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Just what do we think we are doing? Learning outcomes of leader and leadership development

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ABSTRACT

The scientific advancement of leader and leadership development has offered various conceptualizations and operationalizations of evaluation criteria. However, because the complex learning that occurs during leader and leadership development is typically ignored, current leader and leadership development evaluation criteria do not fully capture the multidimensional and temporal nature of learning which serves as a critical mediating mechanism between training and more distal outcomes. Further, evaluations of leadership programs tend to focus on individual (i.e., leader development) outcomes without consideration of collective (i.e., leadership development) outcomes. Thus, we present a comprehensive typology of leader and leadership development learning outcomes that elucidates the multidimensional and multilevel nature of such outcomes and provides greater construct definition and precision. Our purpose is to integrate multiple theoretical perspectives, generating a more precise classification to provide researchers and practitioners assistance in 1) designing and evaluating the effectiveness of leader and leadership development, and 2) clarifying the limits of generalizability of both conceptualizations and empirical research across learning outcomes.

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Introduction

Effective organizations require effective leaders. While many organizations may recruit such leaders (i.e., "buy talent"), the best organizations understand that remaining competitive requires developing leadership capacity as a core business function. Yet, despite organizations pouring billions of dollars into developing leadership talent (O'Leonard, 2014), the science that supports this practice remains immature (Day & Liu, 2018; DeRue & Myers, 2014; Porr, Axton, Ferro, & Dumani, 2016). Indeed, Day and Dragoni (2015) noted that, in leader and leadership development, "shared understandings are lacking in terms of basic definitions, theoretical orientations, the most relevant indicators of leadership development, and other conceptual and measurement considerations" (p. 134).

This problem of construct imprecision is particularly acute with respect to the learning and development outcomes of leader and leadership development. In their call for a more rigorous science of leader development, Day and Zaccaro (2004) argued: "Better clarity is needed regarding the most appropriate criteria to model in leader development" (p. 385). More recent reviews have reiterated this call, highlighting a lack of "insight into what is actually being developed or causing the observed change in leadership performance" (DeRue & Myers, 2014, p. 840) and calling for "disciplined thinking about what changes and when" (Day & Liu, 2018, p. 238) in leader and leadership development. The lack of rigor in considerations of these outcomes has led to the identification of several areas of imbalance in leader and leadership development theory, research, and practice.

First, the preponderance of past studies of leader and leadership development have tended to examine behaviorally based criteria (e.g., behavioral expressions of skills in training; self-assessments of skill expression; Burnaska, 1976; Leigh, Shapiro, & Penney, 2010; Ostroff, 1991; Tracey, Tannenbaum, & Kavanagh, 1995) to the relative exclusion of cognitive, affective, or motivational criteria such as knowledge acquisition, attitudinal change, greater self-awareness, and motivational shifts (Ford, Kraiger, & Merritt, 2010; Gagne, 1984). Lacerenza, Reyes, Marlow, Joseph, and Salas's (2017) meta-analysis of leadership training illustrates the relative higher focus on behaviorally based outcomes; in their analysis of 335 studies, only about 16% examined cognitive and affective/motivational learning outcomes. This predominant focus on skill expression and behaviorally based outcomes underscores DeRue and Myers' (2014) assertion that "there is a considerable need for research on the development of the affective and motivational attributes that enable individuals to effectively participate in the leadership process" (p. 839).

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Second, individual leader development research and practice focus heavily on changes in knowledge, skills, and abilities instead of the changes in leaders' cognitive frames, identities, values, and epistemologies that denote their progression from leadership novices to leadership experts (Day & Harrison, 2007; Lord & Hall, 2005). These latter changes mark the maturation in leadership mindsets (e.g., Maidique & Hiller, 2018) that result from adult developmental processes. The lack of focus on leaders' maturation processes has been recognized by several scholars, including Hogan and Warrenfeltz (2003) who, in emphasizing a distinction between acquiring leadership skills and leader maturation, noted that the literature regarding such maturation is "undeveloped to the point of nonexistence" (p. 77). Likewise, Day, Harrison, and Halpin (2009) anchored their integrated theory of leader development in adult development processes, noting that "these topics have received little, if any, theoretical or empirical research attention" (p. 262).

Finally, despite longstanding theory that distinguishes between leader development (i.e., individual-level development) and leader*ship* development (i.e., collective-level development; Cullen-Lester, Maupin, & Carter, 2017; Day, 2000; DeRue & Myers, 2014; Hannum, Martineau, & Reinelt, 2007; Van Velsor, McCauley, & Ruderman, 2010), there has been relatively little focus on outcomes of development at the collective level (Day & Liu, 2018; DeRue & Myers, 2014). Day and Liu (2018) noted, "there is still much less known about how to develop more collective organizational forms of leadership" (p. 235), and therefore, how to measure the success of such development.

The focus on behavioral outcomes at the expense of cognitive, affective, and motivational outcomes, the failure to distinguish between skill acquisition and leadership maturation, and the near single-minded attention to individual learning over collective learning give rise to gaps in both the practice and science of leader and leadership development. Moreover, the noted gaps may perpetuate an ongoing chasm between practitioners and the academic communities in which practitioners tend to perceive leader and leadership training as failing to meet its target objectives, while academics maintain that well executed leadership training is successful (Leung & Sy, 2018). These disconnects are consistent with a failure by evaluators (both practitioners and researchers) to take a multidimensional, and multilevel view of leader and leadership development learning outcomes.

It is not our intention to suggest that learning-based criteria have primacy over performance-based criteria for evaluating leader and leadership development; after all, desire for performance improvement is a primary driver of investment in leader development (Avolio, Avey, & Quisenberry, 2010). However, measures of performance alone have the potential to either miss learning and developmental change or to confound such change with other extenuating factors. Performance-based assessments of leadership are not solely influenced by a leader's development. Contextual factors may enable or inhibit how the leader expresses learned behaviors (Ford, Baldwin, & Prasad, 2018) and other variables exogenous to learning and development may influence organizational results (Ely et al., 2010; Wilson, Goodman, & Cronin, 2007). Moreover, the time horizon over which leadership development occurs and then contributes to performance is not well understood (Day & Dragoni, 2015). Evaluators relying solely on performance-based criteria may erroneously conclude a leader development program is ineffective because they have overlooked leaders' learning or have assessed data within too-short of a time frame. Conversely, evaluators may be misled into thinking that a program is working due to some exogenous third variable that is affecting performance, with or without an accompanying effect on learning.

Likewise, we do not advocate for sole reliance on learning outcomes. An examination of the relationships between proximal evaluation criteria (i.e., learning and development) and more distal criteria (i.e., performance) may be indicative of the alignment between leadership development initiatives and an organization's strategic priorities (DeRue & Myers, 2014). Put another way, Drucker (1967) urged leaders to focus on *both* efficiency (e.g., doing things right) *and* effectiveness (e.g., doing the right things). While learning outcomes can inform evaluators that they are doing things right, performance outcomes can inform evaluators that they are doing the right things. We therefore advocate for a suite of measures that includes both performance- and learning/development-based criteria. However, due to the gaps in conceptualization of learning and development outcomes described above, such an approach requires greater clarity and conceptual refinement in leader and leadership development learning criteria.

