LEADERSHIP STYLES IN SYNCHRONOUS AND ASYNCHRONOUS VIRTUAL LEARNING ENVIRONMENTS

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ABSTRACT
A comparison of the effects of transactional and transformational leadership in synchronous and a synchronous online teamwork was conducted. In the study, groups of four participants interacted in online text chat and online text forum in problem solving tasks. The groups were leaded by a confederate who acted as a transactional or a transformational leader. Satisfaction in the interactions and participations communicative styles were assessed. Results indicated that transformational leadership is more satisfying and cognitive and metacognitive style oriented than transactional leadership that is more participative style oriented.
Keywords: transactional leadership, transformational leadership, online teamwork, satisfaction, cognitive style

With the advent of new media technologies and the recent advances in networking environments and telecommunications, many researchers have improved their study to the proliferations of teams that do not work face-to-face, but interact over a computer-mediated-communication network.

One of the most important characteristics of groups that discuss in virtual and direct interactions is leadership. In the last twenty years research has increasingly focused on leadership in work groups. The growing amount of research on interaction in face-to-face contexts does not correspond to a similar increase in research on groups interacting with computer-mediated-communication.

LEADERSHIP IN COMPUTER-MEDIATED-GROUPS

Zigurs (2003) maintains that virtual groups afford us a unique opportunity to redefine leadership. According to the traditional model, leaders are supposed to offer encouragement, reward, and motivation – mostly through their physical presence or comments – and reinforce the development of relations inside the group. A virtual environment makes it necessary to revise some aspects of leadership, partly due to the fact that interaction now takes place with a machine. One of the fundamental characteristics of this new context is the *recognizability* of the leader's status. In face-to-face interactions, leadership indicators involve body language, vocal inflection, eye contact, clothing, etc., which in a computer-mediated-communication can be difficult to detect. Consistent with the media richness theory (Daft & Lengel, 1984), the medium forces the leader to adopt other indicators to let followers know he/she is in charge, which include frequency of intervention, small delays between request and responses, being (almost) always available.

Among the approaches to the study of leadership that accurately describe the complexity of the changes under way in our society and in modern organizational contexts, one of the best known is the transformational/transactional framework (Bass, 1985, 1990, 1997).

In this perspective, the leader is the person who not only adapts to various situations, but is also able to transform the reference context. Bass (1990) discusses the difference between a transactional leadership model, in which the leader emerges as the result of transactions and exchanges with group members, whereas a transformational leader is a person willing to adapt to the changes and instability of situations and is also able to involve, motivate, and support collaborators in a manner consistent with the required transformations. The transformational style goes beyond the exchange of incentives and corrective transactions between leaders and subordinates and pushes collaborators out of the individual dimension so as to privilege the group, the mission, and the vision, focusing on long-term objectives and attempting to change existing situations. For Bass (1997) a leader can embody both types and constitute a model of leadership that moves along a continuum ranging from a transactional to a transformational style.

The transactional leadership model considers leaders "negotiating agents" who conciliate and sometimes compromise in order to obtain greater decision-making power within the group. To achieve this goal, leaders perform a series of actions that enable them to influence and convince those individuals who are capable of providing valuable support. Their activity consists in implementing interpersonal transactions in which tasks, expectations, and related awards are indicated and clarified. Followers are motivated by the opportunity to obtain the personal rewards that only the leader can grant, and prefer to replicate behaviors that have been successful and discard unproductive ones (Bass & Riggio, 2006).

Transactional leadership is based on two factors: contingent reward and management-by-exception. The leader administers positive reinforcement, awards, praise, and rewards when pre-determined goals are achieved; he utilizes negative reinforcement like punishment, reprimands, and negative feedback when mistakes and violations or failures occur (Bass & Riggio, 2006). In any case, rewards and punishments aim to ensure that the expected results are achieved and not at a transformation of the followers (Boal & Hooijberg, 2007).

