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CONSIDERING THE EXCEPTIONS: HOW SHOULD LEADERS THINK ABOUT EXPERIENCE?

A THESIS APPROVED FOR THE

DEPARTMENT OF PSYCHOLOGY

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Abstract

Prior research suggests that leaders produce their best and most impactful solutions to organizational problems when they use relatively simple mental models. A critical question which remains, however, is how do leaders work with experience and mental models vis-à-vis elaboration when solving problems? To address this question, 361 undergraduates were asked to work on an educational leadership task where they viewed simple or complex mental models, prototypic or non-prototypic experiential cases, and were asked to elaborate on either the cases, mental model, or both in conjunction. It was found that viewing non-prototypic cases resulted in visionary speeches of the greatest affective impact and that original plans were most likely to emerge when leaders viewed simple mental models, non-prototypic cases, and were asked to elaborate on the cases via the mental model framework. The implications of these observations for understanding leader problem-solving are discussed.

Keywords: leadership, cognition, problem-solving, affective impact

Considering the exceptions: How should leaders think about experience?

Those who occupy leadership roles in firms are asked to do many things. They must establish trusting relationships with followers (Dirks & Ferrin, 2002) and establish a work environment where followers feel safe (Bienefeld & Grote, 2011). They must structure follower work activities (Fleishman, 1953) and establish positive relationships with individual followers (Graen & Uhl-Bien, 2002). They must articulate a compelling vision for their followers (Bass & Bass, 2008) – a vision in which followers can find a sense of personal identity (Shamir, House, & Arthur, 1993). Leaders also must help followers make sense of, or understand, the nature and significance of the problems that emerge in the course of their work (Weick, 1993).

All of these actions and behaviors are components of leader performance that are widely acknowledged to be of some importance. However, Zaccaro, Green, Dubrow, and Kolze (2018) remind us that all these behaviors depend on how leaders go about solving the problems confronting the firm, the team, or individual followers. This functional view of the basis for leader behavior (Mumford, Zaccaro, Harding, Jacobs, & Fleishman, 2000) has a noteworthy implication. Leadership is at least, in part, a distinctively cognitive activity – albeit a social-cognitive activity (Lord & Maher, 2002).

In fact, the evidence accrued in a number of studies points to the importance of understanding cognition in incidents of leader performance. For example, Zaccaro et al. (2015) have shown one cognitive ability (i.e., divergent thinking) will predict performance among one group of leaders, Army officers, over a twenty-year career. Vincent, Decker, and Mumford (2002) have shown intelligence is positively related to leader performance – although the relationship may be curvilinear. Not only are basic cognitive abilities positively related to leadership, leadership performance also appears to depend on complex cognitive skills that grow

out of these basic abilities as a function of experience. For example, Marcy and Mumford (2007, 2010) have shown that performance in leadership positions depends on people's skills in analyzing and manipulating critical causes. Byrne, Shipman, and Mumford (2010) and Shipman, Byrne, and Mumford (2010) have shown that performance in leadership roles also depends on leader's skill in forecasting, or predicting, the downstream implications of actions. Still other work by Sternberg (1990) indicates that wisdom, or social judgment skills, also contributes to leader performance.

Of course, application of complex cognitive skills such as those required by leaders also depends on the type of knowledges available to leaders (Hedlund et al., 2003). In fact, one type of knowledge, case-based, or experiential, knowledge, appears particularly critical for people working in leadership roles (Berger & Jordan, 1992; Nutt, 1984). Accordingly, our goal in the present investigation was to examine how case-based knowledge is employed in incidents of leader performance. Moreover, we hoped to show how leaders' understanding of performance demands influenced how available case-based knowledge is used by leaders.

Knowledge

Any complex performance, including incidents of problem-solving in leadership roles, is held to require the application of knowledge to perform effectively. Thus, knowledge acquired as a function of experience, expertise, has been found to contribute to performance in a number of different domains (Ericsson, 2007; Ericsson & Charness, 1994) including performance on problems classically viewed as leadership problems (Mumford, Friedrich, Caughron, & Byrne, 2007). Knowledge, however, is a complex phenomenon. Typically, it is held that knowledge involves information bearing on events arising in a specific domain (Baer, 1998). Although, even this definition appears too broad because the information accrued as a function of experience

may be structured and stored in memory in different ways. This observation has led scholars to speak of or discuss three general types of knowledge (Hunter, Bedell-Avers, Hunsicker, Mumford, & Ligon, 2008; Shondrick, Dinh, & Lord, 2010): (a) associational knowledge, (b) schematic, or conceptual, knowledge, and (c) case-based, or experiential, knowledge.

Associational knowledge refers to connections, often automatic, among stimuli and responses acquired as a function of experience working in some domain. Schematic, or conceptual, knowledge refers to concepts, or categories, abstracted from experience which accounts for multiple events occurring in a performance domain. Case-based, or experiential, knowledge refers to incidents of performance abstracted from past performance occurring as people work in a domain. Hunter et al. (2008) have shown that these three types of knowledge are used in different ways after people are asked to solve complex problems.

These observations are noteworthy because they broach a new question. What type of knowledge do people use in solving leadership problems? In an initial field study examining how managers used different decision aids, Nutt (1984) found manager preferred to rely on case-based, or experiential, knowledge. In another study along these lines Berger and Jordan (1992) asked undergraduates to think aloud as they solved a leadership problem. They found, in solving leadership problems, people tended to rely on case-based knowledge.

Another line of evidence comes from studies examining the impact of presenting cases on performance in leadership roles. In one study along those lines, Watts, Ness, Steele, and Mumford (2018) presented stories, cases, describing incidents of ethical and unethical leadership performance. Their findings indicated that examining cases of unethical leaders conduct inhibited subsequent ethical decision-making. In another study along these lines, Watts, Steele, and Mumford (in press) presented charismatic and pragmatic leadership cases describing

incidents of past leader performance and found that these cases influenced the type of vision subsequently evidenced by participants when they were placed in leadership roles.

Hammond (1990) has noted that case-based knowledge structures represent an unusually complex form of knowledge – incorporating action relevant information bearing on causes, goals, contingencies, restrictions, actors, and actor affect. In another series of studies, Barrett, Vessey, and Mumford (2011) and Vessey, Barrett, and Mumford (2011) have shown how people work with the types of information embedded in case-based knowledge influences performance in leadership roles. In the Vessey et al. (2011) study participants were asked to solve three leadership problems arising in marketing firms. In the Barrett et al. (2011) study participants were asked to provide solutions to an educational leadership problem – providing a plan and speech to be given to parents, teachers, and students for leading a new, experimental, secondary school. In both studies participants were provided with instruction for working with different aspects of case-based knowledge. Moreover, in both studies it was found that providing instruction for working with these elements of case-based knowledge resulted in better performance in solving the relevant leadership problems.

