

LEADERSHIP SKILLS: CONCLUSIONS AND FUTURE DIRECTIONS

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Mumford, Zaccaro, Harding, Jacobs, and Fleishman have argued that leadership can be understood in terms of knowledge, problem-solving skills, solution construction skills, and social judgment needed to solve organizational problems. In this article, we review the results obtained in a series of investigations intended to examine this proposition. We begin by reviewing the central implications of this skills-based model of leader performance. The strengths and limitations of the available evidence bearing on this model are discussed along with some potential directions for future research. Research directions are considered with respect to model development and refinement, linkages to other models of leadership, and potential practical applications. It is argued that this kind of skills-based model may provide a viable new perspective for understanding leader performance—one particularly appropriate for the dynamic, knowledge-based industries of the twenty-first century.

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INTRODUCTION

The study of leadership is inherently a distinctly practical venture. We study leadership with the hope of improving training, identifying alternative selection and assessment procedures for assessing leaders' strengths and weaknesses (Hogan, Curphy, & Hogan, 1994) and increasing understanding of how executive decisions shape the behavior of organizations or society as a whole (O'Connor, Mumford, Clifton, Gessner, & Connelly, 1995).

Even the most practical research must, however, be guided by theory (Messick, 1995). The importance of theory-guided research becomes particularly important in trying to understand complex, multilevel phenomena such as leadership. Accordingly, the leadership literature is replete with theories—path-goal theory (House, 1996), transformational theory (Bass & Avolio, 1994), and leader-member exchange theory (Graen & Uhl-Bien, 1995) to mention just a few. We do not wish to debate the merits of these theories, each of which has unique value for understanding aspects of leadership. Rather, we want to note that all of these theories frame leadership in a certain way, focusing on leader-follower interactions as the “essence” of leadership.

Leader-follower interactions, however, represent only one way of understanding this complex social phenomenon. Another way to frame the problem is to focus on the individual leader, or to ask “What capabilities must an individual possess to perform effectively in organizational leadership roles.” The research examined in this series of articles poses potential answers to this question, proposing that leadership depends on an interactive package of complex skills. The present article outlines lessons that may be drawn from these studies of leadership skills, examining the strengths and limitations of this research to date, potential directions for future research, and the implications of this research for both theory and practice.

SKILLS-BASED MODEL

Focus on the individual leader is not new. Trait theories have long been used as a potential model for understanding leader performance with leadership being attributed to enduring characteristics of the individual such as intelligence and dominance (Bass, 1990; Lord, Devader & Alliger, 1986). The skills-based model of leader performance proposed by Mumford, Zaccaro, Harding, Jacobs and Fleishman (2000) does not discount the important of traits. In fact, within this model, skills are seen as developing as a function of the interaction between traits and experience. However, within this model, the developed capabilities referred to as knowledge and skills are seen as having a more direct and immediate impact on leader performance than traits as they have traditionally been conceptualized. Broadly speaking, the model proposes that leader performance is based on three key types of skills: (1) complex problem-solving skills, (2) solution construction skills, and (3) social judgment skills. Accompanying the effective exercise of each of these skill sets, moreover, is a body of knowledge or expertise in one or more domains.

Leadership within this model is based on an individual's capability for solving the kind of novel, ill-defined problems with which people are presented in organizational

leadership roles. Leaders must define significant problems, gather information, formulate ideas, and construct prototype plans for solving the problem. These complex, creative problem-solving skills imply a need for expertise bearing on both the nature of the problem and the particular kind of leadership role at hand. Essentially, we are arguing that unless leaders can identify significant organizational problems and formulate solutions to those problems, all the planning and all the persuasion in the world are to no avail.

These statements, however, should not be taken to imply that leadership is simply an abstract problem-solving exercise. Viable solutions to leadership problems are those that work within the context of the organization. Thus, leaders must go outside themselves, appraising the implications of a solution within the organizational context. Relatively little is known about these solution construction skills, although plausible arguments have been made for the need to attend to restrictions (Schor, 1983), identify downstream consequences (Mumford & Peterson, 1999), and identify key causes (Bass, 1995). Moreover, the effective exercise of these skills is likely to depend on mental models expertise reflecting working interrelationships in the organization. These mental models, and the associated skills, allow leaders to revise prototype solutions to create workable solutions within the organizational context.