The operational mode of a transformational leader brings individuals to seek rewards within themselves, favoring the personal growth of individuals and groups, as well as their self-awareness (Scaffidi Abbate & Ruggieri, 2008, 2011) According to Boal and Hooiberg (2007), while the transactional leader exploits interest that already exists in a group, the transformational leader tries to change the value system of each individual in order to construct a new one based on common goals. He/she actively engages with followers, obtaining their collaboration and encouraging them to identify with a vision of the job that goes beyond their immediate individual interests.

A way has thus been found to transcend the exchange of incentives and corrective transactions between leaders and followers – indeed, it is a way to amplify interests and raise consensus and awareness of the group's goals. People are encouraged to abandon their individual dimension in order to enhance the group and the organization, concentrating on long-term goals and attempting to change existing situations. This is accomplished by a leader who accompanies his collaborators, acting as a guide and motivator within a process of change and growth.

In general, research focusing on the effectiveness of transactional and transformational leadership within the context of virtual teams is relatively scarce (Hambey, O'Neill & Kline, 2007; Ji & Chuang, 2012).

In virtual teams transactional and transformational leaders are likely to play a vital role in facilitating the attainment of goals by providing structures, motivating and engaging team members, and attending to socio-emotional aspects of the team (Huang, Kahai & Jestice, 2010). By facilitating certain processes, these leaders introduce changes in followers' behaviors and in the way they interact with one another, thereby changing the capabilities of a team. Past research supports this view (Sosik, Avolio & Kahai, 2010), suggesting that transactional and transformational leadership in virtual teams can overcome process-based losses, thereby improving team creativity and strategies. The facilitation enabled by transactional and transformational leadership styles is likely to be more effective when a virtual team faces more challenging situations (Avolio, Kahai & Dodge, 2000; Joshi, Lazarova & Liao, 2009; Purvanova & Bono, 2009).

Moreover, virtual team research based on situational perspectives of leadership suggests that transformational leadership becomes more effective than transactional leadership in situations involving anonymity. Within these groups, transformational leaders are able to establish higher levels of trust, performance and job satisfaction compared to those of transactional leadership, but that the average level of satisfaction is lower than in face-to-face conditions (Hoyt & Blascovich, 2003; Ruggieri, 2009).

In summary, transactional and transformational leaders are expected to play a greater ''process facilitation" role in virtual teams than established practices for face-to-face teams (Huang, Kahai & Jestice, 2009) .

COMMUNICATION STYLES IN VIRTUAL TEAMS

According to media synchronicity theory (Dennis & Valacich, 1999), there are two types of communication characterizing virtual team interaction: synchronous and asynchronous.

In synchronous interactions team members communicate in real time, such as through teleconferencing, videoconferencing or chat. Synchronous communication media allow individuals to work on the same task, with the same information, at the same time (Baker, 2002). In asynchronous interactions team members communicate

at different times, to solve a problem, to play a game or to join a project. The most used media are e-mail or online text forum and threaded discussions.
Comparing several communication media with each other will help increase our understanding of the technologies that allow virtual teams to collaborate most effectively (Baltes, Dickson, Sherman, Bauer & LaGanke, 2002).

Although in recent years there is a growing interest in the use of video (i.e. videoconferencing), the majority of studies that have examined computer-mediated-communication have used text-based systems. Particularly, online text chat and online text forum are the most common media used. A suggested benefit of this type of text-based interaction is that it may allow for more reflection and the ability to choose one's words more carefully than in face-to-face or telephone communication (Wolfe, 2002). Online text-based communication can also allow team members to more efficiently share ideas in brainstorming tasks because everyone can speak at once, thereby minimizing process losses (Griffith & Neale, 2001). Additionally, text-based communication may neutralize the tendency for increased relational conflict often observed in dissimilar groups, because these differences are less salient (Mannix, Griffith & Neale, 2002). Conversation in this medium, however, has also been criticized for lacking focus because multiple group members may be speaking at the same time (synchronous interaction) or overcommunicate (asynchronous interaction). Also, different rates of typing and reading can lead to more or less delayed responses by individuals within the group discussion, and could result in low contributions by some members who could otherwise improve the team's performance (Hambley, O'Neil & Kline, 2007).