Taken as a whole, these studies all indicate cases, and case-based knowledge, provide a basis for leader performance in problem-solving. Cases are held to be stored in long-term memory where abstracts of actual cases are referenced against, and activated by, a defined set of situational cues or diagnostics (Irby & Wilkerson, 2003). Case abstracts relevant to performance are held to be stored in a library system where a limited number of prototypic cases (i.e., three to five) will be activated when people encounter relevant diagnostics (Habermas & Paha, 2001). Attached to the prototypic cases are a smaller set (i.e., two or three) of commonly encountered exceptions to the case prototypes which are also activated, although to a lesser degree, when

relevant diagnostics are encountered. Analysis of the specific diagnostics evident in the situation at hand results in people using a particular case prototype, or exception, in problem-solving (Kolodner, 1997).

These observations bearing on the structure of case-based knowledge broach a new question. Should leaders in problem-solving employ case prototypes or case exceptions? At a surface level it seems reasonable to conclude that leaders in solving relevant problems should employ prototypic cases as prototypic cases provide (a) more tightly developed abstracts of past experience and (b) represent the material most likely to prove of value in problem-solving. In keeping with this observation, Hershey, Walsh, Read, and Chulef (1990) have shown that when experts make errors in solving problems, specifically errors made by financial advisers, these errors arise from an overreliance on case prototypes.

Leadership roles, however, make two unique demands which suggest leader performance may be tied more to the use of case exceptions than case prototypes in problem-solving. First, Jacobs and Jaques (1991) have argued that the problems brought to leaders are those that cannot be readily addressed by followers. Because followers working in a domain commonly rely on prototypic cases, it seems plausible to argue that leaders may be more likely to rely on non-prototypic cases than case prototypes in problem-solving.

Second, because the problems brought to the attention of leaders are those that cannot be readily solved by followers, Mumford et al. (2000) argued that leader performance in problem-solving will require leaders to address problems of greater novelty, complexity, and ill-definition or suboptimal structuring of requisite problem-solving activities. Of course, as noted by Mumford and Gustafson (2007), it is exactly these types of problems, novel, complex, ill-defined problems, that call for creative thought. Indeed, the findings of Zaccaro et al. (2015) pointing to

the substantial ($R \approx .40$) long term positive impact of divergent thinking skills on leader performance are in keeping with this observation. However, it also seems plausible to argue that by considering case exceptions, as well as case prototypes, it becomes possible for leaders to formulate more original problem-solutions. Because leaders must also produce creative problem solutions, this observation also suggests, given the need for originality in producing creative problem solutions (Besemer & O'Quin, 1999; Weisberg, 2015), that leader problem-solving performance would improve as a result of considering case exceptions rather than prototypic cases. Given these findings, in conjunction with research indicating leaders must articulate compelling visions (Bass & Bass, 2008), we will operationalize leader performance as the quality, originality, and elegance of leader plans as well as the perceived utility and affective impact of leader speeches.

Taken together, these observations suggest that problem solving performance on the part of those occupying leadership roles is more likely to improve if case exceptions are considered in problem-solving along with prototypic cases. Put more colloquially, leaders must consider the exceptions in their problem-solving efforts. Hence our first set of hypotheses:

> *Hypothesis 1a*: Considering case exceptions as opposed to considering prototypic cases will result in the production of better problem solutions (i.e., plans exhibiting higher quality, more originality, and greater elegance) by those occupying leadership roles.
>
> *Hypothesis 1b*: Considering case exceptions as opposed to considering prototypic cases will result in better visionary speeches (i.e., speeches exhibiting higher perceived utility and higher affective impact) produced by those occupying leadership roles.

Mental Models

Rouse and Morris (1986) have argued that case-based, experiential knowledge is organized with respect to an overarching structure. More specifically, they argued cases are organized and understood in terms of broader, or more encompassing, mental models. In fact, mental models have long been held to be critical to leadership. For example, Mumford (2006) has argued that leader visions are based on idealized, prescriptive, mental models constructed after analyzing the situation at hand in relation to more basic descriptive models. Other work on leader styles, which holds that styles arise from the attributes of mental models underlying vision formation, has provided some initial evidence for this argument (e.g., Lovelace, Neeley, Allen & Hunter, in press).

Somewhat more direct evidence in this regard has been provided in a study conducted by Mumford et al. (2012). In this study, participants were asked to complete an instructional program where they were taught how to illustrate the mental models they used for understanding problems arising in a certain domain in terms of structural equations models. Subsequently, participants were presented with an educational leadership problem, formulating a plan for leading a new, experimental, secondary school. Prior to starting work on this problem participants were asked to illustrate their mental models of secondary school performance. Judges rated various attributes of the mental models produced (e.g., number of causes, number of feedback loops) and another panel of judges appraised the quality, originality, and elegance of these solutions provided to the leadership problem. It was found that certain attributes of participant's mental models, for example inclusion of critical causal relationships, were positively related to the quality, originality, and elegance of the solutions provided to this leadership problem.

In another study along these lines, Partlow, Medeiros, and Mumford (2015) asked undergraduates, again, to work on this educational leadership problem. Judges appraised the quality, originality, and elegance of the plans provided for leading this school. Judges also appraised the perceived utility and affective impact of speeches written to be given to students, parents, and teachers in which they were to describe their vision for leading this school. Manipulations occurred through emails provided by a consulting firm hired to help them prepare their plans for leading this school. One email presented more or less complex structural models for understanding the performance of secondary schools. It is of note these models were drawn from the extant educational literature where the simpler, less complex, model contained fewer key causes, fewer outcomes, and roughly half the number of causal relationships specified in the more complex mental model. Another email provided participants with cases, all cases derived from the literature on cooperative learning techniques, with some participants being asked to review two cases and other participants being asked to review five cases. It was found the strongest vision statements emerged when people were asked to work with only a few cases and employ a relatively simple mental model.

In fact, these findings are not especially surprising if leaders, in producing viable problem solutions, are working with case exceptions rather than prototypic cases. Case exceptions are fuzzy and less well developed than case prototypes. As a result, imposition of a complex mental model for understanding case exceptions may prove relatively ineffective. This observation, in turn, led to our second set of hypotheses:

Hypothesis 2a: Use of simpler, albeit accurate, mental models will contribute to the production of better problem solutions (i.e., plans exhibiting higher quality, more

originality, and greater elegance) when people in leadership roles are working with case exceptions as opposed to prototypic cases.

Hypothesis 2b: Use of simpler, albeit accurate, mental models will contribute to better visionary speeches (i.e., speeches exhibiting higher perceived utility and higher affective impact) when people in leadership roles are working with case exceptions as opposed to prototypic cases.

Elaboration

In an initial study of mental models and vision formation, Strange and Mumford (2005) were concerned with what material, or content, leaders should work with when employing mental models and cases to construct a viable vision. In this study, participants were asked to formulate a plan and visionary speech for leading an experimental secondary school with plans being evaluated by judges for quality, originality, and elegance and speeches being evaluated for perceived utility and affective impact by actual students, parents, and teachers. Prior to preparing plans and speeches, however, participants were instructed to think about either causes or goals through an email from a consulting firm hired to help prepare them to lead the school. Another email from this consulting firm presented either successful or unsuccessful cases of cooperative learning techniques. It was found that the strongest plans, and most powerful speeches, emerged when people who were presented with successful cases thought about causes and when people who were presented with unsuccessful cases thought about goals. Thus, the ways people work with cases apparently influences performance.