Integrative model of learning outcomes in leader and leadership development

To respond to this need, we offer a comprehensive, integrated framework of leader and leadership development learning outcomes that reflects multiple dimensions of development criteria that operate at multiple levels of leader and leadership development. This framework is presented in Fig. 1. The foundation of our approach is the principle that learning is a complex, multivariate outcome and the evaluation of learning outcomes during leadership development should consider this complexity. In the following section, we review this framework, incorporating three dimensions of complexity: leadership learning and development (1) occurs at both the individual and collective levels, (2) consists of both skill acquisition and leadership maturation, and (3) includes behavioral, cognitive, and affective/motivational outcomes. We follow this with a discussion of the implications for researchers and practitioners with the hope of improving rigor around the evaluation of learning outcomes of leader and leadership development.

Multilevel nature of learning in leader and leadership development

Fig. 1 includes two levels: the individual and the collective. The individual level pertains to the change in knowledge, skills, abilities, and attitudes that improve an individual's capacity to lead. Although the acquisition and generation of knowledge at the individual level influences (and is influenced by) changes in the collective, collective-level phenomena unfold via *interactions* among members in the collective (Bell & Kozlowski, 2012; Kozlowski & Klein, 2000). Thus, as a collective phenomenon, leader*ship* development refers to the emergence across multiple people of new collective states (e.g., collective knowledge, mutual respect, trust, social bonds) and processes that improve the collective's capacity to lead itself or others (Day, 2000). In this sense, leadership development may refer to collective development at any level, from the dyad, to the team, to the multiteam system, to the organization, or to a profession or society at large. Thus, such development has a shared or externalized focus. On the other hand, individual-level leader development refers to the psychological processes that occur internally to the individual through learning.

The bidirectional arrows between individual and collective activities and learning in Fig. 1 capture the cross-level interactions and interrelationships between leader and leadership development. Leaders influence collective processes and emergent states through activities such as sensemaking and facilitation of motivation (Zaccaro & Klimoski, 2002), and thus changes in leaders' abilities to perform these activities can lead to the development of leadership at the collective level (Cullen-Lester et al., 2017). For example, individual-level training on building relationships and communication in a co-leadership team can be expected to not only change individual understandings of team leadership but also change shared mental models about leadership roles and responsibilities in this collective (Lanzo, 2019).

Likewise, collective learning results in cross-level influences on the development of individual-level leadership capacity in the members of the collective (Van Velsor et al., 2010). Organizational and team-level learning generate learning within the larger systems in which they are nested, and also generate learning down the organizational hierarchy, such that "team learning processes also trigger learning

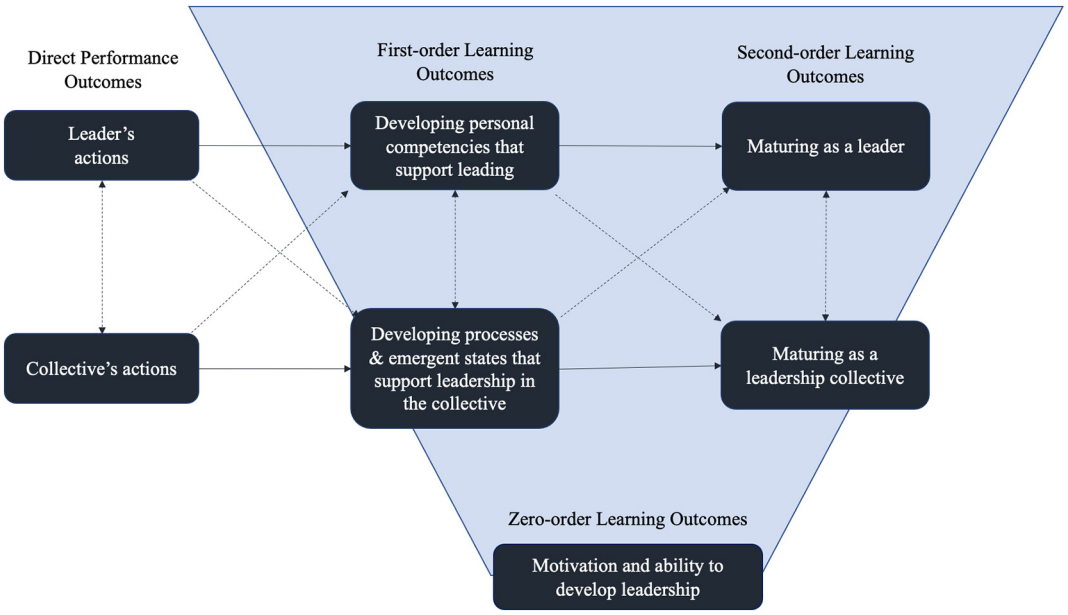

Fig. 1. Classification scheme of leader and leadership development learning outcomes. *Direct performance outcomes* refer to the performance-related outcomes of leadership action (either organizational performance or individual behaviors). Such outcomes do not represent learning per se but are the pre-cursers to learning through lived experiences. *First-order learning outcomes* are the changes in knowledge, skills, and abilities in individuals, or emergent states and processes in collectives, that enable leadership. *Second-order learning outcomes* are the products of maturation processes that result in changing leadership identities and epistemologies. Finally, this maturation strengthens the *zero-order learning outcomes* which serve as the foundation of leader and leadership development that support learning across the model.

processes at the individual level" (Decuyper, Dochy, & Van den Bossche, 2010, p. 120). For example, team-level training that focuses on understanding team and interpersonal needs can be expected to develop leadership capacity in the team (team level) and interpersonal and intrapersonal competencies among team members (individual level; Morgeson, Lindoerfer, and Loring, 2010).

Direct outcomes

Before explicating the learning outcomes of leader and leadership development, we first acknowledge that learning is often not the primary outcome of these programs. Even in on-the-job developmental contexts (e.g., developmental assignments), the focus of assessment tends to be on role performance rather than the development of competencies or maturation of a leader. Such development, in either the individual or the collective, is typically considered to be a desired side- or after-effect, rather than the critical outcome of the experience. This performance focus is illustrated in Fig. 1 by including the performance-related outcomes of leadership action (either organizational performance or individual behaviors). Such outcomes do not represent learning per se but are the pre-cursers to learning through lived experiences. The arrows from these direct outcomes to learning outcomes indicate that these performance-related outcomes drive the learning outcomes.

Because leadership is a social construct, a leader's actions necessarily influence the performance of the collective in which the leader operates. Additionally, since success of the collective is a result of collective action, performance by the collective is often a source of evaluation for the leader's individual performance. The reciprocal relationship between individual and collective-level performance is represented in Fig. 1 by the bi-directional arrows between these two levels. Our model also notes, via arrows from performance to learning outcomes, that the actions and practice of leadership performance can facilitate the emergence of individual and collective mindsets and skillsets that reflect leadership growth outcomes (Kolb & Kolb, 2009).