As important as it is for leaders to be able to shape contextually workable solutions, leaders must be able to get others to work towards those solutions. This often requires complex social skills. Social skills in this sense include not just traditional skills such as persuasion and negotiation, but also skills such as social judgment and decision making that allow leaders to adapt to others and build consensus towards a goal or vision (Zaccaro, Gilbert, Thor, & Mumford, 1991). Supporting the exercise of these skills, moreover, is a requisite understanding or knowledge of the people with whom one is working—their capabilities, needs, desires, and beliefs.

In some senses, the model presented by Mumford, Zaccaro, Harding, et al. (2000) may seem quite straightforward. Embedded in this skills-based model, however, are a number of substantive propositions about the nature of leadership and the prediction of leader performance. The first and perhaps most basic of these propositions is that these skills, and the associated knowledge structures, can be measured in samples of organizational leaders. Second, assuming these skills can be measured, the model at hand implies that they will predict leader performance accounting for variance above and beyond that attributable to trait measures. Third, the different types of skills should also make unique contributions to predictions. Fourth, these skills should develop as a function of experience in organizational leadership roles with skills emerging at certain times in relation to certain kinds of experiences. Fifth, and finally, acquisitions of these skills should be related to certain patterns of underlying characteristics.

RESEARCH STUDIES

The broad intent of the studies presented in this special issue was to provide some initial preliminary evidence bearing on these five general propositions. The primary study used to test those propositions was based on a cross-sectional sample of U.S.

Army leaders. These leaders ranged in age from their mid-twenties to fifties, having two to twenty years of experience working in Army leadership roles. Two extension studies were also conducted to examine the applicability of this model in different samples, using different procedures for skills assessment (Marshall-Mies, Fleishman, Martin, Zaccaro, Baughman, & McGee, 2000), and examining the relationships of these skills constructs to key leader behaviors (Zaccaro, White, Kilcullen, Parker, Williams, & O'Connor-Boes, 1997).

Taken as a whole, these studies support our first proposition—these skills can be measured in samples of organizational leaders. In the Zaccaro, Mumford, Connelly, Marks, and Gilbert study (2000), open-ended scenarios (constructed response measures) were used to assess problem-solving, solution construction and social judgment skills, as well as knowledge of one's leadership role. For example, following Khandwalla (1993) and Redmond, Mumford and Teach (1993), open-ended scenarios, followed by written responses to probe questions, were used to assess problem-solving skills while a task categorization procedure was used to assess leaders' role knowledge. Not only was it found that these measures provided adequate interrater agreement, the resulting factor structure and reference measure correlations provided some evidence for the construct validity of these measures. More centrally, however, these measures were found to be highly effective predictors of performance yielding multiple correlations in the .50s when used to predict objective performance records, and the quality of the solutions posed to various leadership problems.

As compelling as these findings may seem, taken at face value, they pose a host of questions. First, one might ask whether similar findings are obtained in other samples. This issue was addressed in a study conducted with civilian managers in the Department of Defense. Here, a new set of constructed response measures, tailored to the civilian manager sample, produced validities in the .40s when used to predict achievement, problem-solving criteria, and key leader behaviors. Additionally, computer adapted versions of these skills measures show some promise as indicated by the Marshall-Mies et al. (2000) study.

Although these studies address an important set of rather fundamental issues such as measurement of the proposed skills and their ability to predict leader performance, the model presented by Mumford, Zaccaro, Harding, et al. (2000) also implies a number of structural propositions. For example, skills should mediate production of performance, and the different types of skills being proposed should make distinct contributions to the prediction of leader performance. These propositions were most clearly addressed in the Connelly, Gilbert, Zaccaro, Threlfall, Marks, and Mumford (2000) and the Zaccaro, et al. (2000) studies. The findings obtained in these studies indicated that skills measured using the constructed responses measures accounted for variance in leader performance above and beyond that attributable to traditional trait measures (enduring abilities, motives, and personality characteristics). They also revealed that complex problem-solving skills and knowledge partially mediate the relationship of other leader attributes, such as general cognitive ability, personality and motivation, to performance. These findings provide some initial support for the hypothesized structural relationships implied by Mumford, Zaccaro, Harding, et al.'s (2000) model of leader performance.