Rouse and Morris (1986) have argued that people can work with either mental models or cases in solving problems. They argued that using mental models, as opposed to cases, would result in greater adaptability. The assumption underlying this argument was that people, in

problem solving, would typically employ prototypic cases. Earlier, however, we argued that those occupying leadership roles most often work with case exceptions as opposed to case prototypes. Case exceptions will not typically fit as tightly to a person's mental model. As a result, when working with case exceptions it is likely to prove more effective simply to focus on the case exception at hand rather than to try to integrate this case into a broader mental model. And, if case exceptions are to be integrated into a broader mental model it is better a simpler as opposed to more complex mental model be employed because simpler mental models allow greater flexibility – flexibility needed to incorporate case exceptions. However, the research on elaboration with respect to cases and/or mental models is not abundant. With this in mind, these observations led to our set of research questions:

> *Research Question 1a*: How will elaborating on the implications of either the cases, the mental model, or the cases via the mental model framework impact the problem solutions (i.e., as measured by quality, originality, and elegance) produced by those occupying leadership roles?
>
> *Research Question 1b*: How will elaborating on the implications of either the cases, the mental model, or the cases via the mental model framework impact the visionary speeches (i.e., as measured by perceived utility and affective impact) produced by those occupying leadership roles?

Method

Sample

To test these hypotheses and research questions, 361 undergraduates attending a large, southwestern university were offered course credit in an introductory psychology classes if they agreed to participate in the study. Undergraduates seeking credit were asked to review a website

describing the various studies currently seeking participants. A brief, one paragraph description of each available study was provided on this website. Students then selected the study, or studies, in which they wished to participate. In all, 228 women and 132 men agreed to participate in the present study. The average age of the study participants was 19.8 years. Their average ability as indicated by scores on the ACT lay roughly a quarter of a standard deviation above freshman matriculating at four-year institutions.

General Procedures

To test these hypotheses and research questions, a 2 (simple vs complex mental model) x 2 (prototypic vs non-prototypic cases) x 4 (elaboration on either cases, mental model, or the cases via the mental model framework, and control with no elaboration) research designed was employed. Participants were recruited to participate in a study of leader problem-solving in secondary schools. During the first half hour of this three-hour study, participants were asked to complete a set of timed covariates control measures. During the last half hour of the study, participants were asked to complete a set of untimed control measures and a demographics form. For the remaining hour and a half, participants were asked to work on a plan and vision formation task.

The plan and vision formation task used in present study was draw from Strange and Mumford (2005) due to its relevance to the population of concern. On this task, people are asked to assume the role of the incoming principal in a new, experimental, secondary school. In their role as principal, the leader of this school, they are asked to formulate a written plan for leading this school and to provide a speech, in writing, that they might give to the school's stakeholders (i.e., students, parents, teachers, and community members) describing their vision. Judges, doctoral students knowledgeable about leader planning and leader vision, are asked to appraise

these plans and speeches. Plans were appraised for quality, originality, and elegance. Speeches were apprised for perceived utility and affective impact. It is of note prior studies have shown doctoral students' appraisals of speeches with respect to perceived utility and affective impact show good convergence with the evaluations provided by actual students, parents, and teachers (Strange & Mumford, 2005).

Participants are asked to read through the background material describing this school and they are informed that a consulting firm has been hired to help them formulate their plan and prepare their speech. Emails sent by the consultant provided the basis for all manipulations. The first email presented either a simple or a complex mental model (drawn from Partlow et al., 2015) for understanding the performance of secondary schools. The second email presents either three prototypic or three non-prototypic cases drawn from literature on cooperative learning techniques. The third email asked participants to elaborate, in writing, on (a) the model presented, (b) the cases presented, (c) both the model and cases, or (d) no elaboration. After working through these emails, participants prepared their plan and speech.

Controls

Preparation of a plan and speech are typically considered rather demanding cognitive activities. Accordingly, participants were asked to complete a measure of intelligence. The intelligence measure participants were asked to complete was the verbal reasoning measure of the employee aptitude survey. This 30-item measure presents a set of facts and a conclusion. People are asked to indicate whether this conclusion is true, false, or uncertain given the facts presented. This measure typically provides retest reliabilities above .80. Evidence for the construct validity of this measure has been provided by Grimsley, Ruch, Warren, and Ford (1985).

Because some creative thought is also required to complete these tasks, participants were also asked to complete a measure of divergent thinking. In the present study, participants were asked to complete Merrifield, Guilford, Christensen, and Frick (1962) consequences test. On this measure, people are presented with five unlikely events (e.g., What would happen in gravity was cut in half? What would happen if people lost the ability to read and write?). For each question, people are asked to list as many consequences of this event as they can think of in two minutes. When scored for fluency, or the number of consequences generated, an appropriate index when divergent thinking measures are used as a control (Mumford & Gustafson, 1988), this measure produces internal consistency coefficients above .80. Mumford, Marks, Connelly, Zaccaro, and Johnson (1998) have provided evidence for the validity of this measure in accounting for leader creative thinking.

Additionally, participants were asked to complete a measure examining their expertise with respect to education practices. The expertise measure presents a series of life history, or background data, questions examining interest or involvement with educational issues (Mumford, Barrett, & Hester, 2012). The seven items included in this measure asked questions such as “How often have you thought about educational issues?” or “How likely is it you will go into education as a career?”. These questions scored on a 5-point scale produce an internal consistency coefficient above .70. Partlow et al. (2015), Scott, Lonergan, and Mumford (2005), and Strange and Mumford (2005) have all provided evidence for the predictive validity of this measure when people are asked to work on education tasks.

To assess task motivation, participants were also asked to complete a measure of learning goals. This measure presents a series of eight 5-point self-report questions asking if people invest resources in learning when working in academic settings. Thus, sample statements include, “I

want to learn as much as possible from my classes" and "I make demands of myself to achieve academically." The resulting scale provides internal consistency coefficients above .80.

The final control measure participants were asked to complete was intended to provide a global assessment of personality. Accordingly, participants were asked to complete Gill and Hodgkinson's (2007) measure examining neuroticisms, extraversion, openness, conscientiousness, and agreeableness. This measure presents one hundred adjectives such as active, agreeable, reserved, talkative. Participants are asked to indicate on a 9-point scale how accurate these adjectives are in describing them. The resulting scales for measuring neuroticism, extraversion, openness, conscientiousness, and agreeableness produce internal consistency coefficients above .80. Gill and Hodgkinson (2007) provided evidence for the construct validity of these scales.

Experimental Task

The experimental task participants were asked to work on was drawn from Strange and Mumford (2005). People working on this task are asked to assume the role of the incoming principal of a new, experimental secondary school in the state of Oklahoma. This school had been established as part of an effort intended to enhance the quality and effectiveness of secondary education. As the principle of this school, participants were to devise a curriculum for this school which would enhance students' academic success. It was noted that a consulting firm, Education Inc., had been hired to help them formulate this curriculum. Consultants working for Education, Inc. sent participants a number of "emails" which participants were asked to work through prior to preparing their curriculum plan and speech to be given to students, parents, and teachers. All manipulations were made through "emails" from this consulting firm.

