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How Software Development Group Leaders Influence Team Members' Innovative Behavior

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INNOVATION IS THE implementation of a new or significantly improved product, service, process, business model, or organizational structure. For innovation to occur, an organization must generate several ideas and select the best ones to develop, deploy, and market. All this results from individuals exhibiting innovative behavior. Such behavior comes from individuals engaging in the intentional creation, promotion, and realization of new ideas within their job duties, team, or organization to improve their own performance or to benefit the group or organization.[1]

As a human activity in a social environment, innovative behavior is affected by a diverse and complex network of individual, team, and organizational factors. In particular, group leaders exercise—consciously or not—their influence in ways that might increase or decrease the "likelihood of idea generation by followers and the subsequent development of these ideas into useful products."[2]

> Group leaders have a powerful influence on team members' innovative behavior.

The importance of software engineers promoting innovation led us to investigate how team leaders—such as project managers and Scrum masters—influence team members' innovative behavior. We base our claims on empirical evidence derived by synthesizing the findings of two sources. (See the Web Extra at https://extras.computer.org/extra/mso2016050106s1.pdf.) The first was our 2013 systematic literature review of 79 articles from 1964 to 2012. Figure 1 shows the distribution of the studies over those years and the types of study subjects. The second was two industrial case studies of 76 software engineers at Brazilian and Canadian software companies that we performed between November 2012 and March 2014.[3]

Leadership Style and Innovative Behavior

Several studies have investigated the relationship between leadership styles on one hand and creativity, innovation, and performance on the other. (See the sidebar "Innovative Behavior and Creativity.").

In the papers in our literature review, the most studied leadership styles were *transactional leadership*, *transformational leadership*,

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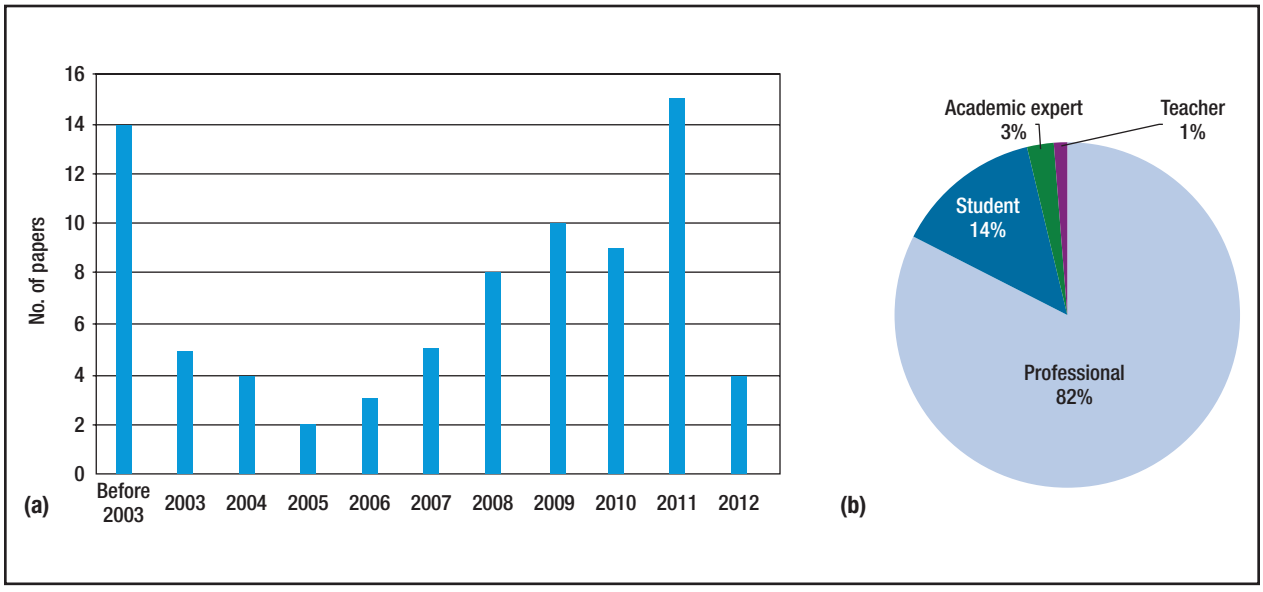

FIGURE 1. Data related to our systematic review of 79 articles from 1964 to 2012 about how software development team leaders affect team members' innovative behaviors. (a) The distribution of the articles over those years. (b) The types of study subjects.

and *charismatic leadership*. Here we focus on the first two styles, which, according to the studies, typically affect team members' innovative behavior in different ways.