Skill-acquisition and leadership maturation as distinct outcomes

Distinct from leader skill acquisition, we define leadership maturation as the development of a growing complexity in leadership identities, conceptualizations, and mindsets. Development as a leader reaches beyond the acquisition of a set of knowledge and skills to the incorporation of complex skill sets into one's mindset as a leader, which, through a process of growth and exploration makes leaders "increasingly capable of flexibly drawing on internal resources such as identities, values, and mental representations of subordinates and situations" (Lord & Hall, 2005, p. 592). This distinction is illustrated in Fig. 1 as a separation of the acquisition of particular skills or skill complexes related to leadership (i.e., competencies) (what we refer to as first-order learning outcomes) and leadership maturation (second-order learning outcomes).

The concept of leadership maturation can be informed by theories of adult development (Day et al., 2009; Hogan & Warrenfeltz, 2003). Moshman (2002) describes the maturation that results from adult (i.e., post formative) development processes as qualitative, progressive, and internally directed. Moreover, such maturation is largely dependent on individual differences and specific experiences rather than a progression through universal stages. Qualitative change is marked by changes in identity, cognitive structures, and values that "transform our understanding of the world and our most fundamental reasoning" (Moshman, 2002, p. 46). Such progressive change can be marked by an integration of what previously appeared to be opposing ideas about leadership into new coherent mindsets. An example of this can be observed in the growing understanding by emerging expert leaders that leadership requires both unyielding adherence to a core set of principles and dynamic flexibility in response to the needs of followers and the demands and affordances of situations (George & Sims, 2007; Lord & Hall, 2005). Finally, maturation is the result of internal direction, rather than external imposition (Boyatzis, 2008). This idea is well-recognized in leader development literature, captured by the oft-paraphrased idea: "Leadership cannot really be taught. It can only be learned" (Geneen, 1984, p. 127).

In Fig. 1, the distinction between first- and second-order leadership learning outcomes exists not only at the individual level, but also at the level of the collective. Team training often "targets latent teamwork knowledge, skills, and/or attitudinal competencies (KSAs) as well as manifest team processes and performance for improvement" (Salas et al., 2008, p. 904). The collective-level emergent states and processes that result from team training often enable leadership in the collective (e.g., psychological safety and decision-making processes); however, what distinguishes leadership development from general forms of team or organizational training is the development of the collective into a cohesive unit or system that *leads itself and others*. Thus, such development reaches beyond the acquisition of a collective-level skill set into maturation of the collective toward leadership.

We define leadership maturation in the collective from two perspectives. First, internal to the collective, we conceptualize leadership maturation as the processes through which a team grows from a collective with external leaders (or one with no leaders) to a self-leading entity. To do so, the collective must not only learn the skills and capacities involved in executing team leadership (Day, Gronn, & Salas, 2004; Morgeson, Lindoerfer, and Loring, 2010), but also must develop the appropriate leadership structures (e.g., cognitions of leadership, networks of leadership) that permit leadership in the collective (Cullen-Lester et al., 2017). For example, as "leaderless" teams work over time, they develop not only various processes that enable teamwork, but they also develop leadership network structures within the team that result in varying degrees of effectiveness (DeRue, Nahrgang, & Ashford, 2015; Solansky, 2008).

Second, some collectives lead other collectives. Examples of such collectives include boards of directors, top management teams, and multiteam system leadership teams (Luciano, Nahrgang, & Shropshire, 2020). Thus, externally to the collective, we conceptualize collective leadership maturation as the processes through which a collective grows in its capacity to lead external individuals or other teams. This involves not only the acquisition of collective-level skills to enable external leadership (e.g., external monitoring, boundary spanning), but also collective-level maturation that informs the collective's networked cognitions, behaviors, and attitudes regarding leadership.

Despite the distinction we draw between the two, skill acquisition and leadership maturation are related, as illustrated by the arrows from first- to second-order leadership learning outcomes in Fig. 1. Cognitive skill acquisition theories describe a process through which discreet skills are applied across new situations, resulting in the development of mental frameworks of larger complexes of skills (Anderson, 1982; VanLehn, 1996). Similarly, the application of specific skills across a variety of situations builds general self-efficacy for those skills, which positively influences the application of those skills to new situations (Holladay & Quiñones, 2003). As new competencies for leading are developed and enacted, individuals incorporate these competencies into complex self-views and increased self-efficacy in leadership roles (Hannah, Woolfolk, & Lord, 2009, Hannah et al., 2012). For example, after conducting and seeing the effectiveness of performance feedback with subordinates, we might expect leaders to incorporate the delivery of performance feedback into a personal model of leadership and to be more confident in their view of themselves as a leader who effectively leverages feedback to build relationships and achieve individual performance results. At the level of the collective, this practice may result in the emergence and strengthening of leadership ego networks in which leaders and followers collectively build and reinforce their social identities (DeRue, Ashford, & Meyers, 2012).

Motivation and ability to develop

Fig. 1 also includes outcomes that enable learning about leadership. We refer to these outcomes as "zero-order" because they represent the starting inputs of development. These zero-order foundations of development include, at the individual level, (1) the ability to develop as a leader (e.g., metacognitive ability and self-awareness), and (2) the motivation to develop as a leader (e.g., learning orientation, implicit theories of leader development, and developmental self-efficacy; Avolio & Hannah, 2008; Hoyt, Burnette, & Innella, 2012; Murphy & Johnson, 2016; Wallace, 2017). At the collective level, Decuyper et al. (2010) described such zero-order foundations as catalyst emergent states that enhance team learning (e.g., shared norms for learning, cohesion). Catalyst emergent states for learning do not, in themselves, represent team learning but rather support, propel, and reinforce learning in the collective. Examples of catalyst emergent states and processes for learning about leadership include processes for collective-level reflection on leadership and the collective self-efficacy for team leadership development.

Despite the foundational nature of these zero-order psychological and emergent states, we refer to them as "learning outcomes" to illustrate that they are subsequent to, and influenced by, the learning and development outcomes posited in the rest of the model. The development of leader identity and self-efficacy influences leaders to seek out leadership tasks, behaviors, and activities (including engagement in leader development), which then further reinforces leader self-identity in a positive spiral (Chan & Drasgow, 2001; Day & Sin, 2011; Lord & Hall, 2005). Returning again to our example of a leader learning to give feedback: as that leader practices providing feedback, growing in their own identity as a leader of others, the leader also grows in *developmental* self-efficacy, a result of the lived experience of developing. This growth may subsequently lead to engagement in leadership learning opportunities and a positive spiral of leader (and leadership) development.

Depth of complexity in learning outcomes

Fig. 1 describes the categories of leader and leadership development learning outcomes, including skill-acquisition, leadership maturation, and outcomes that encourage leadership learning. Within each category, there is a complex array of measurable learning outcomes that reflect the multidimensional nature of learning and the multiple content domains of leadership education. In the sections below, we explicate the dimensions of learning at both the individual and collective levels (see Table 1) and then provide examples of outcomes to be assessed across different content domains within each category (see Tables 2 and 3).