Before participants began to read through these "emails" they were provided with a description of the school. This descriptive material began by noting that the school had been established by the state department of education as a part of a national effort to establish one experimental school in each state. These experimental schools were to establish new educational programs which would contribute to improvements in student academic achievement. At the end of each academic year school performance would be assessed and compared to both other secondary schools in the state and other experimental schools in different states. Performance would be assessed in a pre- post-design with tests being administered to measure general skills such as writing skills, reading comprehension, mathematical skills, and analytical skills. In addition, tests would be administered to assess knowledge gained in specific content areas such as the sciences, social studies, geography, and foreign languages. Those schools which produced the greatest gains in performance would receive additional funding in the following academic year and would be asked to disseminate their curriculum to other schools in the state.

After participants had read through this introductory material, they were provided with a more detailed description of the school and the state educational system. The state's performance on measures of student academic achievement was held to be at 47% and educational funding was held to be at 49% in comparison to other states. The school was described as having 400 students who were drawn from a variety of ethnic groups. It was noted that the school was required to have special educational programs for both the disabled and the gifted. The student/faculty ratio was 20 to 1. Teachers in this school were paid above average salaries as a result of involvement in this initiative. Consequently, teachers were held to be well qualified and highly motivated to improve student academic achievement.

Participants were then instructed that as principal of the Oklahoma Excel school their primary responsibility was to develop a plan for the educational curriculum of this school. In addition to preparing these written plans they were to prepare a speech to be delivered to the school's stakeholders (i.e., students, parents, teachers, and community members). It was noted in preparing their plans and speeches a variety of issues should be considered including teaching strategies, process improvement ideas, special activities, and new programs. In formulating their plans and speeches, participants were informed they would receive help from the educational consulting firm who would provide information and ideas that would help them to formulate a viable new curriculum.

Mental Models

The first manipulation occurred through the first "email" participants received form the consulting firm. In this manipulation participants were presented with either more complex or less complex models (Partlow et al., 2015) for understanding the performance of secondary schools. Both the simple and complex models presented were based on prior research in the educational field examining the causal structure of variables shaping secondary school performance (e.g., MacBeath & Mortimer, 2001; Stockard & Mayberry, 1992). Both the simple and complex models have evidenced validity in prior research and were comparable in general structural although the number of concepts and concept linkages were systematically varied.

Figure 1 provides an illustration of the high complexity and low complexity models. The low complexity model included eight variables. It held that purposeful and structured instruction led to student motivation and achievement with these effects being moderated by socio-economic status, parent-community involvement, and progress monitoring. The more complex model reflected the same basic causal structure, however, eight additional key concepts were added

including achievement orientation, student characteristics, teacher characteristics, professional development, teacher quality, school quality, student behavior, and graduation rates. Moreover, the number of relationships presented among the concepts presented was doubled. Thus, in the complex model classroom climate was held to be influenced by student behavior although this relationship was not specified in the sample model.

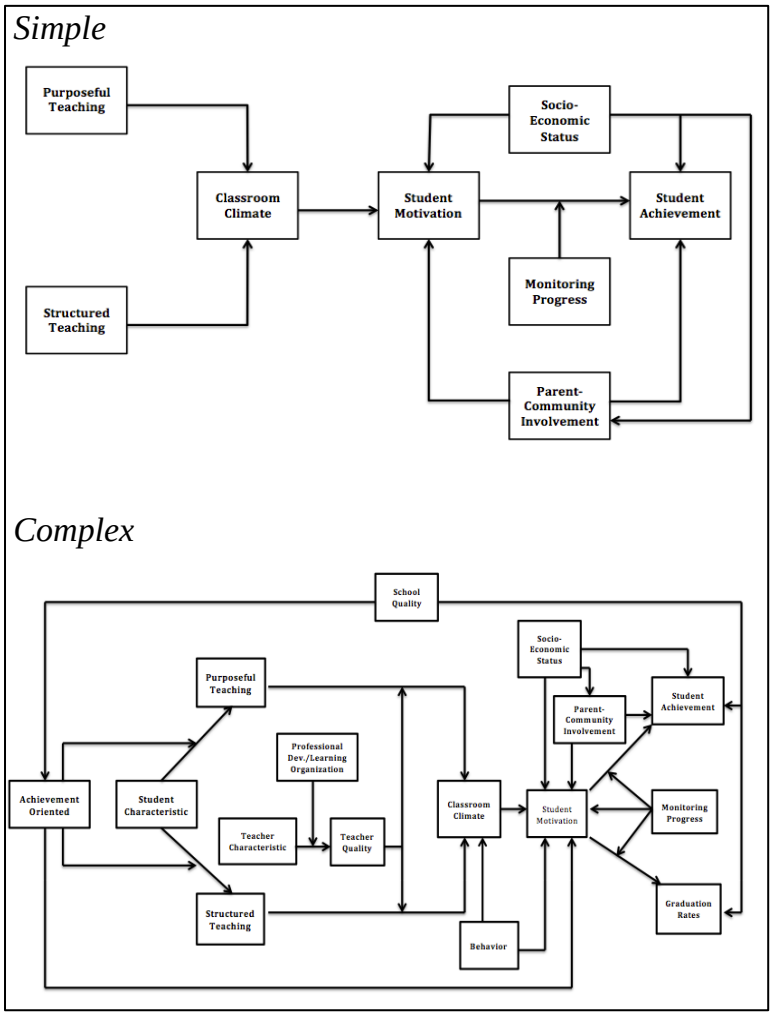

Figure 1. Simple and complex mental models taken from Partlow et al. (2015).

The "email" presented to participants noted that schools frequently use such models to help them solve problems. Prior to presenting the model, each variable included in the model was defined in specific operational terms and its importance in accounting for school

performance was described. Thus, student motivation was described as “whether the student had the drive to perform school duties” and its importance was said to be “motivated students enjoy school more”. Participants were asked to read through the description of each variable before reviewing either the simple or more complex model presented in their condition.

Prototypic and Non-Prototypic Cases

After working through the model of school performance, participants were asked to consider some cases describing potential instructional techniques. All cases presented were drawn from the literature of cooperative learning techniques (Scott et al., 2005). Prior to reviewing these cases, participants were asked to read through a brief, one paragraph, introduction. This introduction noted cooperative learning techniques seek to increase content knowledge and retention through collaboration. Use of these techniques was held to be of value for students of differing backgrounds and skill levels with such instructional techniques fostering teamwork, self-efficacy, and tolerance.

After reading through this general description of cooperative learning techniques, participants were presented with three cases describing particular cooperative learning techniques. A given case provided a label applying to the technique and then a brief, one paragraph, description of how this cooperative learning technique was executed in the classroom in a case-based format where actions and exercises were described. In the prototypic condition participants were presented with three typical cooperative learning cases while in the non-prototypic condition participants were presented with three unusual or non-typical cooperative learning cases. Figure 2 illustrates the three prototypic and three non- prototypic cases presented.