In studies of computer conferencing there is a relatively little use of content analysis technique compared to other techniques such as surveys, interviews, participant observation and computer generated statistical manipulations. In the past, the most common methods for assessing the content and outcomes of online forums have been limited to frequency counts, message maps showing numbers of replies and message chains, and other similar quantitative measures. One notable exception to this was Henri's (1992) work, arguably one of the most influential and sophisticated cognitive analysis models for online interaction. Henri was a pioneer in utilizing content analysis to analyze the transcripts of discussions, in order to evaluate the quality of online learning communities. Influenced by this, researchers have been prompted to take up more challenging methods of content analysis in order to answer crucial questions related to social negotiation of meaning in computer-mediated-communication. Content analysis provides an opportunity to reach a better understanding of learning in a computer-mediated-communication environment since it can help to clarify the students' cognitive processes and ways of handling information during studies.

In Henri's (1992) model, a central concept in view of the content analysis instrument is interactivity. The definition of interactivity is borrowed from Bretz (1983), who states that interactivity is a three-step process: (1) communication of information, (2) a first response to this information, and (3) a second answer relating to the first. Her instrument to analyze the transcripts of discussions is based on a cognitivist approach to learning; although she also refers to particular concepts, such as learning in a cooperative mode and to the concept of collective knowledge.

Henri's analytical framework consists of five dimensions of the learning process that can be found in online text messages. Her work has laid the foundation for subsequent research. Particularly, Henri developed a quantitative approach which analyzed messages into units of meaning and attempted to measure social dimensions, interactivity, cognitive skills, levels of processing and metacognitive knowledge and skills.

The participative dimension comprises two categories: (1) overall participation, which is the total number of messages and accesses to the discussion and (2) the active participation in the learning process, which is the number of statements directly related to learning made by learners and educators. As she believes that messages of unequal length cannot serve as precise measures of active participation, she proposes to divide messages into statements corresponding to units of meaning.

The social dimension comprises all statements or part of statements not related to the formal content of the subject matter. This operationalization is derived from the model of Berger, Pezdek and Banks (1987) that states that social presence is at work in any statement not related to the formal content of the subject matter.

The interactive dimension is first divided in two parts: interactive versus non-interactive (independent) statements. Secondly, the interactive statements can be further subdivided into explicit versus implicit interactions. Furthermore, two different types of interactive messages are distinguished: responses and commentaries. This leads to five categories, namely (1) direct (explicit) responses, (2) direct (explicit)

commentaries, (3) indirect (implicit) responses, (4) indirect (implicit) commentaries, and (5) independent statements (Wever, Schellens, Valcke, & Van Keer, 2006).

The cognitive dimension consists out of five categories: (1) elementary clarification: observing or studying a problem identifying its elements, and observing their linkages in order to come to a basic understanding, (2) in-depth clarification: analyzing and understanding a problem which sheds light on the values, beliefs, and assumptions which underlie the statement of the problem, (3) inference: induction and deduction, admitting or proposing an idea on the basis of its link with propositions already admitted as true, (4) judgment: making decisions, statements, appreciations, and criticisms, and (5) strategies: proposing coordinated actions for the application of a solution, or following through on a choice or a decision. Furthermore, surface processing is distinguished from in-depth processing, in order to evaluate the skills identified (Wever, Schellens, Valcke, & Van Keer, 2006).

The metacognitive dimensions comprise metacognitive knowledge and metacognitive skills. Metacognitive knowledge is declarative knowledge concerning the person, the task, and the strategies. Metacognitive skills refer to ‘‘procedural knowledge relating to evaluation, planning, regulation, and self-awareness’’ (Henri, 1992, p. 131). Henri does notice however that although the messages can reveal useful information, it is impossible to reveal the totality of the metacognitive processes. This means that ‘‘even if no metacognitive activity was noticed, one could not conclude that the students are weak in this area’’ (Henri, 1992, p. 133).

