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Learning to lead: evaluating leadership and organizational learning

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Abstract

Purpose – This paper aims to evaluate leadership diffusion in a federal agency within the context of organizational learning and culture change.

Design/methodology/approach – Using an innovative 360 degree survey assessment method, the impact of the United States Geological Survey (USGS) Leadership Program (LP) was examined. A series of statistical tests was performed to analyze the role of familiarity and exposure in predicting leadership behavior and to compare the level of leadership behavior among co-workers based on exposure to the LP.

Findings – The findings indicate that familiarity is a critical predictor of behavior change across all co-worker subgroups. Increased exposure to the LP results in stronger, more consistent predictive models. Finally, co-workers with higher exposure to the LP have increased levels of leadership behavior.

Research limitations/implications – The results in the study suggest that, in order to promote leadership and organizational learning, familiarity with leadership skills is essential. Furthermore, the greater the familiarity with leadership through at-work interaction, the more likely co-workers are to learn and apply leadership techniques.

Originality/value – The study is especially unique and valuable due to the advanced 360 degree assessment which acts as a tool to measure the diffusion of leadership principles from LP participants to co-workers, while also analyzing the role of participant interaction with co-workers following their participation in a leadership class.

Keywords Workplace training, Leadership, Diffusion, Federal government

Paper type Research paper

Introduction

Organizational learning is widely discussed in the literature across a myriad of fields, ranging from patient safety in health care (Henriksen and Dayton, 2006) and military readiness (Ron *et al.*, 2006) to library effectiveness (Chen, 2006), from information

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systems (Shepherd *et al.*, 2006) to student learning in school systems (Spillane *et al.*, 2004). While there is not a single, simple, or firm definition of organizational learning, it is based on the idea that leadership and innovative thinking foster change and a positive, continual transformation within the organization. Research has shown that many successful learning models encourage skepticism and new ways of thinking by individuals within the organization (Argyris and Schön, 1978). This transformation is based on examining past relationships, and then criticizing not just actions taken, but also the framework for those actions to expand possibilities for the future (Argyris and Schön, 1978; Senge, 1990).

Past research in organizational learning has focused extensively on individual learning in an organizational context, with relatively little regard for the value of team development (Elkjaer, 2004; Gold and Watson, 2001; Lahteenmaki *et al.*, 2001; Lipshitz *et al.*, 2002; Popper and Lipshitz, 2000a). More recent literature has shifted its focus from the individual to a group of individuals, illustrating the importance of interactions between people in groups and the associated social aspects of learning (Amy, 2008; Gold and Watson, 2001; Gronn, 2002; Lahteenmaki *et al.*, 2001; Lick, 2006). Leadership is vital in creating these interactions, as leaders shape the environment in which the interactions take place and play a critical role in both structuring and modeling the interactions. Given the influence of leaders, leadership becomes a critical component to organizational learning.

Leadership and organizational learning

Leaders within an organizational learning context are well described by Senge *et al.* (1999). Under this model, leaders create change by taking part in reinforcing growth processes that allow change to manifest itself in an organization. Successful leaders are able to tap into the dedication of their colleagues to shape a common and evolving future. More recently, this leadership approach has been adapted to investigations of knowledge management (e.g. Loermans, 2002), better emotional understanding of stakeholders in the likes of intense hospital settings (e.g. Moumtzoglou, 2003) and corporations (e.g. Amy, 2008), and in sweeping reforms of higher education (Ramaley and Holland, 2005). In all four instances, leaders were committed to, and invested in, both the organization and the individuals around them.

Such dedicated leaders are critical in influencing an organization's culture and cultural changes (Waldman *et al.*, 1998). While the characteristics of successful leaders were not enumerated by Senge *et al.* (1999), their description of leadership matches well with what has been described as transformational leaders (e.g. Tucker, 2004). Transformational leaders uplift and encourage their co-workers and have values that enhance the good of all (Tucker, 2004). In stark contrast to transformational leaders are transactional leaders, who see interactions as transactions to be conducted based on self-interest (Tucker, 2004). While transactional leadership can create short-term success, transformational leaders create the environment of learning, adapting, and long-term change that goes hand in hand with organizational learning (Bass, 1999; Berson *et al.*, 2001; Berson and Avolio, 2004; Burns, 1978; Elkins and Keller, 2003; Trautmann *et al.* 2007). Indeed, when organizational learning and transformational leadership research are combined, one sees that transformational leadership can promote learning and sustainability, while transactional leadership is more likely to create an environment of short-term, individual-based change. Facets of this idea are

illustrated by MacKenzie *et al.* (2001) in their study of salesperson performance in commercial settings and Amitay *et al.* (2005) in an examination of community clinics, showing a strong correlation between these features.

Transformational leadership; however, can fall short in describing organizational learning by failing to integrate transformational interactions within the organization as a whole (Yukl, 1999). Yukl (1999) critiques transformational leadership models for adhering to the “heroic leadership” stereotype where leadership flows unidirectionally from leaders to followers. Gronn (2002) also cautions against the transformational leadership model as the leader-follower dichotomy misses key aspects of learning in an organizational context. An alternative model that expands transformational leadership to the organization level is distributed leadership, an approach that has gained much attention over the last decade. Under the distributed leadership model, leadership is seen as an interaction between multiple leaders and followers and is influenced by the situation (Spillane *et al.*, 2004). This collective approach to leadership stretches leadership activities across multiple people and may be a more efficient way to distribute responsibilities (Mayrowetz, 2008). Distributed leadership aims to include and engage workers at various levels in leadership action (Harris, 2006).