Multidimensional learning outcomes

Table 1 describes outcomes that take into account the multidimensional nature of learning. Training scholars (e.g., Kraiger, Kevin, & Salas, 1993; Noe & Colquitt, 2002) have offered a multidimensional framework that includes evaluation of three categories of learning outcomes: cognitive (e.g., declarative knowledge and knowledge structures), behavioral (e.g., skill application and the automaticity of behavioral performance), and affective/motivational (e.g., learner's motivations and attitudes around a learned skill or ability). These three dimensions of learning outcomes represent distinct foci of learning that may be influenced differentially by methodological, experiential, and psychological factors, and yet they are interrelated dimensions of a single learning construct such that changes in one often result in changes in another (Kraiger et al., 1993). This framework, as it applies to the individual level, is reflected in the dimensions listed under leader development in Table 1. We have expanded the framework to include collective-level outcomes.

Cognitive learning outcomes

Cognitive learning outcomes relate to both the knowledge that is acquired through training and the organization of this knowledge into

Table 1
Multidimensional learning outcomes of leader and leadership development.

Learning level	Cognitive learning outcomes	Behavioral learning outcomes	Affective/motivational learning outcomes
Leader development	Declarative Knowledge Knowledge Organization Cognitive Strategies	Compilation Proceduralization Composition Automaticity	Attitudinal Motivational Self-efficacy Goal Setting/Commitment
Leadership development	Aggregated Knowledge Transactional Memory Systems Shared Mental Models	Compilation Proceduralization Process Shared Mental Models Automaticity	Attitudinal Emergent states Motivational Climate/culture Collective Self-efficacy

Table 2
Exemplar First-, second-, and zero-order learning outcomes of leader development.

First-order learning outcome domains and examples	Second-order learning outcome domains and examples	Zero-order learning outcomes examples
Intrapersonal Competencies	**Leader Identity**	Learning agility
Creative thinking	Leader identity strength	Motivation to develop as a leader
Problem-solving	Leader identity centrality	Metacognitive ability
Decision making	Leader identity integration	Self-awareness
Personal courage		Implicit theories of leader development
Resilience		Developmental self-efficacy
Proactivity		
Interpersonal Competencies	**Level of leader self-concept**	
Emotional intelligence	Individual, relational, collective identity	
Social intelligence		
Extraverted behaviors		
Warmth		
Management Competencies	**Abstractions of leadership**	
Planning	Leadership philosophy	
Delegating	Transformational leadership	
Monitoring	Authentic leadership	
Developing others	Servant leadership	
Motivating others		
Empowering others		
Collecting, interpreting, and disseminating information		
Building networks		
Boundary spanning		
Advocating for change		
Technical Competencies		
Budgeting		
Sales skills		
Customer relations management		
HR processes		
Patient care		
Military tactics		

Table 3
Exemplar First-, second-, and zero-order learning outcomes of leadership development.

First-order learning outcome domains and examples	Second-order learning outcome domains and examples	Zero-order learning outcome examples
Catalyst emergent states for leadership	**Common abstractions of leadership**	Collective adaptive reflection
Psychological safety	Common leadership philosophies	Knowledge storage and retrieval systems
Group cohesion	Congruence	
Group trust	Differentiation	
Collaborative problem-solving	Collective leadership identities	
Collective identity		
Motivation to work on behalf of the collective		
Voice		
Social support		
Shared purpose		
Collective Leadership Competencies	**Social networks of leadership**	
Supporting team self-leadership	Structure of leadership networks	
Team staffing	Peer leadership networks	
Defining mission	Organizational leadership networks	
Establishing expectations and goals	Cognition of and efficacy for engaging leadership networks	
Structure and planning		
Training and development	Dynamic nature	
Sensemaking		
Providing feedback		
Monitoring the team		
Managing team boundaries		
Challenging the team		
Supporting team leadership of other teams		
Monitoring other teams		
Setting overarching objectives		
Monitoring between team/cross organizational interactions		
Coordinating between team actions		
Prompting other teams		
Collective Technical Competencies		
Financial planning		
Strategy		
Forecasting		
Operational planning		

increasingly complex cognitive structures or schemas. Knowledge tests are a typical way to assess cognitive learning outcomes of training, measuring the attainment of declarative, procedural, and tacit knowledge (Kraiger et al., 1993; Kraiger, Salas, & Cannon-Bowers, 1995). For example, leaders who have completed a performance management training may complete a declarative knowledge test in which they verbalize the elements and procedure of providing good performance feedback. To measure collective-level knowledge, it is common to aggregate (e.g., sum or average) individual knowledge levels (Kozlowski & Bell, 2008).

However, declarative knowledge assessed by knowledge tests may be confounded with general intelligence; thus, assessment of knowledge structures and cognitive strategies that reflect the acquisition, organization, and application of knowledge are equally important cognitive outcomes. Indeed, such cognitive outcomes have been found to have even stronger correlations to completion of knowledge-intensive tasks than do declarative knowledge tests (Kraiger et al., 1995). Individuals' knowledge structures support analogical reasoning, enabling the application of knowledge to unique situations while also supporting the acquisition of related knowledge (Gentner & Gentner, 1982). Examples of measures of knowledge structures include relatedness ratings (ranking how similar concepts are to one another) and concept mapping (specifying links among concepts).

Typically, learners' structural representations are compared to structures developed *a* prior by experts (Dorsey, Campbell, Foster, & Miles, 1999; Kraiger et al., 1995). Collective-level knowledge structures can be represented by the congruence of individual mental models among members of the collective (i.e., shared mental models; Cannon-Bowers, Salas, & Converse, 1993) and the distribution of compatible knowledge across the collective.

Cognitive strategies, distinct from cognitive structures, center on individuals' metacognitive abilities and enable the development of problem-solving strategies and accurate self-assessment of the likelihood of success prior to applying learning and error detection subsequent to the application of learning (Kraiger et al., 1993). In the collective, such strategies rely on metaknowledge of how expertise is distributed across the collective (i.e., transactive memory systems; Wegner, 1987) and shared metacognition regarding the interpretation of environmental cues and incorporation of such cues to adapted cognitions and behaviors (Burke, Fiore, & Salas, 2003). Longitudinal assessments of learning consider how cognitive structures and strategies develop over time (Brandon & Hollingshead, 2004).

Returning to our performance feedback example, an assessment of cognitive learning outcomes might include an individual's ability to explain the role of feedback in performance management, perhaps with examples, across different situations and what elements of the leader's own personality make providing feedback more or less difficult. For the collective, an assessment might include the degree to which managers understand how and why to give performance feedback and subordinates understand how and why to receive and act on performance feedback.

Behavioral learning outcomes

Individuals compose general mental models that connect knowledge with behaviors and then compile these models into situationally-specific behavioral procedures (Anderson, 1982). Similarly, collectives compose shared mental models connecting individual-level knowledge with interactional behaviors and compile individual behavioral models into collective-level behavioral processes (Kozlowski & Bell, 2008). The comparison of observed behaviors to "correct" behaviors is generally taken as an indication of the success of these compositional and compilation developments.