Transactional leaders build relationships with team members by clarifying responsibilities, specifying expectations and task requirements, negotiating contracts, and providing recognition and rewards in exchange for the expected performance.[4] Transactional leadership is associated with practices such as *contingent reward*, in which leaders discuss responsibilities for specific tasks or projects, state performance objectives, and clarify rewards and punishments based on results. This style also entails *management by exception*, in which managers either set standards and monitor mistakes and deviations, or act as firefighters when problems occur.

Transformational leaders raise team members' "level of awareness of the importance of achieving valued outcomes and the strategies for reaching them."[4] They also encourage members to transcend self-interest for the sake of the team or organization and to seek higher levels of achievement, autonomy, and affiliation. Transformational leadership is associated with attributes such as inspirational motivation and intellectual stimulation.

In our literature review, some studies reported that transformational leadership promotes creativity, which is an important part of innovation. Evidence indicates that this relationship is moderated by individual empowerment, group knowledge sharing, and *collective efficacy*, which is team members' shared perception about how capable the group is of achieving its goals. Other studies reported that transactional leadership inhibits creativity, largely because it discourages collective efficacy and knowledge sharing.

Some researchers in our review found that transformational leadership inspires *exploratory innovation*, which results from the search for new ways to do things and solve problems.[5] In contrast, transactional leadership encourages *exploitative innovation*, which is the refinement of current methods to gain efficiency or reduce unplanned deviations.[5]

In addition, some investigators found that both transactional and transformational leadership can inhibit creativity and innovation, indicating that the context in which such approaches are used affects the resulting innovative behavior.[6]

The varying research findings show that these two leadership styles could foster or hinder innovation under differing circumstances. Therefore, theories that explain the relationship between leadership and innovation should consider whether teams are flexible or inflexible in using styles and approaches. Innovation should be both explorative and exploitative.

Therefore, leaders should use both transactional and transformational leadership as needed, resulting

INNOVATIVE BEHAVIOR AND CREATIVITY

Creativity, the generation of new and useful ideas,[1] is an important component of innovative behavior and is part of the innovation process's first stages. However, for creative behavior to be innovative, the individual must promote and implement an idea until it's perceived as being useful as a new product, service, process, or other business component.

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in *ambidextrous leadership*. An ambidextrous leader fosters both exploratory and exploitative behaviors based on situational requirements.[7]

Study Conclusions

Our study led to four conclusions. First, a leader's acceptance of new ideas encourages team members to believe the team will accept innovative behavior. Group behavior generally influences individual behavior. For example, group acceptance of new ideas and approaches encourages members' innovative behavior. Leaders greatly influence the development of group values and behavior acceptance. Therefore, leaders' willingness to accept new ideas coming from the group will affect whether team members believe the group as a whole will be open to such ideas. Leaders must support new ideas with care because they must find a balance between just getting the job done by sticking to set plans or constantly adding innovations at the risk of not delivering timely results. We found that ambidextrous leaders achieved this balance.

Second, a close relationship between the leader and team members encourages members to believe the team will accept innovative behavior. An individual feels freer to propose new ideas—and overcome the fear of proposing something wrong or useless—when a closer relationship exists between the team and its leader. When the relationship isn't close, team members are more reluctant to suggest new ideas because they use most of the little time they spend with the leader performing preplanned tasks. This leaves little room for innovation. In our case studies, transactional leaders tended to work closely with employees, whereas transformational leaders delegated more and thus managed from a distance.

Third, leadership support encourages innovative behavior. Usually, leaders make the major project-planning decisions and act as a team's technical or managerial reference. So, their support of group members helps get the resources (such as time, equipment, software, and literature) necessary to implement innovative behavior and overcome challenges. Transactional leaders avoid deviating from plans and thus are less flexible with unplanned requests for resources to support innovative behavior. Also, their vocal criticism of proposed plan deviations discourages such behavior.

Finally, ambidextrous leadership encourages innovative behavior. Our findings agree with evidence from the literature on fields other than software engineering that leaders must use both transactional and transformational styles to support innovative behavior. Transactional leaders manage tasks more closely, making followers believe they have support for their activities. However, they tend to be less flexible with resource use, which reduces the actual support provided. Transformational leaders manage from a distance but can be more supportive of unplanned resource utilization. So, a combination of the two styles is optimal.

Leaders are likely to better support their followers if they listen to new ideas. This tells team members that the organization values innovative behavior. Leaders should also provide feedback on employee proposals by assessing in a timely manner the viability of acquiring resources for the development of new ideas. They should also balance delegation, autonomy, and flexibility with close task and resource management.

Our study results confirmed the findings of research in several business sectors that leaders' exploratory- and exploitative-innovation strategies are complementarily important.[7] In software development, project managers and other group leaders should take this into account. And, they should be stimulated and supported in adopting such practices to create the conditions for innovative behavior to thrive.

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