Similar to the distributed leadership idea, Cooksey (2003) maintains that the presence of leaders at every level is vital to organizational learning. Moreover, Cooksey further argues the importance of leadership because it drives continuous learning. Cooksey proposes the idea of “learnership” to tie the ideas of leadership and organizational learning together. Learnership is a continuously adapting process of learning where leadership is fundamental. The key to Cooksey’s theory is diffusion of learnership from a few individuals to all members of an organization. This adoption of skills creates an environment of flexible leader-learners who are capable of adjusting their level of leadership based on their circumstances. By this logic, leaders and learners are one and the same and the characteristics of each meld together (Cooksey, 2003). This parallels the interdependency among leaders and leader-learners in the distributed leadership approach (Spillane, 2004).

Our research takes form within this framework and is based on the premise that the heart of organizational learning is leaders creating more leaders, the idea of diffusion of learnership. A transformational leader diffuses leadership to the whole organization. The key to organizational diffusion, then, revolves around the acceptance of new leadership norms by the members of an organization. While many models of diffusion assume a top-down process, an organizational learning model of diffusion is decentralized with information moving within and between all levels (Nutley and Davies, 2000; Rogers, 1995). Again parallel to the distributed model, ideas being diffused can adapt and be improved (Nutley and Davies, 2000) to maximize functionality in specific contexts. To measure this diffusion, we use a learning model that emphasizes distributed interactions among individuals and develops a multi-step process toward behavioral and cultural change. Before fully explaining this model, we must first investigate our study organization.

Evaluating organizational learning in the United States Geological Survey
In recognition of the importance of leadership in an organization’s future and success, the United States Geological Survey (USGS) established a Leadership Program (LP) in 1999 to begin a shift towards what they term a leadership centered culture (LCC). For a

federal organization of about 10,000 employees, whose main background and mission is in the hard sciences – and less centered on the more socially interactive humanities – this is no small feat. The philosophy for this culture shift is that leadership is important at all levels and therefore, all individuals must take responsibility for it. Continuous learning is emphasized and employees are encouraged to model leadership behavior to others in order to help this culture diffuse to all individuals and across all levels of the USGS. The end goal is a high-performance, productive, and energized organization where the USGS community can develop to their full potential. It is clear from this description that a LCC serves as a valuable example of distributed leadership and organizational learning. While not modeled on the distributed leadership perspective, the USGS program matches up well with the multiplicity of leadership interactions as suggested by Spillane (2004) and others.

Since bureaucratic systems like the USGS are generally defined by a hierarchical structure of employees and highly regulated processes, acquiring a more holistic view of leadership values across all levels is a great challenge (Taormina, 2008). Taormina (2008) suggests that leadership in more bureaucratic cultures tends to be restricted to the hierarchical structure whereby managers use controlling behaviors to influence employees. This limitation to vertical leadership and transactional methods is detrimental to the potential leadership capacity of the organization (Ensley *et al.*, 2006; Tucker, 2004). The bureaucratic nature of the USGS inevitably impedes the transformational culture change.

To diminish the effect of structural obstacles on the LP's efficacy, the approach to leadership diffusion was more decentralized. Decentralized diffusion focuses on the sharing of power, the flow of knowledge in horizontal networks, innovations derived from experimentation instead of expertise, problem-centered frameworks, and local behavior adaptation among employees (Rogers, 1995). Communication and interaction in teamwork settings is necessary to facilitate this decentralized process.

The first step of decentralizing leadership diffusion in the USGS LP has been introducing employees to leadership and organizational learning through course instruction. The Program involves two week-long courses, a 101 and 201, which bring employees together from offices around the country. The courses are designed to train people in the ideas and skills necessary to transform the USGS into a LCC. Through an internal nomination process, about 24 participants are selected for the 101 course, and remain with their cohort for a second 201 course, typically scheduled 18-24 months following 101. By way of active modeling, nearly all of the instructors in the 101 and 201 are themselves USGS employees.

Sessions for the 101 course cover a wide variety of topics including: examinations of leadership and vision, principle-centered leadership, coaching, mentoring, ethics, team-building, assessment of personal behavioral tendencies, leadership potential, differences between leadership and management, overviews of negotiation and conflict resolution, and fundamentals of organizational philosophy. The 201 course builds directly on the foundation of 101 by promoting the growth and development of participants, strengthening cross-disciplinary relationships, and providing access to high-level managers within the bureau. The primary foci of the 201 course include: storytelling as a leadership tool, creative problem solving, learning about yourself, science ethics, addressing personal and USGS challenges, and enhancing interactions. In order to overcome the reality that many organizational change initiatives fail because they only reach a small percentage of the population (Senge *et al.*, 1999), the

hope of the LP is to intensively train participants of the 101 and 201 courses to become transformational leaders who will spread leadership techniques and characteristics when they return to their respective offices and regions.