Beyond mere composition and compilation of behavioral procedures, automaticity refers to the progressions by which these procedures become rote (i.e., transferring from controlled to automatic processing), accompanied by additional tuning toward a perfection of individualized application across situations (Anderson, 1982). Therefore, assessments of behavioral outcomes may also involve observation of the quality and speed of behaviors, as well as the cognitive resources expended to repeat the skills over time and across applications (Kraiger et al., 1993). An individual-level assessment here might include observing a leader giving performance feedback, demonstrating appropriate technique, and, over time, finding the feedback process less cognitively demanding. A collective-level assessment might include observing the interactions of a team, noting the quality, quantity, and speed of monitoring and feedback behaviors among team members.

Affective/motivational learning outcomes

Affective/motivational learning outcomes refer to changes in the internal states that drive behaviors, which include both changes in affective attitudes (e.g., diversity training leading to more tolerance for diversity) and motivations, goals, and intentions around a learned behavior. Assessments of affective/motivational learning outcomes may measure changes in self-efficacy, performance- and learning- goals, or even self-assessments of knowledge as a result of training (Kraiger et al., 1993; Kraiger, 2002; Sitzman, Ely, Brown, & Bauer, 2010), with similar outcomes at the collective level (e.g., collective efficacy, group potency; Salas et al., 2008). An individual-level assessment of affective leader development learning outcomes might include the leader's assessment of their own self-efficacy for providing effective performance feedback. In the collective, the assessment might include group members' confidence that members can give each other honest and constructive feedback.

Skill-acquisition outcomes (first-order learning outcomes)

Tables 2 and 3 provide examples of the skills and competencies acquired during development, organized into content domains. It is likely that different methods of training and developmental experiences vary in effectiveness across different content domains. This assertion is supported by Lacerenza et al.'s (2017) findings that effectiveness of leadership training varied across different training content. This section, then, focuses on describing the content domains of leadership skills and competencies, first at the individual level and then at the level of the collective. Individual and collective improvement in these skills and competencies represent the first-order (i.e., skill acquisition) outcomes of leader and leadership development.

Individual-level first-order outcomes

First-order learning outcomes of leader development represent the acquisition of knowledge or skills around particular competencies that support leading (e.g., developing a competency for giving performance feedback). There have been many attempts to create taxonomies of individual-level leader competencies, ranging from lists of specific competencies (e.g., Tett, Guterman, Bleier, & Murphy, 2000) to broad categories (e.g., Spreitzer, McCall, & Mahoney, 1997). We relied largely on Hogan and Warrenfeltz's (2003) four-domain description of managerial training content to identify four areas of first-order learning outcomes of leader development: *intrapersonal competencies*, *interpersonal competencies*, *management competencies*, and *technical competencies*.

Intrapersonal competencies

Intrapersonal competencies are combinations of knowledge, skills, abilities, and attitudes, that enable leaders to recognize and engage in behaviors demanded or afforded by the leadership context. Examples of such competencies are abundant in the literature. Zaccaro, Green, Dubrow, and Kolze (2018) identified cognitive capacities that can emerge through leader development such as problem-solving skills, creative thinking, strategic thinking, wisdom, cognitive flexibility, and judgment and decision-making skills. In their study of international executives, Spreitzer et al. (1997) identified other intrapersonal competencies such as commitment ("a strong passion for one's work," p. 8), courage and self-confidence, cross-cultural sensitivity, openness, and adaptability. Additionally, Boyatzis (1982) incorporated the following intrapersonal competencies: critical thinking, proactivity, self-confidence, self-control, and speaking-ability.

In an example of assessment of intrapersonal competency development, Zapalska, McCarty, Young-McLear, and Kelley (2017) examined US Coast Guard Academy students' critical thinking skills using the Watson-Glaser Critical Thinking Appraisal at the beginning and end of the four-year program. The Watson-Glaser instrument is a skill-based assessment of the critical thinking competency. To capture the multidimensional nature of learning in this context, students could have been assessed on their ability to verbalize the elements of critical thinking and procedures for applying critical thinking skills to a unique problem (i.e., cognitive learning). To assess affective/motivational outcomes, students could have been assessed on their self-efficacy for thinking critically or their self-identification as "critical thinkers."

Interpersonal competencies

Interpersonal competencies are social competencies that promote effective interactions with others. Such competencies include a

constellation of knowledge, skills, and abilities around receiving, processing, and sending verbal (social) and non-verbal (emotional) expressions (Riggio, 1986), and extraverted behaviors such as being open and warm with others, and understanding and influencing others (Schneider, Ackerman, & Kanfer, 1996). Additional interpersonal competencies include knowledge, skills, abilities and attitudes about managing group processes, collaborative problem-solving, and working in a team setting (Boyatzis, 1982; Morgeson, Reider, & Campion, 2005; Stevens & Campion, 1994).

An example of assessment of interpersonal competency development can be found in Ellis, Bell, Ployhart, Hollenbeck, and Ilgen's (2005) study of a teamwork training intervention. The authors assessed cognitive outcomes by measuring declarative knowledge of teamwork competencies, and they assessed behavioral outcomes by measuring the communication and collaborative problem-solving skills of the students. In this context, affective/motivational outcomes could have been assessed by evaluating self-efficacy for teamwork. Note that these are measures of individual-level interpersonal skills rather than collective-level teamwork. It would also have been appropriate to measure collective-level outcomes such as a growth in team cohesion or changes in collective cognitions of leadership structures as leaders enact their newly learned communication and problem-solving skills.

Management competencies

Management competencies are those sets of knowledge, skills, and abilities required to enact effective management behaviors across a wide range of leadership situations. These functional behaviors include such activities as: planning, assigning, and monitoring tasks; developing, motivating, and empowering individuals; collecting, disseminating, and leveraging information; envisioning, advocating for and implementing change efforts; and boundary spanning (Fleishman et al., 1991; Yukl, 2012).

DeRue, Nahrgang, Hollenbeck, and Workman (2012) provide an example of assessment of management competency development through structured reflection during after action reviews. Their study measured skill-based learning outcomes with facilitator ratings using a modified version of the Leader Behavior Description Questionnaire at two time points. Specifically, the measure focused on three items assessing task-related leadership behaviors (e.g., initiating structure), and three items assessing relational leadership behaviors (e.g., consideration). Assessments of cognitive outcomes in this context could include evaluations of the leaders' ability to describe initiating structure and consideration behaviors they had learned. Assessments of affective/motivational outcomes would entail measuring the self-efficacy of the students for those behaviors.

Technical competencies

Finally, technical competencies involve the knowledge, skills, and abilities that are particular to a technical field and expected of senior leaders. Examples of technical competencies include financial management (business), tactical planning (military), and patient care (medical). While these competencies may not reflect leadership per se, they are often required for assuming senior roles. Senior leaders are expected to have technical expertise, which should enable effective leadership and management of technical tasks. In addition, technical expertise permits leaders to leverage more than only formal role power in relating to others (Katz & Kahn, 1978). Finally, the shared language and basic assumptions that mark the culture of an organization (Schein, 1984) may be imparted through the training and development of leaders in technical competencies.