To identify prototypic and non-prototypic cases, a panel of 21 doctoral and undergraduate students were presented with descriptions of the cooperative learning techniques. Panel members

Cooperative Learning Techniques

Background:
These activities were led by students with the aim of increasing their content knowledge and retention through peer collaboration. In all cases, students were split into groups that were composed of members with varying skill levels and differing backgrounds. These techniques fostered teamwork, higher self-esteem, increased tolerance for differing views, friendship, and interdependence with members bringing forth their various experiences and skills. Through these activities, students activated higher-level thinking than necessary for typical lecture structure.

Prototypic Cases

Content:

- Think-pair-share:
    - After a traditional lecture, the teacher posed a question to the class. Students were instructed to first think on their own and write down their answers. After all students had individually answered the questions, they split into small group and shared with the other group members their solution to the problem. After the students consulted each other, the teacher had the groups share their answers with the class.
- Active review session:
    - After splitting the class up into groups, the teacher posed a series of question to the class. For each question, group members discussed among themselves and chose an answer. The group then presented their answers to the class, with the spokesperson changing each round. The class then compared and contrasted each group's answer to find common themes and unique characteristics.
- Group investigation:
    - After discussing the chapter materials, the teacher split the class up into groups. Each group was assigned a subtopic and was instructed to develop a lesson plan. After developing the lesson plan, each group presented their subtopic material to the class.

Non-Prototypic Cases

Content:

- Game show:
    - The class was split up into groups and each group was given a separate topic from the course content. As a team, the groups created questions to quiz the other class member over their content area. Groups competed against each other to score points with correct answers. If a question was widely missed, the group was asked to further explain the concept to the class.
- Role play:
    - The teacher overviewed the chapter topics for the students. The class was then split into groups. Groups were then instructed to develop a skit that depicted their assigned subtopic from the chapter. The students were told that every member must have a role in the skit. After developing their skits, the students presented them to the whole class.
- Puzzle learning:
    - Students were members of two groups: a base group and an expert group. For the base group, each student was assigned a different topic. Students then left the base group and matched up with the other students in the class whom shared their topic, the expert group. After the students learned the material in their expert groups, they went back to their base group. Once there, each student was responsible for teaching their base group members their topic.

Figure 2. Prototypic and non-prototypic cases of cooperative learning techniques.

were asked to read through the case description applying to each cooperative learning technique and rate on a 6-point scale the extent to which each technique represented current educational practices in secondary schools. Three techniques were found to be more common, or prototypic (M = 3.98, SD = 1.27) and another set of three techniques were found to be less common, or non-prototypic (M = 2.39, SD = 1.05). Moreover, as a manipulation check, study participants in the prototypic case condition were presented with the three most common cooperative learning techniques identified by the panel and were asked to indicate the extent to which they believed each technique is used in secondary school (M = 4.04, SD = 1.27). Similarly, participants in the non-prototypic case condition were presented with the three least common cooperative learning techniques identified by the panel and were asked to indicate the extent to which they believe each technique is used in secondary school (M = 3.42, SD = 1.27)

Elaboration

The third and final manipulation occurred through instructions provided in an email from the consulting firm Education, Inc. Here instructions were given in order to provide different ways of working through the problem. More specifically, participants were asked to elaborate on certain materials before formulating their leadership plan. Participants were given one of the four prompts instructing them with the following: “Taking what you’ve learned, please write a paragraph describing the future effects or implications that could result from…” for either (a) the mental model presented, (b) the cases presented, (c) the cases vis-à-vis the mental model framework, or (d) no elaboration instruction was provided. These instructions were intended to encourage elaboration, or depth processing with respect to cases, mental models, or cases with respect to mental models.

Dependent Variables

After reading through relevant emails form the consulting firm, a new email asked participants, who have assumed the role of principal at the Oklahoma Excel School, to provide a two-page written plan describing how they would go about establishing a curriculum for achieving academic excellence. As they began to prepare their plans, it was noted the plan should include a number of elements such as instructional strategies, process improvement ideas, special activities, and new programs. These written plans provided the basis for assessing the quality, originality, and elegance of participants problem solutions.

In keeping with prior studies (e.g., Dailey & Mumford, 2006; Scott et al., 2005; Vessey et al., 2011) quality was defined as a complete, coherent, useful plan. Originality was defined as an unexpected and clever plan. Elegance was defined as a refined plan where the elements of the plan flowed well together. Judges, three doctoral students familiar with the educational and leadership literatures, were asked to appraise plans with respect to quality, originality, and elegance.

After participants had completed their plan, a final email from the consulting firm was presented. This email asked participants to prepare a two-page written speech to be given to students, parents, teachers, and community members describing their plan for leading the Oklahoma Excel School. Speeches given to key stakeholders are commonly held to reflect leader's visions for the institution (Strange & Mumford, 2005). In keeping with the observations of Strange and Mumford (2005), three judges, again all doctoral students familiar with the leadership and educational literatures, were asked to appraise speeches with respect to two key attributes of viable vision statements – perceived utility and affective impact. Perceived utility was defined as a speech which would lead to successful institutional change without undue

effort. Affective impact was defined as a speech which students, parents, teachers, and members of the community would find to convey an attractive image for the school and cause people to want to attend this school.

Plan quality, originality, and elegance along with speech perceived utility and affective impact were approved using a set of benchmark rating scales. Use of benchmark rating scales to appraise plans and speeches was based on the findings of Redmond, Mumford, and Teach (1993) pointing to greater reliability and stronger validity when judges are asked to appraise complex products with respect to a set of exemplar solutions evidencing differing amounts of the relevant attributes. To develop these benchmark rating scales, three judges, all doctoral students in industrial organizational psychology familiar with the leadership and educational literatures, were asked to rate, on 5-point scale, forty sample plans using the definitions of quality, originality, elegance, and forty sample speeches using the definitions of perceived utility and affective impact, provided above. Using these evaluations, products near the high, medium, and low scale points were identified, based on judges, mean ratings, which also evidenced low standard deviations or good agreement. These products were then abstracted and used to define scale benchmarks. See Appendix A for the benchmark rating scales used to appraise the quality, originality, and elegance of participants' leadership plans. Appendix B presents the benchmark rating scales used to appraise the perceived utility and affective impact of visionary speeches.

The judges, again all doctoral students in industrial/organizational psychology familiar with the leadership and educational literatures, were asked to apply these benchmark rating scales in appraising participants' plans and speeches. Prior to making these ratings, all judges were required to complete a training program. In this training program, judges were familiarized with the rating scales, the operational definition underlying a scales construction, and the ways in

which each attribute might be reflected in the plans, or speeches, provided by participants. They then practiced applying these rating scales to a set of sample products. Judges then met following initial ratings to discuss and resolve observed discrepancies. Following training, the interrater agreement coefficients obtained for evaluations of plan quality, originality, and elegance were .81, .77, and .75 accordingly. The interrater agreement coefficients obtained for appraisals of speech perceived utility and affective impact were .82 and .71.