Learning model

The learning model that we use in our evaluation of the LP is a diffusion-based model that takes into account the social environment of the learner and emphasizes experiential learning. It builds on on the classic social learning theory developed by Bandura (1977) and was brought to the present by such researchers as Mavin and Cavaleri (2004), as well as Small and Irvine (2006). Much diffusion theory is centered on the work of Rogers (1995) who has proposed a universal model of adoption processes. Rogers' (1995) model is a linear trajectory where formal knowledge predicts behavior. However, Kaplan (1999) argued that this diffusion model may be inadequate to account for the early stages of adoption decisions. While knowledge plays a part in predicting behavior, our model builds on Rogers' (1995) model by incorporating experiences and comfort level with a skill into the trajectory for behavior and diffusion. The model also accounts for the training evaluation perspectives of Kirkpatrick and Kirkpatrick, whose work is used extensively in applied program assessment (Kirkpatrick and Kirkpatrick, 2006) (Figure 1).

The goal of this learning model is to better understand the processes of learning leadership skills. While this learning model can be used to explain the links between each of the variables and how increased levels of one lead to increased levels of another, the purpose of the current study is solely to examine how motivation, knowledge, experience, and familiarity directly influence behavior. Motivation focuses on the underlying reasons for involvement in the organization, knowledge focuses on formal learning through classes and materials, experience examines informal learning by watching and doing, and familiarity focuses on an individual's degree of comfort

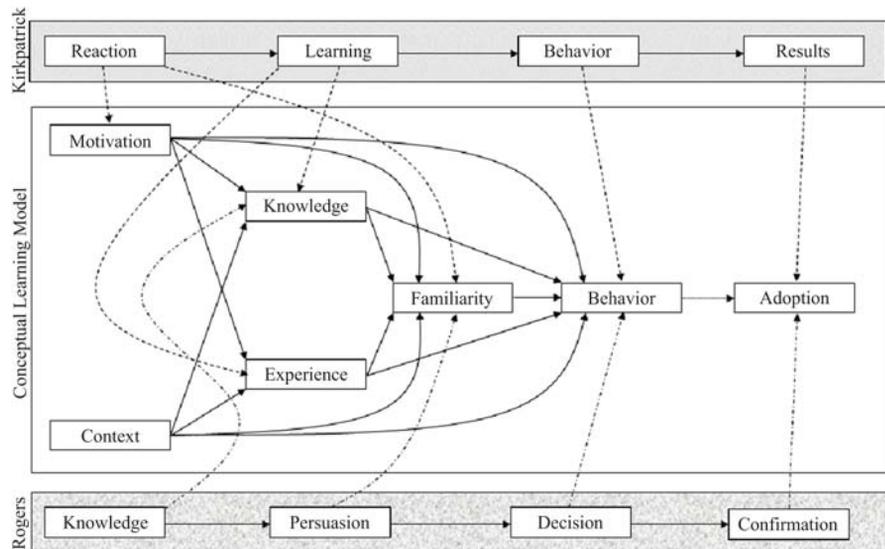


Figure 1.
Conceptual learning model

Note: Solid lines = causal relationships; dashed lines = substantive relevance

and confidence with leadership. All four variables influence leadership behavior, which is measured by leadership activity and intention. By studying behavior and diffusion of leadership skills to co-workers, we can assess whether the USGS is progressing towards the ultimate goal of a LCC.

The influence of motivation and knowledge on leadership behavior has already been demonstrated in previous research (Senge, 1990; Washington and Hacker, 2005; White, 1959). For example, Washington and Hacker (2005) describe knowledge as an important factor in developing behavioral change and critical to creating a culture shift through organizational learning. Motivation is also a clear antecedent of leadership behavior in many contexts (Barbuto, 2005). Our interest here is to focus on the other two predictors that have not been explored in as much depth as these.

Experience refers to the application of techniques acquired through exposure. It measures the direct and indirect ways in which participants experiment with leadership, both personally and vicariously. Experiences within the classroom, workplace, and other environments are examined with this variable. Learning through observation and storytelling are considered highly effective in reinforcing behaviors and enhancing organizational learning (Baker *et al.*, 2005; Burns, 1978; Gold and Watson, 2001). Numerous authors have emphasized the importance of experiential learning both in direct and vicarious models (e.g. Bandura, 1977; Jarvis, 2006; Kolb, 1984). Moreover, in an organizational learning context, the processing of these experiences is equally important and leads to further experiences. The social setting of organizations creates many opportunities for group processing of experiences as well (Baker *et al.*, 2005; Elkjaer, 2004; Gold and Watson, 2001; Kayes *et al.*, 2005).

Familiarity is an affective state that reveals the combination of comfort and confidence with an idea or activity. The comfort and confidence of familiarity may be seen as the result of individual and group reflection on ideas or experiences they have gained. Familiarity can be thought of as an intermediate step where the learning facets develop before leadership behavior is observed (Yeo, 2006). Kaplan (1999) suggests that behavior changes evolve when some degree of familiarity is achieved, and that without familiarity, behavior change, and ultimately organization learning, is unlikely.

Since previous research indicates the success of the learning model and the efficacy of the LP on participants (Kirkpatrick and Kirkpatrick, 2006), this study investigates the impact of the LP on organizational behavior as a whole through an innovative 360-degree assessment (see Methods). For the purposes of this study, we focused on behavioral changes, with an emphasis on the importance of the four measured predicting variables: motivation, experience, knowledge, and familiarity. We first wanted to explore the level of leadership diffusion in the USGS, which we measured by comparing behavior levels of three groups of co-workers with differing degrees of exposure to the LP. We then aimed to examine the importance of the predictive variables on behavior in each of the groups of co-workers. We were particularly interested in the relationship between familiarity and behavior with the understanding that all of the aforementioned independent variables are integral in adopting leadership behaviors (Senge, 1990; Washington and Hacker, 2005; White, 1959), leading us to the following hypotheses:

- H1. Leadership behavior increases with exposure to the Leadership Program.
- H2. Familiarity is the most important predictor of leadership behavior.