A skills-based model is unique in the sense that it postulates growth in requisite leadership skills as a function of experience. In the Mumford, Marks, Connelly, Zaccaro, and Reiter-Palmon (2000) study, the cross-sectional sample of Army leaders was used to test this proposition. Here, it was found that the knowledge and skills measured using the open-ended constructed response measures showed the expected differences in Army officers across organizational levels characterized by increasingly complex and demanding leadership roles. These differences were also described in a series of discriminant analyses intended to control for the effects of prior performance. Thus, in accordance with the model proposed by Mumford, Zaccaro, et al. (2000), one type of evidence was accrued for increases in these skills as a function of experience.

The Mumford, Marks, et al. (2000) study provided some evidence indicating that the skill and knowledge differences observed across less experienced and more experienced leaders are consistent with current models describing the acquisition of expertise. More specifically, it was found that training and assignments presenting complex, novel, ill-defined problems contributed to the acquisition of these skills. Additionally, the components of skills showing increased at higher organizational levels were consistent with this model in the sense that principle-based knowledge structures appeared to precede the development of more complex problem-solving skills.

Skills and knowledge structures do not develop in a vacuum. Instead, development of these characteristics is contingent on a complex set of abilities, motives, and personality characteristics. In the Mumford, Zaccaro, Johnson, Diana, Gilbert, and Threlfall study (2000), we found that patterns of abilities, motives and personality characteristics defined successful types of leaders, or those that maintained similar percentages of members at lower and higher organizational levels. More importantly, however, was the finding that the patterns of abilities, motives and personality characteristics associated with higher skill and knowledge levels are positively related to leader performance. Thus, the *Thoughtful Innovators*, as opposed to the *Social Adaptors* or *Concrete Achievers*, appeared to be the most successful performers across all levels of Army leadership roles.

Taken as a whole, these findings provide some compelling support for the model of leader performance proposed by Mumford, Zaccaro, Harding et al. (2000). Not only could meaningful measures of these knowledge and skills be devised, measures of these knowledge and skills were found to be highly effective predictors of leader performance across difference criteria and different settings. Skills and knowledge also displayed increases in accordance with general models bearing on the acquisition of skilled performance. Thus, these studies support the use of a skills-based model in our attempts to understand leader performance while indicating that the kind of problem-solving, solution construction, and social skills, along with the associated knowledge structures, indeed represent key contributions to leader performance.

SUBSTANTIVE ISSUES

As with any other new theoretical effort, the present set of investigations leaves a host of substantive issues unresolved. Accordingly, in this section, we will examine

some of those issues, emphasizing those that represent promising directions for future research.

No one set of studies can examine all of the capabilities contributing to a complex phenomenon such as successful organizational leadership. In the present set of investigations, we have focused primarily on relevant skills and one form of knowledge—knowledge of leadership role requirements. Given the theory put forth in this series, however, knowledge of leadership role requirements is not the only form of knowledge likely to influence leader performance. For example, viable mental models describing key components of the organization and the interactions among these components, may represent an essential background for the effective exercise of various skills. Along similar lines, it is difficult to see how leaders can exercise social skills effectively without an intimate knowledge of peers, subordinates, and superiors. Thus, further work is called for examining the procedures needed to measure expertise in these domains. Other research should consider both how these different forms of expertise contribute to leader performance, the structure of expert systems, and the variables that influence the acquisition of these expert structures.

In addition to extending our understanding of how different forms of expertise influence leader performance, the present set of investigations point to the need for studies examining new types of skills. With a few notable exceptions (e.g., Bass, 1995; Mumford, Peterson, & Childs, 1999), studies have not devoted much attention to the kind of system skills likely to be required for effective leader performance. This state of affairs is lamentable in part because the present set of investigations indicates that these skills—for example, attention to restrictions and time frame—may be particularly important determinants of leader performance. The present set of studies, however, must be viewed as an initial exploratory attempt to define these skills. New alternative procedures for assessing these skills and models describing the emergence of these skills over the course of leaders' careers, might prove of substantive value in our attempts to understand and improve leader performance.

On a broader level, however, it should be recognized that the present study did not, and indeed could not, examine all of the capabilities that might influence leader performance. Variables that warrant further attention in this regard are the leaders' beliefs and values. As Mumford, Gessner, Connelly, O'Connor, and Clifton (1993) point out, when leaders are presented with and asked to solve complex, novel, ill-defined problems, the goals and structure they impose on their problem solving efforts are not purely functional. Instead, broader life themes and enduring beliefs can and will influence how they construe that problem, its implications in the organizational system, and others' likely reactions. This point is illustrated in a recent study by O'Connor et al. (1995) which found that negative life themes were an important influence on the tendency of some types of charismatic leaders to encourage destructive organizational behavior. Thus, research is needed examining how personal beliefs and broader life themes influence the acquisition and exercise of the problem-solving, solution construction, and social skills that provide the foundation for Mumford, Zaccaro, et al.'s (2000) leadership model.