In keeping with prior studies, a strong positive relationship ($r \approx .64$) was observed between ratings of plan quality, originality, and elegance. Again, in keeping with prior studies (e.g., Partlow et al., 2015), the relationship between perceived utility and affective impact of speeches ($r = .26$) was weaker although still positive. Some further evidence bearing on the validity of these ratings was obtained by examining correlations with the covariate control measure. Thus, the production of high quality plans was found to be positively related to divergent thinking ($r = .14$) and learning goals ($r = .14$). The production of original plans was found to be positively related to was found to be positively related to divergent thinking ($r = .14$). The production of elegant plans was found to be positively related to intelligence ($r = .11$) and learning goals ($r = .11$). Moreover, when examining the dependent variables for participant speeches, it was found that the production of speeches exhibiting high perceived utility were positively related to intelligence ($r = .12$). The production of speeches with high affective impact was found to be positively related to divergent thinking ($r = .10$).

Analyses

A series of analysis of covariance tests were used to appraise the effects of the model, case, and elaboration manipulation on the quality, originality, and elegance of plans and perceived utility and affective impact of speeches. It is of note, in all analyses, a covariate was

retained only if it proved significant at the .05 level in initial analyses. Separate analyses of covariance test were conducted for each dependent variable.

Results

Plans

Table 1 presents the results obtained when the quality of leadership plans was examined as the dependent variable. Both divergent thinking (F (1, 340) = 6.94, $p \leq .05$) and learning goals (F (1, 340) = 8.22, $p \leq .05$) were positively related to the production of higher quality plans. However, no other significant effects were observed for the quality of participants' leadership plans.

Table 1.
ANCOVA results for quality

Source	SS	df	MS	F	Sig.	Partial Eta Squared
Divergent thinking	3.85	1	3.85	6.94	.009	.020
Learning goals	4.56	1	4.56	8.22	.004	.024
Mental model	.033	1	.033	.060	.806	.000
Cases	.538	1	.538	.969	.326	.003
Elaboration	.263	3	.088	.158	.925	.001
Mental model*cases	.897	1	.897	1.62	.205	.005
Cases*elaboration	3.08	3	1.03	1.85	.139	.016
Mental model*elaboration	2.42	3	.806	1.45	.228	.013
Mental model*cases*elaboration	1.441	3	.480	.865	.459	.008
Error	188.75	340	.555			

Note. SS = Type III Sum of Squares, *df* = degrees of freedom, *MS* = Mean Square, *F* = F-ratio, *p* = significance level, *Partial Eta Squared* = effect size estimate.

For originality a somewhat different pattern of effects emerged. Table 2 presents the ANCOVA results for originality. Again, divergent thinking proved to be a significant (F (1, 343) = 8.12, $p \leq .05$) covariate with divergent thinking proving to be positively related to the

production of more original plans. A marginally significant (F (3, 343) = 2.26, p = .08) interaction emerged between the case and elaboration manipulations. Examination of the cell means indicated that highly original plans emerged when participants were presented with prototypic cases and asked to elaborate on the mental model presented (M = 2.98, SD = .14) while particularly non-original solutions emerged when participants were presented with non-prototypic cases but asked to elaborate on the mental model presented (M = 2.58, SD = .14) in comparison to all other conditions. Table 3 presents the means, standard deviations, and confidence intervals for the marginally significant 2-way interaction. Apparently, presentation of prototypic cases contributed to mental model use while presentation of non-prototypic case interfered with viable elaboration on the presented mental model.

Table 2.
ANCOVA results for originality

Source	SS	df	MS	F	Sig.	Partial Eta Squared
Divergent thinking	7.06	1	7.06	8.12	.005	.023
Mental model	.007	1	.007	.008	.930	.000
Cases	.021	1	.021	.025	.875	.000
Elaboration	1.88	3	.625	.720	.541	.006
Mental model*cases	.273	1	.273	.314	.575	.001
Cases*elaboration	5.89	3	1.97	2.26	.081	.019
Mental model*elaboration	3.40	3	1.13	1.31	.273	.011
Mental model*cases*elaboration	7.57	3	2.52	2.91	.035	.025
Error	297.93	343	.869			

Note. SS = Type III Sum of Squares, *df* = degrees of freedom, *MS* = Mean Square, *F* = F-ratio, *p* = significance level, *Partial Eta Squared* = effect size estimate.

These findings, however, should be considered in light of the significant 3-way interaction observed between mental model complexity, case content, and elaboration strategy (F (3, 343) = 2.91, $p \leq .05$). When a simple mental model was presented along with non-prototypic

cases, elaboration on cases with respect to the mental model presented proved useful (M = 3.08, SD = .20). However, when a complex mental model was presented along with non-prototypic

Table 3. Means, standard deviations, and confidence intervals for marginally significant 2-way interaction

Cases	Elaboration	Mean Originality	Std. Error	95% CI Lower Bound	95% CI Upper Bound
Prototypic	Elaborate on mm	2.98	.141	2.70	3.26
	Elaborate on cases	2.69	.137	2.42	2.96
	Elaborate on cases via mm	2.61	.137	2.34	2.88
	No elaboration	2.74	.137	2.47	3.01
Non-prototypic	Elaborate on mm	2.58	.137	2.31	2.85
	Elaborate on cases	2.70	.138	2.42	2.97
	Elaborate on cases via mm	2.80	.142	2.52	3.08
	No elaboration	3.01	.143	2.73	3.29

cases, elaboration on cases vis-à-vis the presented mental model resulted in particularly unoriginal solutions (M = 2.51, SD = .21) in comparison to all other conditions. Table 4 presents the means, standard deviations, and confidence intervals for the significant 3-way interaction. Thus, participants could apparently work with non-prototypic cases to produce original solutions but only when the mental model being employed was relatively simple – perhaps because simple mental models allow for greater flexibility when working with non-prototypic cases.

Table 5 presents the results obtained for elegance. Intelligence (F (1, 340) = 4.21, $p \leq .04$) proved to be a significant covariate, whereas learning goals (F (1, 340) = 3.44, p = .06) proved to be marginally significant, with both intelligence and learning goals proving positively related to the production of more elegant leadership plans. No significant main effects or interactions

emerged for the mental model, case content, and elaboration manipulations in accounting for the elegance of participants leadership plans.