Methods

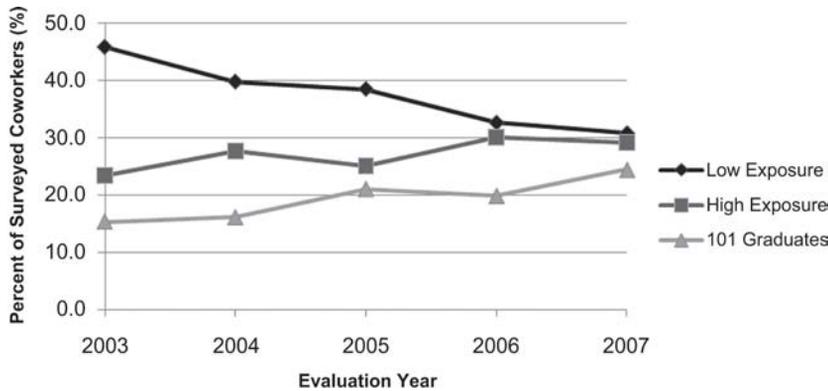
The USGS LP has impacted over 1,000 employees through direct participation since the program's inception in 1999. Besides surveying each participant, we have also surveyed over 3,500 co-workers since 2003 through the 360-degree assessment (see below). In this study, we used a subgroup of this large dataset focusing on surveys from 2005 through 2007. We chose this subset based on the consistency of survey items that were asked regularly in those years of a broader, longitudinal study.

Pre-course surveys were administered two months prior to the 101 or 201 courses. Surveys were designed and administered in accordance with standard survey procedures (Dillman, 2000). LP participants were required to complete a comprehensive evaluation that included both a self-assessment and evaluation by eight to ten co-workers, including at least one supervisor, peer, and employee. These evaluations proved to be an essential part of the leadership building sessions in the courses because participants received personal feedback on how to improve their individual skills. The surveys asked participants questions regarding their own behavior and tendencies of the USGS as a whole, while co-worker evaluators (henceforth referred to as evaluators) were asked to evaluate the participant, the evaluator's own leadership, and leadership within the USGS as a whole. We refer to this comprehensive method of surveying both participants and evaluators as a 360-degree evaluation. Our 360 evaluation was unique in that we used evaluator surveys to gain insight into the leadership capabilities and exposure of the co-workers. Thus, we were able to simultaneously learn about both the participant and co-workers through the same survey administration.

The information gathered from the co-worker self-assessment was used to examine diffusion of leadership skills in the workplace. This diffusion-based approach to measuring organizational learning is proposed by Cooksey (2003), who recommends organizations use learning to develop leadership as a way to implement and measure organizational learning. However, a method for evaluating leadership dissemination is still not widespread because of the difficulties in measuring learning within organizations (Garvin, 2000; Spector and Davidsen, 2006). Our unique methodology advances the study of organizational learning by providing insight into co-workers' leadership skills and perceptions. By surveying the leadership capacity of the co-workers, leadership diffusion throughout the USGS can be inferred.

The co-workers are asked questions regarding their leadership motivation, knowledge, experience, familiarity, and behavior, and we evaluate the responses based on the co-workers' level of exposure to the Leadership Program (determined by the question, "How familiar are you with the Leadership Program?"). Co-workers rate their exposure level on a six-point scale and are subsequently categorized into three groups: 1 – 2 = Low ($n = 726$), 4 – 5 = High ($n = 595$), and 6 = 101 Graduate ($n = 464$). Co-workers who choose three are removed from the analysis on the grounds that this exposure level is too vague to elicit valid results or comparisons. Since 2003, we have seen a consistent trend in the data whereby the percentage of low exposure co-workers slowly decreases as the percentage of 101 graduates increases; high exposure co-workers show little change over the years (Figure 2).

The demographics are consistent across the three sample groups, Table I. On average, the co-worker respondents are split 54.5 per cent male and 44.0 per cent female (note 1.5 per cent of respondents did not indicate gender). The average surveyed



Note: 2003 n = 397; 2004 n = 353; 2005 n = 574; 2006 n = 582; 2007 n = 639

Figure 2.
Change in co-worker exposure over time

		Low exposure	High exposure	101 Graduates	Co-worker averages
Gender ^a	Male (%)	59.2	49.6	52.1	54.5
	Female (%)	38.7	49.1	47.0	44.0
Average years of employment	Current position	8.9	6.4	5.7	7.2
	Federal Government	17.8	22.0	22.7	20.8
Programmatic identity ^b	Administration (%)	8.3	18.5	17.5	14.0
	Biology (%)	18.6	14.9	11.5	15.3
	Geog/GIS (%)	12.8	25.0	26.3	20.3
	Geology (%)	18.8	14.3	10.3	14.8
	Water (%)	31.2	23.7	30.8	28.9
	Other (%)	8.5	2.2	3.4	5.4

Notes: ^a 1.5 per cent of respondents did not indicate gender; ^b 1.3 per cent of respondents did not indicate Programmatic Identity

Table I.
USGS LP co-worker demographics from 2005-2007

co-worker has been working in his or her current position for seven years and has been working in the federal government for approximately 21 years. The programmatic identity of the survey respondents is sorted based on the divisions of the bureau: Administration (includes Administrative Policy and Services, Director’s Office, Office of Regional Services, Regional Director’s Office); Biological Resources; Geog/GIS (includes Geographic/Geospatial Information Office, National Mapping, Geography); Geology; Water Resources; Other (includes None of the Above, Non-USGS). For the 2005-2007 data sample, 14 per cent of all surveyed co-workers worked in Administration, 15 per cent in Biology, 20 per cent in Geog/GIS, 15 per cent in Geology, 29 per cent in Water, and 5.4 per cent are Other.