Along related lines, this model of skills, however plausible, assumes that individu-

als possess requisite knowledge and skills and that they know when, where, and how to apply these capabilities to the greatest benefits of the individuals and organization around them. Effective application of requisite skills, however, is not solely a matter of intent. It also involves a series of choices about problems on which to focus, knowledge crucial to the issues at hand, and the need to gather additional knowledge. Thus, one can ask the question "What mechanisms or capabilities allow leaders to make these choices?" Expertise must be part of any answer to the question. However, one might also allow that certain cognitive control mechanisms, such as those subsumed under the rubric of meta-cognitive skills are also relevant to answering this question (Zaccaro, 1996). For example, some potentially unique meta-cognition capabilities, such as time sensitivity, prioritizing, and solubility assessments, might all be relevant to understanding the effective application of these skills, particularly in complex organizational settings where time is short and demands are many.

Still another question that needs to be addressed in future research is ultimately related to the implications of meta-cognitive skills. With the proviso that principals provide a basis for generalization, knowledge and expertise are commonly held to represent domain-specific capabilities (Phye, 1990). Skills, however, are seen as more generalizable or more transferable. Unfortunately, the present set of studies could not assess the extent to which the various problem-solving, solution construction, and social skills transfer from one organizational setting to another. This issue is of some importance, in part because of its relevance for a skills-based theory of leader performance, and in part because leader development programs must necessarily focus on transferable components of performance such as skills. Future research examining the extent to which problem-solving and social skills developed in one setting transfer to other settings, as illustrated in the work of Zaccaro, Foti, and Kenny (1991), may prove useful in addressing a key theoretical issue and in identifying training and developmental interventions likely to have a lasting impact on leaders' performance capabilities.

Situations may exert another somewhat more subtle set of effects on the application of the problem-solving, solution construction, and social skills held to underlying leader performance. This point is illustrated by cognitive resource theory (Fiedler & Garcia, 1987). This theory holds that the effects of cognitive capabilities on leader performance are moderated by the effects of stress such that leaders are less likely to apply cognitive capabilities when confronted with high degrees of stress. Based on these findings, it seems reasonable to hypothesize that stress, along with a host of other situational variables, including time pressure, inadequate resources, and staff limitations, may all act to inhibit effective application of the problem-solving, solution construction, and social skills. Future research examining the organizational context variables, which promote or inhibit effective application of these skills, may therefore prove of some value. Research along these lines is especially likely to prove useful if it carefully articulates the efforts of different kinds of situational variables on accessing different knowledge structures and applying different skills. For example, it is possible that interpersonal conflict, while inhibiting the application of problem-solving skills, may serve to encourage the application of social skills.

METHODOLOGICAL ISSUES

Although the studies examined in this special issue represent a relatively comprehensive and programmatic set of investigations, a number of methodological issues remain to be addressed. One set of methodological issues that immediately comes to fore in considering these studies derives from the nature of the samples in use. Specifically, the studies were based on samples drawn from various organizations within the Department of Defense. One advantage of studying the development of leadership skills within this sector is that the stability of the leadership cadre and the systematic career progression structure make it possible to draw developmental inferences from cross-sectional data. On the other hand, it is open to question whether our findings can be arbitrarily extended to business settings, particularly more dynamic organizations.

In this regard, three central issues should be considered in future studies. First, do the same kind of problem-solving, solution construction, and social judgment skills predict leader experience and performance in other settings? Second, are the same types of skill differences across organizational levels observed in organizations where career progression is less structured? Third, is it possible to develop skill and knowledge measures that generalize across other organizations? Although further research is needed to address all three of these questions, the findings of McCauley, Ruderman, Ohlott, and Morrow (1994) and Simonton (1995) indeed suggest that we can reasonably expect some generality in this regard.

Empirical studies of leadership have for the most part focused on first-line supervisors (Zaccaro, 1996). This trend reflects the kinds of samples that are typically available. In contrast, the present set of studies has expressly covered a wide range of leadership roles considering entry-level or supervisory positions, mid-level positions and more senior leadership roles. However, we have not, in any of these studies, expressly examined the ability of these measures to predict general officer or executive-level performance.