An example of assessment of technical competency development can be found in Uhles, Weimer-Elder, and Lee's (2008) study with healthcare leaders. The study evaluated the use of a simulated game that sought to teach the essentials of financial management, a critical but less emphasized technical competency for healthcare leadership. Learning outcomes of the financial management training were evaluated using cognitive and affective/motivational learning outcomes. Specifically, the study administered a recognition and recall test which consisted of 25-item questionnaire assessing knowledge of healthcare financial terminology and concepts pre- and post-training. Additionally, assessors collected qualitative responses to questions regarding trainees' goals for utilizing the information learned.

Collective-level first-order outcomes

First-order learning outcomes of leadership (collective) development represent the emergence of collective states and processes that enable leadership. We organize these into (1) catalyst emergent states that enable leadership, (2) collective leadership competencies, and (3) collective technical competencies.

Catalyst emergent states for leadership

Emergent states are collective-level psychological states that, along with interpersonal processes, mediate the relationship between team inputs and team outputs (e.g., Ilgen, Hollenbeck, Johnson, & Jundt, 2005). Borrowing the concept of catalyst emergent states for learning (Decuyper et al., 2010), we define catalyst emergent states *for leadership* as collective-level psychological states that support, propel, and reinforce leadership in the collective. These include emergent states that enhance the effectiveness of individual leader behaviors (Howell, Dorfman, & Kerr, 1986), as well as emergent states that enhance shared leadership (Cullen-Lester et al., 2017). Examples of catalyst emergent states for leadership include psychological safety to promote voice and diversity of ideas (Edmondson & Lei, 2014) and trust to promote interpersonal interdependence and coordination (Avolio, Jung, Murry, & Sivasbramaniam, 1996).

Catalyst emergent states for leadership do not betoken leadership, per se; indeed, they often support team performance in general. However, their development, which can result from either direct interventions or as a natural result of teamwork, is essential in developing effective leadership capacity in the collective (Day et al., 2004). Thus, although in typical leadership research these states might be considered as moderators or mediators of leadership effectiveness (Howell et al., 1986), for leadership development, catalyst emergent states for leadership should be an explicit learning outcome.

In an example of assessing such emergent states, Serban and Roberts (2016) measured the internal team environment that would enable shared leadership, composed of shared purpose, social support, and voice. They used a self-report measure of team behaviors to assess this emergent state. In this context, cognitive learning outcomes at the individual (e.g., to what extent can members describe how to promote voice and why it is important) or collective (e.g., to whom do team members look for social support) level can also be assessed as leader and leadership development criteria. Likewise, measuring outcomes such as the extent to which the team believes in its ability to promote voice or set goals for social support serve as assessments of affective/motivational leadership learning criteria.

Collective leadership competencies

Collective leadership competencies refer to the collective-level processes required to enact effective leadership functions across a wide range of leadership situations. Morgeson, DeRue, and Karam (2010) identified a variety of leadership functions that are enacted at the collective level including: composing the team, establishing expectations and goals, developing & challenging the team, sensemaking, monitoring, managing team resources and boundaries, solving problems, and creating a positive climate. The development of such processes results in collective leadership competencies that support the collective's capacity to self-lead. DeChurch and her colleagues (DeChurch et al., 2011; DeChurch & Marks, 2006; Zaccaro, Marks, & DeChurch, 2012) identified functions of leaders in multiteam systems around strategizing and coordinating through which teams lead other teams. To these, Wallace,

Torres, and Zaccaro (2019) added a number of between team and within-team alignment behaviors through which teams in a multiteam system contribute to the overall MTS leadership. The development of these collective leadership competencies supports the collective's capacity to lead itself and other collectives. Evaluation of leadership development outcomes for these competencies should rely on assessment of task and process learning outcomes around the functions.

Collective technical competencies

Finally, technical competencies involve task and process learning outcomes around technical collective task performance. Again, while development of these technical tasks may not be development of leadership capacity per se, the learning outcomes from these tasks may serve as catalysts for abstractions of collective leadership in the team. Examples of the development of collective technical competencies include governance training for boards of directors (Coulson-Thomas, 2007).

Leadership maturation outcomes (second-order learning outcomes)

Second-order learning outcomes represent the leadership maturation that results from the integration of first-order learning outcomes (i.e., competencies for leadership) into the leadership-related identities, values, and holistic frameworks through which individuals and collectives perceive and make meaning of themselves and their environment.

Individual-level second-order outcomes

In describing these second-order outcomes of leader development at the individual level, we consider (1) the growth or maturation of an individual's identity as a leader – both the strength and structure of that identity –, and (2) the leader's epistemic cognitions about leadership.

Identity development

Leader identity refers to the self-conceptualization of oneself as a leader (Hiller, 2005). It reflects a complex amalgam of experiences, leader conceptions, and self-conceptions that drive leader cognitions, affective reactions, and behavioral choices across a variety of situations (Day & Harrison, 2007; Epitropaki, Kark, Mainemelis, & Lord, 2017; Hannah, Balthazard, Waldman, Jennings, & Thatcher, 2013). Those who self-identify as leaders are likely to take on leadership roles, perceive the leadership demands and affordances of situations, and develop appropriate mental models of the leadership networks around them (Epitropaki et al., 2017; Lord, Gatti, & Chui, 2016).

Leader identity strength and integration. The development of one's identity as a leader involves an often-intensive process of crafting, experimenting with, negotiating, and revising stories of the self that provide interpretive meaning to observed events (Ibarra & Barbulescu, 2010). Individuals must first recognize an experienced leadership-laden event and then make a connection to other, similar (or dissimilar) events from previous experiences. They then engage in a cognitive process of making connections (or disconnections) across events and assigning interpretive meaning to those associations. Of note, these cognitive processes may include both subconscious and conscious processes, and growing leaders may need the assistance of others (such as coaches and/or mentors) to appropriately process and interpret leadership events (Hammond, Clapp-Smith, & Palanski, 2017).

The evolution of leader identity should be assessed as an important leader development outcome. Through such maturation, we would expect developing leaders to be able to articulate what it means to be a leader or to describe leadership principles (verbal knowledge), to hold increasingly complex understandings of what a leader is across situations (knowledge structure), and to grow in their self-awareness of their own identity (cognitive strategies). Affectively and motivationally, we would expect the endorsement of leader identity in terms of both strength (the intensity with one identifies as a leader) and integration (the level of incorporation of identity as a leader into one's general self-concept; Hammond et al., 2017). Moreover, we would expect an increase in their leader self-efficacy, first in specific situations and then across various situations (a sign of self-concept complexity; Hannah et al., 2009). Behaviorally, we would expect to see the manifestations of leader identity in terms of taking on formal leadership roles or participating in informal leadership or leadership moments in groups and teams, all with decreasing attentional effort.

Leader identity level. Beyond strength and integration of self-conceptualizations as leaders, those who develop leaders should also consider the *level* of leader self-concept as an outcome of leader development. Lord and Hall (2005) identified three levels of leader self-conceptualizations that emerge with increasing leadership expertise. Novice leaders tend to adopt an individual leader self-concept, viewing themselves as occupying a special role, distinct from followers and other leaders. Intermediate leaders come to endorse a relational leader self-concept – they are leaders of others and understand their identity through the framework of their relationships with followers. With further maturation, expert leaders come to see themselves as cogs in the wheel of the team – a person with certain roles that we call "leadership" – with or without formal distinctions – and their leader identity is as part of the collective (Day & Harrison, 2007; Lord & Hall, 2005).