Index construction

Each question on the survey was specifically designed to address one of the main five variables (motivation, knowledge, experience, familiarity, and behavior). The indices

for each of the five variables were constructed based on corresponding survey items. The survey item composite for each variable index was based on the cohesiveness of the 2005-2007 co-worker responses ($n = 1785$) using Cronbach's Reliability Test. (See Appendix for a complete listing of index items and summary reliability measures.) Each index is scaled on the same basis as the questions that created it, so all range from one to five.

Statistical analysis

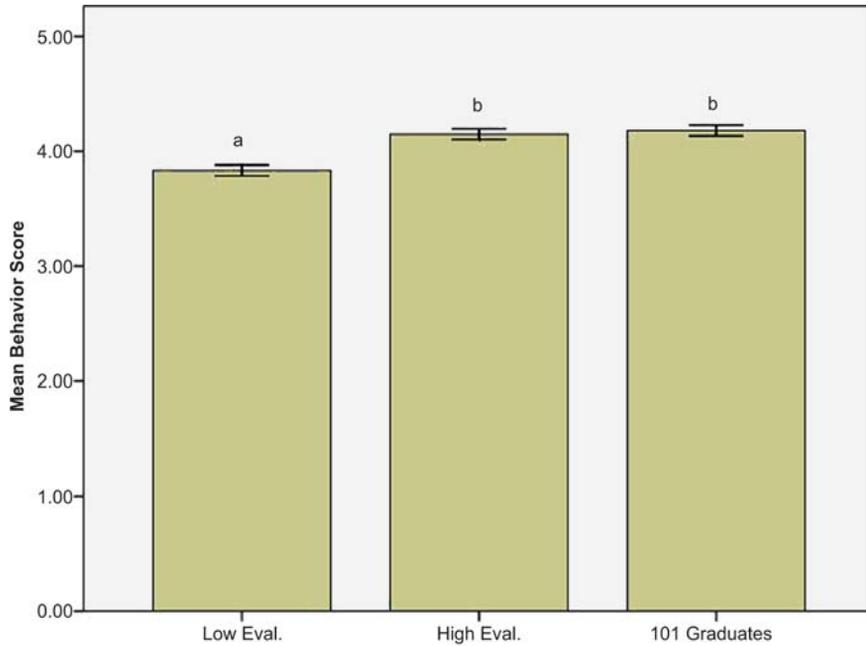
An analysis of variance (ANOVA) was used to compare levels of leadership behavior across co-worker groups based on exposure. Statistical significance was evaluated at $p < 0.05$. Linear regressions were generated to assess the hypothesis concerning the role of familiarity in predicting behavior. Independent variables included motivation, knowledge, experience, and familiarity, as well as demographic variables measuring each programmatic identity (Administration, Biology, Geography/GIS, Geology, and Water), gender, years in the government, years in current position, relation to the LP participant, and level of familiarity to the participant's work performance. Behavior functioned as the dependent variable. All results were considered significant at $p < 0.05$ except where noted. Adjusted R-squared values were used to demonstrate the predictive power of each model. The basis for accepting our familiarity hypothesis was through comparison of standardized beta values (β) among the independent variables expected to predict behavior in tests of different samples.

Results

The Cronbach alphas were strong for each of the variable indices evaluated. The motivation index ($\alpha = 0.782$; three items) was composed of questions assessing the respondent's level of interest in leadership and inclination towards leadership opportunities. The knowledge index ($\alpha = 0.706$; five items) draws on facets and materials learned in the leadership courses, such as a leader's responsibilities and the importance of storytelling and personal action plans. Items included in the experience index ($\alpha = 0.687$; three items) addressed the influence of observing others, hearing stories, and practicing skills in leadership development. The familiarity index ($\alpha = 0.767$; four items) is comprised of co-workers' comfort with negotiating, communicating concerns, expressing goals, and taking on leadership roles. Questions in the behavior index ($\alpha = 0.694$; four items) focused on the respondent's interactions with other people, such as holding others accountable, stepping up to leadership roles, reinforcing diversity, and communicating effectively. Each index is statistically independent of all others.

The results for the ANOVA test on leadership behavior yielded a significant difference between low exposure and high exposure co-workers ($p < 0.001$) and a significant difference between low exposure and 101 graduate co-workers ($p < 0.001$). There was no statistically significant difference between high exposure and 101 graduate co-workers (Figure 3).

The linear regression model for leadership behavior showed significant relationships among the independent variables in each of the three sample groups (Table II). In the low exposure analysis, motivation, knowledge, and familiarity directly predicted behavior change ($p = 0.001$, $\beta = 0.22$; $p = 0.032$, $\beta = 0.12$; $p = 0.001$, $\beta = 0.46$, respectively). Familiarity showed the strongest impact on behavior in



Notes: A difference in letter indicates statistical significance of $p < 0.05$. Bars represent standard error.