There is reason to suspect that the model of leader performance being formulated in the present study will have some value in understanding executive leadership. For example, it is easy to see how identification of restrictions or analysis of downstream consequences could positively influence executive performance. In fact, in a recent analysis of the most populous jobs in the U.S. economy, Mumford, Peterson, and Childs (1999) found that the executive jobs typically required higher levels of creative problem-solving and solution construction skills than other lower-level managerial jobs. On the other hand, however, it is possible that in executive positions, other types of skills may come into play, including internal and external representations and the analysis of environmental trends (Zaccaro, 1996). Hopefully, future research will serve to both identify additional skills needed in executive positions and how those skills unfold from the kind of knowledge and skills identified in the present set of investigations.

These observations about executive positions point to another direction for future research. The findings obtained in the present set of studies were based on a cross-sectional design. Although cross-sectional designs can provide useful developmental data, longitudinal or cohort sequential designs provide far more powerful vehicles

for assessing developmental change and the acquisition of skilled performance (Baltes & Schaie, 1973). This point is noteworthy as something more than the traditional call for on-going longitudinal studies of leader development (Howard & Bray, 1988). Because the present set of investigations was based on a cross-sectional design, it was not possible to address a host of potentially important questions. For example, our findings can not describe patterns of skill acquisition at the individual level. Moreover, we can not say much about the process by which these skills and associated knowledge structures are acquired. Certainly, these issues need to be addressed not only to provide further evidence for this skills-based framework for understanding leader performance, but also to provide concrete, practical guidelines indicating how we should go about trying to develop those skills at different points in leaders' careers.

Aside from these design and sampling issues, another methodological concern needs to be addressed in future studies. In the present set of investigations, we expressly focused on the performance of individual leaders using both achievement records, critical incident ratings, and ratings of performance in solving relevant leadership problems. The convergence observed among these criterion measures provides some evidence for the generality of these findings. However, all of these criteria focus on performance at the individual level. In attempts to understand leader performance however, it is desirable to look at performance from different perspectives and different levels of analysis such as group performance and outcomes (Dansereau, Yammarino, Markham, Alutto, Newman, Dumas, et al. 1998).

For example, it would be useful to have studies examining how leader perceptions, member satisfaction, and group performance are related to different kinds of leader expertise or higher levels of problem-solving, solution construction, and social skills. It is possible, furthermore, that group performance is more strongly related to solution construction skills while member satisfaction is more strongly related to social skills. Along similar lines, the impact of these skills on group or organizational performance, may also vary as a function of organizational structure and culture. This point is illustrated in the Mumford, Peterson, and Childs (1999) study, which found that high-performance organizations (e.g., minimal hierarchy, high performance standards, autonomy, etc.) called for lower levels of leader problem-solving and solution construction skills where team contributions could substitute for skilled, capable leadership.

Finally, in all of these studies, the focus was on the measurement of skills and their implications for performance. Little has been said about an important set of intervening variables—the leader's decisions and behaviors as they go about solving significant organizational problems. In other words, the behavioral events, or cognitive strategies, resulting from application of these skills have not been examined in any detail. Thus, studies examining how these skills and the associated knowledge structures are transcribed into action represent a necessary direction for future research. This point is illustrated in recent studies by Lord and Maher (1990) and Mintzberg (1991) which indicate that these skills may be applied in an interactive, dynamic fashion as leaders go about solving multiple evolving problems in the course of their day-to-day interactions.

OTHER MODELS

Our foregoing observations with regard to cognitive resource theory (Fiedler & Garcia, 1987) point to another, somewhat broader characterization of the proposed skills-based model of leader performance. More specifically, this model might serve as a basis for extending or refining many current theories of leadership. Hundreds of theories have been proposed over the years that might be used to account for leader performance (Bass, 1990). Although it is clearly impossible to examine in any detail the implications of this skills-based model for each and every theory, it might be useful to consider how this model might be used to supplement or extend a few select current theories.

One theory of leadership that has received substantial attention in recent years is the Bass theory of transformational leadership. Bass (1985, 1990) was concerned with identifying the behaviors underlying incidents of exceptional leader performance. To identify leaders capable of exceptional performance, he devised a behavioral description inventory which led to the identification of factors such as idealized influence, inspirational motivation, intellectual stimulation, individualized consideration, management by exception, and contingent reward. The kinds of problem-solving skills identified in the present effort should contribute to intellectual stimulation. The types of skills under consideration here may also account for the propensity of leaders to use transformational as opposed to transactional tactics when managing subordinates.

