, but also the degree to which distributed information is exchanged and integrated. Research on group elaboration of information has shown that groups that engage in more information elaboration and integration reach better decisions (van Ginkel & van Knippenberg, 2008). In virtual teams, knowledge sharing is positively related with job effectiveness (Lin, 2011) and perceived job effectiveness (Lin, Wang, Tsai, & Hsu, 2010). In this study, we extend this research examining the relationship between group information elaboration and team learning, since team learning is a precursor for effectiveness in teams and organizations (Edmondson, 1999).

The growing prevalence of virtual teams in current organizations is due to the rapid development of information and communication technology (ICT) and the advantages of using this type of teams (Hertel et al., 2005). ICTs offer numerous interactive applications (e.g., virtual communities of practice, wiki, forums or 3D virtual world) designed to create virtual learning environments (Tolosa, Labra, Martínez, Méndez, & Ordóñez de Pablos, 2010; Zhang, Ordóñez de Pablos, & Zhu, 2012; Zhang et al., 2014), which can provide team members with an opportunity of virtual learning experiences. However, despite the advantages of virtual teams, they are often less effective in making group decisions, need more time to reach decisions, and their members are less satisfied in comparison to face-to-face teams (Baltes, Dickson, Sherman,

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Bauer, & LaGanke, 2002). Past research has acknowledged the importance of developing interventions (such as training, kick-off meetings, or team feedback) to overcome some of these problems (Hertel et al., 2005). According to this, we have developed a team feedback intervention to examine how to improve group information elaboration and learning in virtual teams. In a team feedback intervention, we provided outcome and process feedback to teams. After receiving feedback, teams had a period of reflection to think about the feedback obtained immediately. We incorporated this period of reflection based on a study by Anseel, Lievens, and Schollaert's (2009) showing that feedback combined with reflection is more effective to improve performance.

Past research has investigated the effects of team process feedback on motivation and subsequently on performance and the effects of outcome feedback on performance in virtual teams (Geister, Konradt, & Hertel, 2006; Shepherd, Briggs, Reinig, Yen, & Nunamaker, 1996). However, little is known about the effects of team feedback on information processing and learning in virtual teams. In this study, we propose to examine this relationship based on the social exchange theory (Blau, 1964). Information processing and learning at the team level not only involves individuals' cognitions and information processing, but also a social exchange interaction among team members. Unlike economic exchanges, social exchanges are not based on contractual obligations stipulated in advance, but on expected and actual returns (Staples & Webster, 2008). Taking into account the social exchange nature of information processing and learning in teams, we consider that team trust may play a relevant role in this relationship.

In sum, the present study aims to investigate a moderated mediation model in which team trust moderates the indirect effect of team feedback on team learning through group information elaboration in virtual teams.

1.1. Information processing and learning in virtual teams

Team learning is conceptualized as a process of reflection and action aimed to discover gaps in teams' plans and make changes accordingly (Edmondson, 1999). According to this author, this process is characterized by a set of team learning behaviors that team members show, such as asking questions, seeking feedback, experimenting, reflecting on results, and discussing errors or unexpected situations. Team learning involves an open discussion with other team members in order to reflect on teams' functioning.

Some authors have studied collective learning by focusing on the common and shared understanding and meaning about the learning process, and in the new knowledge that is developed as a result (Gubbins & MacCurtain, 2008). In this sense, team learning can be conceived as a collective form of learning that involves a process of social interaction among the members of a team. Unlike individual learning, team learning is supported by team members' sharing and integration of information.

Team learning requires obtaining and processing information in order to detect errors, reflect on results, and adapt to the environment (Edmondson, 1999). Thus, a factor that can be important for team learning is group information elaboration. This process is defined as the exchange, discussion and integration of information and perspectives, including individual-level processing of information and perspectives and the process of feeding back the results of the individual-level processing into the team (van Knippenberg, De Dreu, & Homan, 2004). Research on group information elaboration has shown that the exchange, consideration and integration of distributed information among team members are important to achieve better group decisions (van Ginkel & van Knippenberg, 2008).

According to the groups as information processors framework (Hinsz et al., 1997), teams process relevant and available informa-

tion in order to perform a variety of tasks. Information and perspectives that are shared have a greater impact on teams' processes and results. An important aspect of information processing in teams is how teams combine and elaborate available information and resources. Dual-process models (Chaiken & Trope, 1999) state that individuals can choose between heuristic and systematic ways of processing information. On the one hand, systematic information processing implies in depth and detailed information processing and a greater cognitive effort. On the other hand, heuristic information processing is characterized by less cognitive effort and the use of simple rules learned from past experiences. Group information elaboration can be considered as an indicator of in-depth processing of task-related information and perspectives, since greater elaboration involves the use of systematic information processing and less reliance on heuristics (Rijnbout & McKimmie, 2012). A greater elaboration of information about the task may lead team members to a better knowledge about their improvements, and to reflect whether the actions taken by the team are effective to accomplish its goals. Despite the lack of empirical research testing the relationship between information processing and learning in virtual teams, we expect that virtual teams will learn more when they reach an in-depth processing of task-related information and perspectives. Accordingly, based on the previous rationale, we propose the following:

Hypothesis 1. Group information elaboration will be positively associated with team learning in virtual teams.

1.2. The effect of team feedback on information processing and learning in virtual teams

Team feedback consists of information provided to a team for the purpose of an increase in performance (Geister et al., 2006). Team feedback can be team-oriented by aggregating individual feedback and presenting it to the whole team. Two forms of feedback are studied in previous literature: outcome and process feedback (Earley, Northcraft, Lee, & Lituchy, 1990). Whereas outcome feedback provides information about performance outcomes, process feedback provides information about how one performs a job and about interpersonal behaviors that can be rated by external observers (Geister et al., 2006).

Shepherd et al. (1996) has shown that providing outcome feedback increases productivity in electronic brainstorming groups by activating social comparison processes, which can be useful to reduce the losses in productivity due to social loafing. These authors based outcome feedback on the number of text lines produced by the team, and presented it on a graph. In the social comparison condition, participants were given the graph and a baseline to which compare their productivity. In the two control conditions, one group of participants received no outcome feedback and the other received outcome feedback but without a baseline in the graph.

In a study investigating the effects of process feedback, Geister et al. (2006) found that virtual teams that received process feedback showed an increase in performance compared to virtual teams that did not. Moreover, these authors found that process feedback has a positive effect on team members' motivation and satisfaction for less motivated members. Process feedback was manipulated by means of providing subjective perceptions of team members about the collaboration to improve their teamwork. Team members rated several items about motivation (e.g., motivation with team goals), task-related content (e.g., participation in planning), and relationship-related content (e.g., satisfaction with cooperation and communication) on a 7-point scale. This information was aggregated on a team level and provided to the team indicating positive and negative evaluations.

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