Source: Data compiled from 2005-2007 survey responses

Figure 3. Leadership behavior results based on co-worker exposure to the USGS Leadership Program

Predictors	Low exposure β	High exposure β	101 Graduates β
Motivation	0.22**	0.36**	0.31**
Knowledge	0.12*	0.01	-0.14*
Experience	0.03	0.01	0.13*
Familiarity	0.46**	0.40**	0.45**
Gender	-0.02	0.12*	-0.02
Relation	0.13**	-0.02	0.00
Familiar	0.04	0.11*	-0.01
Government years	-0.03	0.05	0.14*
Water Division	-0.01	-0.20*	-0.26
F	16.60	17.72	11.21
R^2	0.46	0.45	0.41
Adjusted R^2	0.43	0.42	0.38

Notes * $p < 0.05$; ** $p < 0.01$; Betas are standardized values; only demographic variables that were significant in at least one evaluator group are listed in the Table

Table II. Assessing predictors of USGS leadership behavior

comparison to motivation and knowledge ($\beta = 0.46$). A total of 43 per cent of the variance in behavior was explained by the independent variables ($p = 0.001$). The only demographic variable found to predict behavior was relation, indicating that the leadership behavior of co-workers increased for supervisors in comparison with

employees of the participant (scale 1-3: 1 – employee, 2 – peer, 3 – supervisor) ($p = 0.008$, $\beta = 0.13$). When studied in isolation, the demographic variables explained six percent of the total variation in behavior.

High exposure co-workers had two significant independent variables from our four main predictors impacting behavior: motivation and familiarity ($p = 0.001$, $\beta = 0.36$; $p = 0.001$, $\beta = 0.40$, respectively). Familiarity had the relative greatest impact on behavior change ($\beta = 0.399$), followed closely by motivation ($\beta = 0.356$). The three demographic variables of co-workers that impacted behavior were gender, familiar, and Water Division ($p = 0.017$, $\beta = 0.12$; $p = 0.014$, $\beta = 0.11$; $p = 0.042$, $\beta = -0.20$, respectively), indicating that females have higher levels of leadership behavior than males, co-workers who knew the participant better had higher levels of leadership behavior than those who knew the participant less well, and Water Division employees had lower levels of leadership behavior than individuals who worked outside that division. A total of 42 per cent of the variance in behavior was explained by the independent variables. A total of 3 per cent of the variance in behavior was explained by the demographic variables alone.

For the 101 graduates, all four of our main predictive variables impacted behavior (motivation $p = 0.001$, $\beta = 0.31$; knowledge $p = 0.053$, $\beta = -0.14$; experience $p = 0.054$, $\beta = 0.13$; familiarity $p = 0.001$, $\beta = 0.45$). Familiarity was the relative best predictor of behavior compared to the other independent variables in the 101 graduate regression ($\beta = 0.45$). The only significant demographic variable was the number of years the co-worker has worked for the government ($p = 0.014$, $\beta = 0.14$), indicating that co-workers who have worked for the government longer had higher levels of leadership behavior. Studied in isolation, the demographic variables were unable to significantly predict leadership behavior. When demographics and index variables are combined, they explain 38 per cent of the variance in behavior. Figure 4 summarizes these models.

Discussion

The results in Figure 3 show that co-workers who are familiar with the LP have higher levels of leadership behavior, which supports our first hypothesis. As co-workers within the low exposure, high exposure, and course graduate groups do not differ significantly in their demography (Table I), we surmise that the foremost explanation for the relationship between leadership behavior and program exposure is the diffusion of leadership material from the graduated LP participants to colleagues. As described by Rogers (1995), diffusion is a process where innovation and ideas are spread by one member of a social system to another. The diffusion of organizational learning is dependent on effective observation, conversation, shared vision, and team learning which are best accomplished through interactive team settings (Baker *et al.*, 2005; Bandura, 1974; Senge, 1990). It appears, therefore, that LP participants are returning to their home offices, communicating leadership with their colleagues, and facilitating an environment in which co-workers can develop their own leadership potential.

This analysis suggests that the LP participants show signs of functioning as transformational leaders. As Tucker (2004) describes in his account of transformational leaders, successful leaders – such as the trained participants of the LP – return to the workplace with the skills to facilitate leadership diffusion to their co-workers. A transformational leader engages with employees by raising motivation,

Low Evaluators				High Evaluators				101 Grads																																																																																																																																										
Model	F	R Square	Adjusted R Squ	Model	F	R Square	Adjusted R Squ	Model	F	R Square	Adjusted R Squ																																																																																																																																							
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Figure 4. Regression sensitivity analysis

providing new direction, instilling inspiration, and, ultimately, changing behaviors (Bass, 1999; Burns, 1978; Tucker, 2004). Likewise, charisma is critical in a transformational leader to generate excitement about the successes that are possible if everyone works as a team (Bass, 1999). In the USGS, just as LP graduates offer signs of transformative activity, the co-workers with high exposure to these leaders are learning leadership behavior.