Table 4. Means, standard deviations, and confidence intervals for significant 3-way interaction

					95% CI	
			Mean Originality	Std. Error	Lower Bound	Upper Bound
Mental model	Cases	Elaboration				
Simple	Prototypic	Elaborate on mm	2.85	.203	2.44	3.25
		Elaboration on cases	2.96	.194	2.58	3.35
		Elaborate on cases via mm	2.47	.194	2.09	2.85
		No elaboration	2.61	.194	2.23	3.00
	Non-prototypic	Elaborate on mm	2.64	.195	2.26	3.02
		Elaboration on cases	2.62	.195	2.23	3.00
		Elaborate on cases via mm	3.08	.195	2.70	3.47
		No elaboration	2.84	.195	2.46	3.22
Complex	Prototypic	Elaborate on mm	3.12	.194	2.73	3.50
		Elaboration on cases	2.41	.194	2.03	2.80
		Elaborate on cases via mm	2.76	.194	2.37	3.14
		No elaboration	2.87	.194	2.48	3.25
	Non-prototypic	Elaborate on mm	2.52	.195	2.14	2.91
		Elaboration on cases	2.78	.195	2.39	3.16
		Elaborate on cases via mm	2.51	.209	2.10	2.92
		No elaboration	3.18	.209	2.77	3.59

In conclusion, there were no significant main effects with respect to the manipulations and the dependent variables for plans (i.e., quality, originality, and elegance). However, with respect to originality, there was a marginally significant 2-way interaction between cases and elaboration. More centrally there was a significant 3-way interaction between the mental model, case, and elaboration manipulations. Given these results, there is partial support for Hypotheses

1a and 2a. In responding to Research Question 1a, findings indicate, at least in the case of originality, that participants worked better with non-prototypic cases when they were provided simple mental models and asked to elaborate on those cases via the mental model framework.

Table 5.
ANCOVA results for elegance

Source	SS	df	MS	F	Sig.	Partial Eta Squared
Intelligence	2.83	1	2.83	4.21	.041	.012
Learning goals	2.31		2.31	3.44	.064	.010
Mental model	.017	1	.017	.025	.875	.000
Cases	.153	1	.153	.228	.634	.001
Elaboration	1.38	3	.459	.683	.563	.006
Mental model*cases	.446	1	.446	.664	.416	.002
Cases*elaboration	1.72	3	.575	.855	.465	.007
Mental model*elaboration	.934	3	.311	.463	.708	.004
Mental model*cases*elaboration	.423	3	.141	.210	.890	.002
Error	228.54	340	.672			

Note. SS = Type III Sum of Squares, *df* = degrees of freedom, *MS* = Mean Square, *F* = F-ratio, *p* = significance level, *Partial Eta Squared* = effect size estimate.

Speeches

Table 6 presents the results obtained for the perceived utility of visionary speeches. Intelligence (F (1, 334) = 5.00, $p \leq .05$) proved to be a significant covariate. Intelligence was found to be positively related to production of speeches of greater perceived utility. No significant main effects or interactions were obtained for the manipulations of model complexity, case content, or elaboration statements. A somewhat different pattern of effects however, emerged when the effects of these manipulations on the affective impact of speeches was examined. Table 7 presents the results obtained in this analysis. Again, divergent thinking proved to be a significant covariate (F (1, 334) = 3.27, $p \leq .05$) proving to be positively related to

production of speeches of greater affective impact. More centrally, a significant (F (1, 334) = 4.05, $p \leq .05$) main effect was obtained for the case content manipulation. It was found more affectively engaging speeches emerged when participants were presented with non-prototypic (M = 2.52, SD = .07) as opposed to prototypic (M = 2.32, SD = .07) cases.

Table 6.
ANCOVA results for perceived utility

Source	SS	df	MS	F	Sig.	Partial Eta Squared
Intelligence	3.01	1	3.01	5.00	.026	.015
Mental model	.045	1	.045	.075	.784	.000
Cases	.048	1	.048	.081	.777	.000
Elaboration	2.53	3	.844	1.40	.242	.012
Mental model*cases	.011	1	.011	.018	.894	.000
Cases*elaboration	3.47	3	3.47	1.921	.126	.017
Mental model*elaboration	.660	3	.660	.366	.778	.003
Mental model*cases*elaboration	.912	3	.912	.506	.678	.005
Error	200.8	334	.601			

Note. SS = Type III Sum of Squares, *df* = degrees of freedom, *MS* = Mean Square, *F* = F-ratio, *p* = significance level, *Partial Eta Squared* = effect size estimate.

In conclusion, there was a significant main effect for cases with respect to affective reaction, but not for perceived utility when analyzing the speech dependent variables. Therefore, there is partial support for Hypothesis 1b. There were no other significant main effects or interactions, so hypothesis 2b was not supported. In responding to Research Question 1b, findings indicate that there was no impact of elaboration for any condition on visionary speeches.

Table 7.
ANCOVA results for affective impact

Source	SS	df	MS	F	Sig.	Partial Eta Squared
Divergent thinking	2.99	1	2.99	3.27	.072	.010
Mental model	1.67	1	1.67	1.83	.178	.005
Cases	3.70	1	3.70	4.05	.045	.012
Elaboration	5.09	3	1.70	1.85	.137	.016
Mental model*cases	1.71	1	1.71	1.87	.173	.006
Cases*elaboration	4.47	3	1.49	1.63	.183	.014
Mental model*elaboration	.398	3	.133	.145	.933	.001
Mental model*cases*elaboration	1.396	3	.465	.508	.677	.005
Error	305.67	334	.915			

Note. SS = Type III Sum of Squares, *df* = degrees of freedom, *MS* = Mean Square, *F* = F-ratio, *p* = significance level, *Partial Eta Squared* = effect size estimate.

Discussion

Before turning to the broader implications of the present study, certain limitations should be noted. To begin, the present study was based on classic environmental paradigm where the leadership plans and speeches formulated by undergraduates were examined. As a result, the question arises as to whether our findings can be generalized to more experienced managers or leaders (Ericsson, 2009). By the same token, however, it should be recognized that the present study was based on a leadership task arising in a domain that in which undergraduates had some familiarity with – secondary school leadership. In keeping with this observation, prior studies by Barrett et al. (2011), Shipman et al. (2010), and Strange and Mumford (2005) all have provided some evidence for the validity of this task in undergraduate samples.

Along related lines, it should be recognized that participants in the present study were asked to work on a single vision formation task. This task asked them to formulate a vision for leading an experimental secondary school. Accordingly, the question remains as to whether

similar effects would be observed if vision formation tasks had been drawn from other domains (Baer, 1998) – for example, marketing, a domain which undergraduates also have some familiarity with. Although this limitation is of some note, it should also be recognized this educational leadership task is rather demanding. The demands imposed by this task are sufficient to suggest this limitation could be addressed only by conducting multiple, additional, studies.

It should also be recognized the present study was based on a low fidelity simulation paradigm (Motowidlo, Dunnette, & Carter, 1990). In low fidelity simulations manipulations typically occur in a fixed order where the order of manipulations is intended to maximize realism within the experimental task at hand. Thus, in the present study, the model complexity manipulation always preceded the case content manipulation. Although this manipulation order appeared natural to study participants, and fixing the order of manipulations does ensure adequate control, it is not clear if the same findings would emerge if the manipulations occurred in a different order.

Finally, it should be recognized that performance on this leadership task was assessed in a specific framework. More specifically, leader visioning was appraised with respect to the quality, originality, and elegance of the plans formulated for leading the experimental secondary school and the perceived utility and affective impact of visionary speeches to be given to key stakeholders. Although prior studies have shown good convergence in evaluation of speeches with respect to perceived utility and affective impact across stakeholder groups, between stakeholder groups, and doctoral student judges (Strange & Mumford, 2005), it is also true that other aspects of visionary leadership, for example identification with the leader and their plans (Mumford, 2006), were not examined in the present study. As a result, the question remains as to

whether the same pattern of findings would emerge if other attributes of leaders' vision had been appraised.