Another theory of leadership closely related to Bass' distinction between transformational and transactional leaders, is House's theory of charismatic leadership (House, 1977; House, Spangler & Woycke, 1991). In House's view, these incidents of exceptional leadership reflect the construction and communication of a motivating vision. The leader skills examined in this series, however, can be viewed as preconditions for the formulations of viable visions. More specifically, it is difficult to see how leaders can construct viable visions without the types of skills examined here. Moreover, the mental models of organizational relationships held to underlie the effective application of skills may unto themselves constitute a vision. This observation in turn raises a new question, one likely to be of some interest to students of charismatic leadership: Why are some models of the organization and its future more compelling to followers than other models?

Theories of charismatic and transformational leadership focus on exceptional leadership. Other theorists, however, have chosen to focus on day-to-day, or more active manifestations of leadership. Path-goal theory represents one particularly compelling theory of day-to-day leadership. In path-goal theory, the effective leader is one who identifies goals, removes blockages to goal attainment, and provides opportunities to pursue individually-valued outcomes (House & Mitchell, 1974; Schriesheim & Neider, 1996). Perhaps the most straightforward application that might be drawn from a skills-based model of leader performance, is that the leader's expertise must ultimately lay a foundation for clarifying goals and removing blockages. In complex organizational systems, however, both social judgment and solution construction skills may be needed to identify and remove blockages while identifying those outcomes likely to be valued by subordinates. In keeping with this notion, it

is hardly surprising that skills, such as attention to restrictions, were found to be effective predictors of leader performance in the studies under consideration.

While path-goal theory focuses on the behavior of leaders, other theories focus on the interaction or exchange among leaders and subordinates. One illustrative theory of this type may be found in Leader-Member Exchange theory (Baugh, Lankau, & Scandura, 1996; Graen & Uhl-Bien, 1995). Leader-Member Exchange theory focuses on social exchange relationships occurring between the leader and members of his or her team. One implication of this theory, which holds that leaders differentiate among subordinates, is that leaders select lieutenants. What remains unsaid, however, is exactly why leaders choose certain individuals as lieutenants. Our leadership model suggests a potential answer to this question and perhaps a useful extension of the leader member exchange theory. More specifically, an effective leader may be one who selects lieutenants who are strong in skills in which the leader is weak. Thus, a leader who has strong problem-solving skills but weak social skills may benefit by choosing lieutenants who have strong social skills.

Theories of leadership have for the most part focused either on desirable behavior on the part of the leader (e.g., Bass, 1985; Graen & Uhl-Bien, 1995; House, 1977; House & Mitchell, 1974), or, alternatively, on others perceptions of leader behavior and the inferences drawn from it (e.g., Hall & Lord, 1995). Valuable as these approaches are, they leave an important question unanswered: What allows effective leaders to generate the right behavior at the right time in the kind of novel, ill-defined situations where leadership makes a difference? One answer to this question may be found in the skills, and associated knowledge structures identified in this series of studies. By linking various behaviors to these underlying skills and knowledge, it may therefore be possible to formulate more comprehensive theories of leader behavior and leader performance than has previously been possible.

PRACTICAL IMPLICATIONS

Skills-based models of leader performance serve not only as a basis for extending current theory, they also have a host of practical applications. From the perspective of practitioners, those of us interested in the assessment and development of leaders, current theories of leadership pose a problem. Leader behavior necessarily varies from one situation to another, at times, substantially. As a result, it is difficult to identify the kinds of assessments and developmental interventions likely to prove useful across a wide range of situations. This problem is not unique to leadership. In fact, it is a problem that has long plagued educators who must create assessment and development programs that will prepare people to perform in a wide range of situations (Halpern, 1994). One solution to this problem has been to focus on these skills and associated knowledge structures by stressing underlying generative structures. Accordingly, one might expect that the skills-based framework for understanding leader performance proposed by Mumford, Zaccaro, et al. (2000) would have a host of practical implications.