The next step requires translating this budding leadership into organizational learning and a shift to a LCC. Transformational leaders have been shown to be imperative in the development of transformational change and organizational learning (Amy, 2008; Cooksey, 2003; Chapman, 2002; Popper and Lipshitz, 2000b). Organizational learning is a systematic process which isolates areas of weakness in strategic thinking while promoting goal-oriented, motivated behaviors and is especially critical during times of organizational change (Argyris and Schön, 1996; Lipshitz *et al.*, 2002; Lucas and Kline, 2008). In order for the USGS to develop a shift towards a LCC, the efficacy of the transformational leaders in enhancing organizational learning is crucial. Leaders play a pivotal role in transferring learnership, or the process of facilitating and supporting learning in others (Cooksey, 2003), from the individual to the organizational level by challenging the status quo and guiding employees through shared and collective learning (Amy, 2008). The results from the high exposure co-workers indicate that the LP participants are participating in learnership by returning to the office and disseminating leadership qualities to their colleagues. If there is any associated intent of creating more leaders, this reinforces the distributed leadership model discussed above.

However, learnership is only one step in creating a LCC. The co-workers who are exposed to the participants still need to find their own way to demonstrate leadership behavior, ultimately showing distributed leadership has occurred. Therefore, it is important for the USGS to understand what variables significantly impact the adoption of leadership behaviors. The results from the linear regression analysis indicate that familiarity is an important predictor of behavior. Across all levels of exposure to the leadership program, familiarity most strongly predicts behavior, providing compelling evidence to support the second hypothesis. Motivation is also present in each model and plays an integral role in influencing co-worker behavior as seen in previous studies (Senge, 1990; White, 1959). The learning model considers knowledge and experience to also have an effect on behavior (Kaplan, 1999). Knowledge, but not experience, was present for low exposure evaluators, while neither was significant for the high exposure evaluators. Both variables were present in the graduate model, but knowledge had a negative influence. The variation within these two variables in predicting behavior in co-workers suggests that the model for vicarious learning does not adhere to the same structure as that of the standard formalized training model across groups.

One explanation for this difference could be that different underlying cues influence each of the three groups. For instance, low exposure evaluators are new to leadership. They have the lowest levels of leadership behavior and subsequently, probably have the fewest leadership experiences of the three groups. Therefore, experience may not factor into leadership behavior for low evaluators because they do not have the experiences necessary to predict any type of behavior. As for high exposure and 101 graduate evaluators, they do know about leadership and show the highest levels of

leadership behavior. The information is no longer new to them, and therefore the knowledge variable may not be as important because the facts are not their primary driving force. They do not need to deliberate, for example, whether a leader is different than a manager (a knowledge index question), but rather they may focus on the bigger picture (e.g. how to achieve effective leadership). We do find it curious that high evaluators appear to be indifferent to the knowledge and experience variables, and perhaps that gap results from a missing link that the formal class would fulfill.

Overall, demographic variables explained only a minute proportion of the variance in leadership behaviors. They did, however, differ among the three groups of evaluators in the regression results. The evaluator-participant relationship was the only important variable for the low exposure group. This suggests that for low exposure co-workers, supervisors were more likely to demonstrate leadership compared to participants' peers and subordinates. For high exposure evaluators, increased connection with the participant was associated with higher behavior scores, suggesting that evaluators who knew a participant better perceived themselves as more leader-like in their own behavior.

One seemingly odd result was that high evaluators are less likely to have high levels of leadership behavior if they are within the Water Division of USGS. One possible explanation is that the Water Division underwent some restructuring and a change in leadership during the study period and that may have negatively influenced employee leadership. It will be important to continue monitoring the various divisions to see if this changes in future years. For graduates, the only demographic variable that influenced leadership behavior was the number of years spent working in the federal government, indicating that evaluators with more experience in the government are more likely to display higher levels of leadership behavior.

While many variables affect leadership behavior and while differences can be seen between the three evaluator groups, familiarity with the leadership material was consistently the most important facet of adopting new leadership behaviors. Consequently, in order to encourage further leadership development in the workplace, making employees comfortable with leadership principles is essential. Whereas previous studies have focused on knowledge and practice in changing behaviors (Connelly *et al.*, 2000; Gold and Watson, 2001; Senge, 1990; Washington and Hacker, 2005), few theorists have engaged with the role of familiarity in predicting behavior adaptation. Keeping the focus on the importance of experiential learning in a team environment (Baker *et al.*, 2005; Senge, 1990), the comfort component has been only mildly scrutinized. Our results suggest that familiarity with leadership concepts is the most important variable affecting leadership behavior and deserves more attention in future research. Additionally, leadership programs, including the USGS, should consider ways in which to increase an employee's comfort with leadership before expecting to see dramatic changes in leadership behavior.

Implications

In sum, an important step to increase leadership development and organizational learning (i.e. learnership) in any business or institutional setting is to help increase familiarity with leadership fundamentals. Familiarity demonstrates how employees respond to leadership learning in their comfort and confidence with the material. In our study, gaining comfort directly impacts the employee's leadership behavior.

Maximizing hands-on exposure to leadership so that participants can develop this familiarity is likely to be a crucial educational step. It is likely that familiarity breeds interest, opening the door for increased knowledge acquisition and opportunities to experiment with leadership concepts in a safe environment.

A second step to increase leadership development and organizational learning relies on graduates of a leadership course spreading the information to their co-workers in the workplace. Once co-workers gain exposure to leadership from these newly minted transformational leaders, they are at an advantage to begin developing their own leadership behaviors. When familiarity with leadership grows throughout the organization, learnership can occur among all employees. New inspiration and shared vision has the power to help the organization overcome challenges and changes, thus reinforcing the basic tenets of distributed leadership.