THE RESEARCH

The aims of the present research project was to analyze if and how leadership style and communication medium used, interact with the followers communication style. As mentioned above, the status of group leader is definitely less recognizable in computer-mediated-groups due to the difficulty in the use of implicit indexes of status such as vocal inflection or eyes contact. The medium force the leader to adopt other indicators to let followers know about his/her being in charge: frequency of intervention, small delay between request and responses, being (almost) always available etc. This difference in leader’s behavioral style may result in different ingroup dynamics which, in turn, may affect followers’ interaction styles and satisfaction. Moreover, these possible difference may vary according to leadership style. In particular, transformational leaders are expected to be more effective in enhancing cognitive and metacognitive styles and job satisfaction.

Participants and design

Ninety-six Web user (51 males and 45 females) took part in this study. Participants’ age ranged between 18 and 46 years (mean = 28.6; s.d. = 3.4). They were all enrolled, on a voluntary basis, from face-to-face and online friends, and explicit request in online communities, from two undergraduate students.

The participants were randomly assigned in a two conditions of a 2 (interaction mode: online text chat vs. online text forum) X 2 (management style of the group: transactional vs. transformational) mixed between-within participants design.

Procedure

The experiment was presented as problem solving activity. Specifically, the participants were given the task to a solve a brain teaser in online virtual groups that had to be solved in five days.

The groups use a Computer Supported Collaborative Work (CSCW) context using text chat (for those interacting in synchronous mode) or a forum (for those with asynchronous interaction).

Each group consisted of four participants and one senior expert – the confederate – who directed the group’s activity. Every participant took part in two different conditions. On the whole, there were 48 groups composed of four participants plus the senior expert who acted as leader, who did not suggest the solutions, but who helped the groups to find itself. In one half of the groups, the senior expert was instructed to act as a transactional leader, and in the other half as a transformational leader. Instructions were created by following Mindgarden’s (2000) Multifactor Leadership Questionnaire and its scales and subscales. Senior experts did not know the real aims of the research.

All activities of the groups (online chat and forum) were recorded. After completing the task, job satisfaction was assessed via self-report questionnaire.

Instruments

Content analysis. The content of the online chat and web-forums was coded according to Henri's (1992) framework. The messages were divided into "message units" for analysis. A message unit can be divided "by words, by a group of words, by proposition, by sentence, or by paragraph" (Henri, 1992, p. 134). Henri also notes that an objective determination of the unit of meaning is difficult to make. In the present study it turned out that message units tended to correspond to paragraphs, as this is the way that written communication is organized. This kind of analysis is considered more effective in analyzing discussion where a message often answers more than a question or presents more phases of the same contribution. Leader's message were excluded from the present analysis.

Job satisfaction. This was measured using the Satisfaction with Job - General (Dubinsky & Hartley, 1996; Italian version translated, validated and adapted by Barbaranelli, Bortone and Di Matteo, 2010), on a seven-point scale (from "very unsatisfied" to "very satisfied"), and specifically, five questions aimed at evidencing a person's level of satisfaction with respect to a performed task.

Results

Manipulation check. In all, 4515 units were coded. Two researcher, independently each other, coded all the messages. The coding reflected a middle-good agreement (for the five dimensions, 0.62<Cohen's k<0.74).

The analysis of univariate effects revealed the existence of significant differences between the effects of transactional and transformational leadership in four of five dimensions of Henri's model. Specifically, it was observed that relating to participative dimension, no differences were observed (p=n.s.). Transactional leaders conditions create higher score in social and interactive dimensions than transformational leaders (social: $F(1,4515)=24.23$; $p<.01$; interactive: $F(1,4515)=22.11$; $p<.01$). Differences also can be found in cognitive and metacognive dimensions. Indeed, transformational leaders generate more messages in this dimensions than transactional leaders (cognitive: $F(1,4515)=18.56$; $p<.01$; metacognitive: $F(1,4515)=19.17$; $p<.01$).