As leaders grow from individual to relational to collective leader identities, we can assess which of these levels is evident in their leader self-conceptualizations as an important leader development outcome. Cognitively, we would expect maturing leaders to be able to articulate definitions of leadership and illustrative leadership theories congruent with the different levels (see Table 1 of Day & Harrison, 2007). We might also expect them to adopt knowledge structures consistent with these different levels. For example, leaders with individual-level identities are likely to rely on implicit leadership theories and generic problem-solving heuristics, whereas relational-level leaders might be expected to rely on domain-specific problem-solving and more reliance on knowledge of others around them (see Table 1 of Lord & Hall, 2005). Affectively and motivationally, we would expect the endorsement of changing levels of leader identity, measured through self-report scales of leader self-concept (e.g., Johnson, Venus, Lanaj, Mao, & Chang, 2012; Selenta & Lord, 2005) or through coding of leadership philosophies or narratives. Behaviorally, we would expect growing leaders to transition from behaviors that emphasize the distinction of the leader to those that emphasize building relationships with followers to those that craft a meaningful sense of group identity among leaders and followers (Epitropaki et al., 2017; Johnson et al., 2012).

Epistemic cognition of leadership

Beyond identifying as a leader, having a coherent idea of what it means to be a leader and how one approaches leadership is another important outcome of leader development. For the individual leader, this involves the creation of a leadership philosophy - a personal framework of how leadership "works" that guides an individual in how they perceive situational leadership demands and affordance and how those perceptions guide their actions toward achieving leadership outcomes (U.S. Department of the Army, 2012).

Some formal leader development programs might use well-known models such as authentic leadership, servant leadership, or transformational leadership as a guide toward providing their students with a holistic understanding or overall approach to leadership. The extent to which a student's abstraction of leadership conforms to and endorses a specifically adopted approach of the leader development program offers an evaluation of cognitive and affective/motivational leader development learning outcomes, respectively. When a program does not endorse a specific overarching model of leadership, assessments might simply measure leaders' ability to verbalize and adhere to a coherent,

personally developed leadership philosophy. As an example of a program focusing on a particular model, Arthur and Hardy (2014) describe a case study of officers who completed a transformational leadership training program at an infantry recruit training command for the British Army. To assess the officers' developmental outcomes, the authors assessed subordinate observations of transformational leadership behaviors (a second-order individual leader development behavioral learning outcome) and recruit performance (a collective results outcome). In this context, it would also have been appropriate to measure the extent to which leaders understood and personally endorsed and/or felt confident in adopting transformational leadership (cognitive and affective/motivational learning outcomes, respectively).

Temporal considerations in individual maturation as a leader. The maturation of a leader varies in speed and intensity as one takes on new roles and practices new skills for leadership (Maurer & London, 2018). These shifts are accompanied by deeper awareness of the complex self, development of values, and increased confidence and efficacy in various areas (Komives, Owen, Longerbeam, Mainella, & Osteen, 2005). As a result, the evolution in leader self-conceptualizations and the complex associated psychological constructs takes time and is often marked by a turbulent cycle of growth and setbacks (Day et al., 2009; Ibarra & Barbulescu, 2010; Komives, Longerbeam, Owen, Mainella, & Osteen, 2006). Nonetheless, as developing leaders recover from initial challenges and doubts, their identity narration evolves such that these developmental experiences (and perhaps having "survived them") are incorporated into a stronger sense of self as leader. Thus, the assessment of the leadership learning outcomes that result from developmental attempts need to be sensitive to time. Leadership maturation may not be captured in a single leader development episode or program. In the short term, assessment of skill acquisition may be the only available way to measure the success of developmental attempts.

Collective-level second-order outcomes

As previously discussed, second-order outcomes in leadership development represent collective maturation. Internally, this refers to the collective's development from an entity that is led by others (external to the group) into an entity that is increasingly able and willing to lead itself (i.e., a self-leading entity). Externally, this refers to the collective's development into an entity that is willing and able to lead other individuals and collectives. In describing these second-order outcomes, we consider (1) the common abstractions of leadership in the collective, and (2) the development of social networks of leadership and followership.

Common abstractions of leadership

Common abstractions of leadership refer to the congruence across team members – an emergent phenomenon – of the individual holistic cognitive frameworks which describe what it means to be a leader and how an individual or a collective approaches leadership. This is distinct from the shared mental models of how leadership occurs in the collective, which we discuss in the next section. Increasingly congruent common abstraction of leadership will emerge through an isomorphic composition process in which members of the collective share a common leadership developmental episode. For instance, activities such as members completing a leadership training class together, a group discussion about what leadership means, or a performance episode in which a certain philosophy of leadership is confirmed as effective may produce common abstractions of leadership.

For example, in the case of the Arthur and Hardy's (2014) transformational leadership intervention described above, a second-order leadership development assessment would be to evaluate the accuracy and congruence of the leaders' understanding of transformational leadership (i.e., the extent to which they agreed on the definitions of transformational leadership). An exemplar of behavioral second-order outcomes would be the level of transformational behaviors among group leaders (both mean and differentiation).

While the congruence of abstractions of leadership within the collective may be an explicit learning objective of leadership development, it remains an empirical question whether such congruence is to be desired. On the one hand, ideas about appropriate ways to lead, about the construct and appropriateness of philosophical approaches to leadership and collective leadership styles should be held in common among members for effective self-leadership to emerge in the collective. For instance, a team in which the appointed leader expects proactive followers who participate in leadership functions, and yet the followers are dedicated to vertically hierarchical structures in which followers are better seen than heard will have difficulty leading itself or others (see Holm & Fairhurst, 2018 for an example of this). On the other hand, enforced conformance of thought can be a barrier to collective learning (Decuyper et al., 2010). Thus, highly congruent common abstractions of leadership might result in a rigidity that prevents growth in leadership. This suggests that disparate yet compatible abstractions of leadership that result from discontinuous compilation may be more valuable for leadership development.

Social networks of leadership

As the leadership networks of collectives grow, we can assess this growth as an indicator of leadership development. From such experiences, we would expect members to be able to describe and understand the social networks of leadership under different times and circumstances – in addition to the triggers that might bring about changes (Cullen-Lester et al., 2017). The ability to adapt these social networks of leadership quickly and accurately in response to change cues, and the collective endorsement of these structures and collective efficacy around the ability of these structures to lead represent behavioral and affective/motivational learning outcomes of leadership development, respectively. Changes in individuals' understanding of the network may be construed as a leadership learning outcome (Cullen-Lester et al., 2017) or development in the structure itself may be reflected in such assessments (Hoppe & Reinelt, 2010).

Discussion

Leader and leadership development theory and practice have been stymied partly due to the absence of a comprehensive conceptual model that delineates and provides insights into leader and leadership development and the types of learning outcomes that should be evaluated. Researchers and practitioners alike have focused on behavioral outcomes over cognitive and affective/motivational outcomes, skill acquisition over leadership maturation, and individual over collective outcomes. As a result, leadership education is often treated as a one-dimensional activity in which time plays a minor, if inconvenient, role. For the science and practice of developing leaders and leadership to advance, appropriate attention needs to be paid to the multidimensional, temporal, and complex nature of 21st century leader and leadership development.