We found that transformational leaders can be essential for transmitting leadership values to co-workers. Therefore, we believe that transformational leadership and distributed leadership are not necessarily at odds with one another as suggested by Yukl (1999). Rather, distributed leadership can stem from transformational leadership as long as leaders understand the importance of working interdependently and sharing responsibilities. To help foster the transition from transformational to distributed leadership, organizations should encourage opportunities for interaction and conversational learning in the workplace (Arnold *et al.*, 2001; Baker *et al.*, 2005). Such interactions can be encouraged through experiential learning in team groups, which provides the opportunity for co-workers to learn from a leader's example (Bandura, 1974; Gold and Watson, 2001). Creating situations where distributed leadership can occur within a horizontal network is an effective means for infiltrating the hierarchical structure and establishing a more efficient system to develop organizational learning and culture change (Ensley *et al.*, 2006). Formal courses provide a valuable starting point for organizational growth, but this represents only one component of leadership and organizational development, which must be reinforced in the office.

Data limitations

There is an obvious limitation in our data due to our reliance on self-reported evaluations of behavior (Harris and Schaubroeck, 1988). While, ideally, we would include an observational reconnaissance to validate the self-reported responses, the magnitude of the evaluation project combined with constrained time and resources precludes this option. While the lack of observational research serves as a disadvantage, the high response rates and large sample sizes are beneficial to gain significant insights and reduce validity threats.

Additionally, there are several potential interaction effects not included in this study. The relationship of the co-worker to the participant (i.e. supervisor, employee, and peer) has been examined in prior analyses and has shown to be far less critical than exposure in influencing leadership behavior (Kirkpatrick and Kirkpatrick, 2006). We cannot study the effects of hierarchical income structures to leadership development because we do not have access to the co-workers' salary level for logistical reasons and the possibility of promotion and/or job changes between courses. However, since the relationship variable has demonstrated minimal to no impact on leadership and the salary level is likely correlated with position, we do not believe that salary is significant to the study.

Furthermore, this study assumes that exposure to the Leadership Program is obtained solely through participant-co-worker interactions. As information taught in the classes is not available to the general population of USGS, there is little chance that high exposure to the program could result from anything other than talking with a participant about his or her experiences. However, we certainly recognize that non-USGS exposure to leadership topics is possible, and some degree of evaluator contamination is possible. Our anecdotal impression is that this is a minor factor and that the overwhelming weight of leadership information evaluators obtain is directly through participants.

Conclusion

This study offers empirical evidence to support the role of familiarity as a critical factor underlying the behavior of transformational leaders in a bureaucratic organization. Our use of the 360-degree assessment as a conduit for evaluating co-worker leadership behavior is unique in the field of organizational learning and leadership diffusion. This technique provides the methodology and empirical data to support organizational learning and culture change theory. The innovative use of the 360-degree assessment method to obtain co-worker self-assessments provides important insight into the function and success of transformational leaders at the USGS. Knowing how co-workers respond behaviorally to the transformational role of the LP participants is integral to discern whether the agency is developing organizational learning. The findings revealed the significance of familiarity in predicting behavior and value of leadership exposure through participant interaction to adopt leadership behaviors. As long as the participants continue to successfully diffuse leadership fundamentals to their office co-workers, the organizational learning necessary to foster a leadership-centered culture should continue to gradually evolve.

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Appendix. Reliability test: Cronbachs for Low, High, and L101 Graduate Evaluators, 2005-2007

Motivation index

$n = 1,783$; Cronbach's Alpha = 0.782

- mt2 How interested are you in interacting with co-workers in a teamwork setting?
- mt12 How interested are you in taking a leadership role within the bureau?
- mt13 How interested are you in learning about leadership skills?

Knowledge index

$n = 1,744$; Cronbach's Alpha = 0.706

- kn26 How important do you think it is to use storytelling to influence co-workers?
- kn27 How important do you think it is to develop a personal action plan for leading?
- kn32 How much responsibility do you think leaders have to scope out new solutions to problems?
- kn33 How much responsibility do you think leaders have to guide people in their circles of influence?
- kn34 How much responsibility do you think leaders have to think beyond their discipline?

Experience index

$n = 1,763$; Cronbach's Alpha = 0.687

- ex24 How much influence does observing others in leadership positions have on your leadership development?
- ex25 How much influence does hearing leadership success stories have on your leadership development?
- ex26 How much influence does practicing particular leadership skills yourself have on your leadership development?

Familiarity index

$n = 1,774$; Cronbach's Alpha = 0.767

- fm5 How comfortable do you feel about negotiating with your colleagues?
- fm14 How comfortable do you feel about expressing the goals and vision of the USGS?
- fm17 How comfortable do you feel about communicating concerns to a supervisor?
- fm12 How comfortable do you feel about taking a leadership role within the bureau?

Behavior index

$n = 1,771$; Cronbach's Alpha = 0.694

- bh4 When working with other people, how likely are you to hold team members accountable?
- bh10 When working with other people, how likely are you to volunteer for a leadership role?
- bh32 When working with other people, how likely are you to reinforce the value of diversity of your co-workers?
- bh33 When working with other people, how likely are you to communicate effectively with colleagues?

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