As regards to interaction mode, online text chat and online text forum, no differences were observed in participative dimension (p=n.s.). More messages in social and interactive dimensions were observed in online text chat than in online text forum (social: $F(1,4515)=54.14$; $p<.01$; interactive: $F(1,4515)=15.06$; $p<.01$). On the other hand, more messages in cognitive and metacognitive dimensions were observed in online text forum than in online text chat (cognitive: $F(1,4515)=27.32$; $p<.01$; metacognitive: $F(1,4515)=46.08$; $p<.01$).

No interaction effects emerge between leadership style and media in all five dimensions (p=n.s.).

Job satisfaction was analyzed in the two interaction conditions and the existence of a main effect was found ($F(1,96)=17.3$; $p<.01$), ascribable to an higher level in chat than in forum condition. It was also observed that individuals in situations of transformational leadership possess higher levels of satisfaction with respect to the performed task ($F(1,96)=12.4$; $p<.01$).

DISCUSSION AND CONCLUSION

On the whole, these results enlighten a coherent scenario of the functioning of leadership in virtual teams and on the communicative styles which leaders evoke, examining the nature of online interactivity in problem solving processes. Interaction is one of the most important components of any learning experience and it is a crucial concept in online problem solving and education. The approach used, based on Henri's (1992) model of analysis, offered insights to understanding how the online leaders addressed discussions in online context. As Lally (2001, p. 401) points out: "One of the major strengths of Henri's approach to content analysis using categories is that it focuses on the social activity and the interactivity of individuals in a group at the same time as giving a picture of the cognitive and metacognitive processes of those individuals. However, one of its major limitations is that it gives no impression of the social co-construction of knowledge by the group of individuals as a group, in a discussion or a seminar". Although the instrument has been criticized (i.e. Pena-Shaff & Nicholls, 2004), it can be considered as pioneering work and has been the base for subsequent research.

A particularly interesting result concerns the distinction between transactional and transformational leadership. As shown by this study, working in an on-line group on the Web and being led by a leader who seeks the transformation of individual motivations (rather than a simple transaction involving resources) induces an increased level of cognitive and metacognitive communications.

The transformational leader is able to produce behavior that promotes individual potential and inspires an optimistic vision of the future that is oriented towards longer-term goals. These characteristics enable him to

provide his group with incentives for self-aware thinking: being aware of one's own thoughts ensures that behavior truly useful for personal growth is adopted. Reinforcing forms of higher-level reasoning thus helps individuals to become more aware of their own untapped capabilities and offers continuous intellectual stimulus, encouraging people to do more than what they expected of themselves in the beginning; all this enhances levels of proactive personality and team identification.

Job satisfaction results are also consistent with what was postulated by Bass (1990) and confirmed by subsequent research on interaction via Web (Hoyt & Blascovich, 2003; Ruggieri, 2009), that is, that a primary characteristic of the transformational leader is his interest in satisfaction and, in particular, the job satisfaction of his co-workers, which also entails holding in high consideration their individual skills and aspirations. The transformational leader has thus the ability to influence the emotional climate of the work group, generating an effect on the job satisfaction of each individual collaborator. McColl-Kennedy and Anderson (2002) maintain that these leaders have a positive impact on the optimistic vision of their followers and also create a pleasant general emotional state in relation to the job itself.

Results show also how the choice of interactive tools for virtual exchanges has a fundamental role in guiding communication within virtual contexts. These media are not however used in a "neutral" and transparent way, but rather are instruments to which communication must adapt; they are therefore able to generate their own domains and relations that are not necessarily analogous to those that occur in face-to-face interaction.

These findings have significant consequences for groups that interact on the Web. Providing incentives for adopting specific models of leadership and media in virtual work groups represents in fact the first step towards creating motivated and effective groups. It follows that a worker who is more satisfied and aware of his own resources can guarantee greater personal success and, consequently, better results for the organization.

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