One noteworthy set of practical implications may be found for leader assessment. Studies of leader assessment that have traditionally focused on various skills held to underlie leadership or managerial performance examining capabilities such as

decision making, intelligence, and communication (Bray, Campbell, & Grant, 1974; Howard & Bray, 1988). Typically, these capacities are assessed using performance or realistic assessment center exercises. In recent years, however, assessment center exercises have come under increased scrutiny with the technique being criticized because of the limited number of behavioral samples available, method variance, rater contamination, and expense (Klimoski & Brickner, 1987; Sackett, 1987; Schneider & Schmitt, 1992). The present set of studies suggests that paper-and-pencil and computerized measures of at least some of these skills can be formulated using constructed response techniques based on the identification of low fidelity exercises expressly intended to elicit certain key skills (Motowidlo, Dunnette, & Carter, 1990; Mumford, Supinski, Baughman, Costanza, & Threlfall, 1997). In fact, the present set of investigations has shown that these more structured, focused exercises can yield effective prediction, providing a potentially useful new approach to the problem of leader assessment.

Not only do the findings obtained in the present set of studies suggest an alternative approach to leader assessment, they point to a need to extend current assessment systems. With the notable exception of abilities, motives, and personality characteristics, assessment centers have traditionally focused on observable performance. Thus, little attention is given to some key capabilities, principal-based knowledge, mental models, and identification of consequences, which are less readily assessed using observational techniques. The present set of studies underscores the importance of these "hidden" capabilities as potential predictors of leader performance. They also suggest that exercises can be developed to provide viable assessments of these hidden capabilities, which may provide the foundation for effective organizational leadership.

Assessment sometimes serves as a basis for the identification of talented leaders. At other times, however, the results of assessment center exercises are used to identify requisite developmental interventions. One advantageous characteristic of the model of leader performance proposed by Mumford, Zaccaro, et al. (2000) is that it expressly focuses assessments on those capabilities, skills, and knowledge that have been shown to develop as a function of experience in organizational leadership roles. By focusing developmental interventions on these key capabilities, it should become possible, over time, to develop far more powerful interventions. For example, training programs might be devised, using case studies or other instructional techniques, encouraging leaders to examine alternative definitions of the problem situation or to articulate multiple potential consequences of an event. Based on the findings obtained in this series of studies, there is good reason to suspect that these kinds of developmental programs will prove of some tangible value in enhancing leader performance.

It is important to bear in mind that the requisite leadership skills are increasingly manifest at higher organizational levels. This is consistent with current understanding of the sequence by which people acquire complex skills in different domains of endeavor. For example, exercises intended to facilitate the application of requisite problem-solving and solution construction skills are unlikely to prove of any great value early in leaders' careers when leaders lack the principal-based knowledge structures needed for effective application of these skills. Thus, this series of studies,

and the model of leader performance being proposed, imply that effective interventions must be timed in accordance with the general skill development process and the individual's readiness to learn. This point is important because it suggests that no one developmental intervention or training course will ensure effective leadership. Instead, real gains in leadership capabilities will require systematic programs of development programs.

CONCLUSIONS

However valuable these various practical implications of a skills-based model of leader performance, we believe that the present effort has a broader set of implications for the practice and theory of leadership. Traditionally, students of leadership have focused on how leaders exercise direct interpersonal influence. This research stream has a long history beginning with the seminal studies of Fleishman (1953) on consideration and initiating structure and proceeding to more recent theories such as the individualized leadership theory of Dansereau et al. (1998). All of this work views the leader as a direct immediate presence in the social group.

The skills-based model of leader performance in this series does not discount the value of this approach. In fact, it extends this approach by identifying some of the capabilities needed to engage in these behaviors at appropriate times and places. By the same token, however, this skills-based approach to leader performance adds a significant new element to our conception of leadership. It postulates that leadership may sometimes be a rather indirect phenomenon where influence is exercised through cognition and performance as well as through interpersonal interaction. We believe that cognitive performance or skills performance embedded in a distinctly social context, has always been a key aspect of leadership and is likely to become progressively more important as we move into the twenty-first century.

The age of mass production and the ensuing need for high levels of controlled interaction is coming to a close. As we enter the post-industrial information age, organizations are becoming progressively more loosely-knit entities where a premium is placed on the organization's ability to rapidly adapt to changing competitive environments and new technologies. Under these conditions, the kinds of skills under consideration here are likely to become progressively more important determinants of leader performance. They permit leadership on a distributed net where actions are words, ideas, and systems. Hopefully, the present set of investigations will serve as an initial stimulus showing how traditional conditions of leadership can be extended to help us prepare leaders for this ever more complex and dynamic world.

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