Recognizing this need, we have integrated perspectives from within the leadership and learning domain to present a conceptual model that accounts for the multidimensional development of the capacity to lead in both the individual and the collective, and that makes a distinction between this growth in capacity and leadership maturation. We have offered examples of leader and leadership learning outcomes that represent the core stages of our multilevel model. While other researchers have provided extensive reviews of the leader and leadership development literature (e.g., Day & Dragoni, 2015; DeRue and Myers, 2014; Day, Fleenor, Atwater, Sturm, & McKee, 2014), our proposed classification system builds on these reviews by offering evaluators an explicit framework with which to create evaluation plans that appropriately assesses both learning and performance outcomes of leader and leadership development.

The classification system articulates both proximal and distal outcomes of leader and leadership development. Our distinction among outcomes (learning vs. performance, individual vs. collective, behavioral vs. cognitive vs. affective/motivational, etc.) is not intended to make the case for one type of outcome over others, but rather to provide clarity to the assessor about the distinct aspects of leader and leadership development that should be considered during the early evaluation planning stages.

By parsing out aspects of leader development criteria, we are better able to understand the complexities involved in the developmental process. Specifically, using the proposed classification system as a framework should shed insights into any unexpected findings regarding the effectiveness of leader and leadership development activities and interventions. In the following sections we provide suggestions regarding possible research designs which can be employed to assess the proposed outcomes.

Implications for assessment

In this section we offer overarching recommendations for evaluators assessing leader and leadership developmental programs. First, we recommend that evaluators become more explicit about the intended learning outcomes of their leader and leadership development initiatives. This can be accomplished by incorporating a suite of learning-oriented measures into the evaluation plan that assess change after developmental interventions. We encourage the use of both quantitative and qualitative assessments to track developmental changes in leader and leadership, as use of both forms of assessments may glean additional insights into the nature of development (Day & Dragoni, 2015). Moreover, in addition to behavior-based measures of learning, practitioners should also collect cognitive and affective/motivational learning measures. Inclusion of these additional measures should help to inform training design and elucidate failures in transfer and performance. Taking a more comprehensive approach to program assessment permits the disentanglement of cognitive, affective/motivational, and behavioral change from one-another, as well as from changes in organizational performance. Additionally, insight into both learning and performance outcomes can inform evaluators about the appropriateness of their interventions; when learning outcomes have improved but performance outcomes have not, one likely culprit is a misalignment in the training strategy.

Second, evaluators should be cognizant of the importance of time in assessing leader and leadership development learning outcomes. As highlighted in our model, learning is a process. As such, evaluators should consider temporally assessing skill acquisition and leadership maturation when developing their evaluation plan. Recent work on the development of leader identity trajectories offers guidance on how this can be accomplished (see, for example, Miscenko, Guenter, & Day, 2017 and Middleton et al., 2019). Even relatively minor leadership maturation may require several episodes of skill development, practice, and application before changes in leaders' frameworks and self-views of leadership change in a substantive and permanent way. We therefore encourage evaluators interested in assessing leadership maturation to include multiple measurements across a longer time span to accurately capture the nature of these developmental trajectories.

We do acknowledge the cumbersome nature of integrating multiple timepoint measurements into an evaluation plan. We point readers to recent recommendations that have been offered on how to plan and conduct multilevel data collection efforts which utilizes repeated measure techniques (Zhou, Song, Alterman, Liu, & Wang, 2019). Relatedly, we note that when assessing whether leader and leadership maturation occurred, data collection methods need to be aligned with appropriate analyses. Examples of multilevel analytic techniques that can be employed include hierarchical linear modeling (e.g., Gentry & Martineau, 2010) and growth curve modeling (e.g., Day & Sin, 2011; Middleton et al., 2019; Miscenko et al., 2017).

Finally, evaluators would do well to consider and appropriately measure collective-level learning outcomes. As our model indicates, development at the individual level may have important influence on collective-level leadership learning outcomes. Thus, in addition to serving as indicators of leadership development program efficacy, collective-level outcomes may also serve as indicators of efficacy in individual leader development interventions. For example, social network analysis may capture changes in the structure of leadership ego networks in a team or organization following individual training, which may be considered an important indicator of the organizational benefit of such training (Cullen-Lester et al., 2017). A note of caution: assessors using such measures need to attend to issues and methods of aggregation from the individual to the collective (Castro, 2002; Chen, Bliese, & Mathieu, 2005).

Implications for research

As all conceptual models aspire to do, ours raises additional questions for further exploration. The addition of construct depth in terms of different types of learning outcomes at the individual and collective level raises questions about how leader and leadership development operate differentially across outcomes. For example, does the 70–20-10 "rule of thumb" for leader development (commonly recognized, but not empirically validated; Clardy, 2018) which suggests that leaders obtain the 70% of their knowledge from experiences, 20% from interactions with others, and 10% from formal instruction apply equally across outcomes, or is formal instruction more effective in producing cognitive outcomes whereas challenging experiences are more important for developing affective/motivational outcomes? Or are challenging experiences more important in the development of second-order outcomes as leaders come to apply their learning across unique leadership performance situations than they are in the development of first-order outcomes where "safe spaces" for practice might be better suited for error-driven competency development?

We also echo others calls for greater consideration of time in leader and leadership development as a ripe area for research exploration (e.g., Cullen-Lester et al., 2017; Day & Dragoni, 2015). Little is understood about the amount of time needed for individual or collective development – either in terms of the minutes, days, and years of development or in terms of training periods or experiential episodes. For example, at the leader development level, what are the individual differences that influence the time required for leaders to build self-efficacy and identity around a new role? At the collective level, how long does it take for leadership social networks to develop around a newly hired or promoted manager and what are the individual and collective level factors that influence that time? Successful research efforts which will advance scientific progress of leadership development process, and address these questions are likely to utilize various forms of quantitative and qualitative measurements over time (Day, 2011). Social network analysis is increasingly recognized as an important tool in evaluating leadership development (Cullen-Lester et al., 2017). To this we would add experience sampling methods (see Gabriel et al., 2019 for a review) as a fruitful avenue to answer questions regarding the intraindividual dynamic nature of leader development. Another avenue might be machine learning/big data techniques (D'Mello, 2020) such as analyzing discourse among leadership students or among members of a collective or using natural language processing to evaluate development at the individual or collective levels (or both) over time.

Conclusion

In this article, we have integrated multiple perspectives to provide a classification system for leader and leadership development learning criteria. In providing additional construct depth and clarity, we are optimistic that this model can support practitioners who design and evaluate the effectiveness of leader education and developmental programs

to cultivate measures of learning and development outcomes in conjunction with performance-based outcomes. Additionally, our hope is that the proposed typology will spark future leader and leadership development research that will advance our understanding of how it is that individuals and collectives develop the capacities and mindsets needed to lead and function effectively in the dynamic 21st century workplace.

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