Even bearing these limitations in mind we do believe the present study has some noteworthy implications for understanding leader vision formation. Earlier, we noted that the type of knowledge leaders employ in problem-solving is case-based knowledge (Barrett et al., 2011; Mumford, Todd, Higgs, & McIntosh, 2017) as opposed to schematic/conceptual knowledge or associational knowledge. Case-based knowledge, however, is held to be organized in a library system which incorporates both prototypic cases and non-prototypical, or exceptional, cases.

Recognition of this point, along with a key feature of the type of problems brought to the attention of leaders, problems, others cannot really address (Mumford et al., 2000), led us to hypothesize that in problem-solving leaders might be more likely to rely on non-prototypic cases than prototypic cases under the assumption that if they are presented with the problem it is likely to be unusual. In fact, people in leadership roles appear to use both prototypic and non-prototypic cases, however, use of non-prototypic cases in formulating plans, at least original plans, seemed to disrupt elaboration on ideas vis-à-vis mental models – either simple or complex mental models. Thus, people appear to have difficulty integrating non-prototypic cases into the mental models they use for understanding problems. These findings do not provide support for Hypotheses 1a or 2a, but they do help us to better understand Research Question 1a.

However, if leaders employed a simple mental model and elaborated on non-prototypic cases vis-à-vis this simple mental model, then they provided more original leadership plans. This findings in keeping with earlier work by Partlow et al. (2015) indicating that leader vision formation was more impactful when based on simple as opposed to complex mental models. The

findings obtained in the present study, however, suggest that use of simple mental models is especially useful in vision formation because simple mental models allow leaders to work with non-prototypic cases. These findings provide partial support for Hypotheses 1a and 2a, and additionally aid us in better understanding Research Question 1a.

The need for leaders to work with non-prototypic case vis-à-vis simple mental models is noteworthy for two reasons. First, in using non-prototypic cases leaders may be perceived by followers as being different. Second, given rapid activation of prototypic cases, the value added by leaders in problem solving may lie in their capacity to consider exceptions to case prototypes. However, considering these exceptions requires leaders to employ relatively simple mental models due to the flexibility they provide at least with respect to the production of more original if not higher quality and more elegant plans.

Leaders selective use of non-prototypic cases vis-à-vis simple mental models is not simply a matter of how leaders go about solving problems. Use of non-prototypic cases apparently effects the social impact of leaders' problem solutions. More specifically, we found the visionary speeches which had the greatest affective impact were those where non-prototypic cases were considered, providing partial support for Hypothesis 1b. However, these findings do not support Hypothesis 2b, but do give us insight into Research Question 1b. Formulating and articulating visions, which diverge from the commonly accepted wisdom reflected in prototypic cases, however, will get people's attention (Meindl, Ehrlich, & Dukerich, 1985). Thus, leaders use of non-prototypic cases may allow them to formulate not only more original plans but also more compelling visions.

The impact of use of non-prototypic cases in vision formation, at least with respect to the production of original affectively engaging visions, has some important practical implications.

Leaders use of non-prototypic cases implies that leaders should have not only more experience than followers, they should also have a wider range of experience (Mumford, Marks, Connelly, Zaccaro, & Reiter-Palmon, 2000). Moreover, leader development is likely to be facilitated by asking leaders to reflect on these non-prototypic experiences and how they might contribute to performance in leadership roles (Strange & Mumford, 2005).

More broadly, however, these findings suggest that future research on both leader development and vision formation should not focus simply on the amount and nature of experience. Instead, the findings emerging from this present study suggest we must begin to consider how to balance typical and atypical experiences as we seek to develop leaders bearing in mind these atypical experiences, the exceptions, may be as, if not more, important than typical experience. We hope the present study provides an impetus for future research along these lines.

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Appendix A

School Plan Ratings:

1. Quality

Definition: the overall quality of the participant's plan.

Things to look for:

- **Completeness:** Did the participant understand the critical issues? Did he/she address all of the most relevant information at hand?
- **Coherence:** Was the response coherent? Was it well thought out and logical?
- **Usefulness:** Is the response actually feasible and appropriate for addressing the problem?

Rating Scale

1 – Poor quality. The plan is haphazard and fragmented and does not address any of the key issues; it does not provide key information in a logical manner.

> On the bases on academic emphasis, to achieve the academic success requires there has to be a sense of competition and achievement for the student. For behavior, there should be a strict guideline on the punishments and consequences for breaking certain rules. Students perform better when their parents are involved, so a parent-teacher student program will be created to achieve this.

2 – Poor to average quality. A few key issues may be addressed; however, a clear plan is still not presented; key parts of the plan are unclear.

3 – Average quality. The plan is presented in a logical form; a number of key issues may still be missing or vague, but overall the plan addresses some of the major issues of the problem and is presented clearly and coherently.

> Achieving academic excellence won't happen overnight. I believe the first step in doing so would be improving teaching strategies. Allowing for a variety of teaching strategies will help reach out to every student that has a different learning personality. Many students are audio, visual or any other type of learner so improving teaching strategies to help every student is a must Another thing is process improvement ideas. Allowing room for improvement and suggestions will help the school thrive and help academic excellence. Special activities will also help. By allowing our students time to relax and have fun, this will increase their drive to learn. Student motivation is very important in pushing students to want to achieve great things later on in life. Monitoring progress is also important in that focusing on the future and leading students in the right direction will increase academic excellence.

4 – Average to excellent quality. Many of the key issues are addressed in the plan and plan is feasible; however, some information may seem unimportant to the plan or is not completely thought out.

5 – Excellent quality. The plan is presented so that is exceptionally coherent and clear and addresses the key issues in a manner that is feasible.

-classroom climate: Teachers have a large role in ensuring that is comfortable and inviting for learining at every level. The climate should be representative of a teacher's own style but should also resemble the school's goals of making every student feel included as well as challenged to a level that they can succeed.
-Technology: is important in allowing for exploration in various subjects and a connection to things in the world that are currently happening such as reading news articles every week in a biology class regarding new discoveries or new applications to subject material.
-purposeful teaching: objectives should be presented throughout the course to allow students to know what information they should be gaining from a particular unit and overall in a class in order to keep the interest and curiousity.
-structured teaching: Teachers should incoorporate discussion as much as possible which allows every student an opportunity to speak with the possibillity of extra credit for a statement or question. Quizzes should be used as benchmarks to guage the overall standing of the class and can alternate between verbal, written, kahoots etc. to keep them engaging rather than tedious.
-Student motivation: ensure that with the classroom climate students are able to feel motivated throughout the semester/year/high school career.
-socioeconomic status: each student should be given an oppurtrnity to follow up with a school guidance counselor. 1st meeting mandatory for a "get to know you" and 1 more at the start of the next semester. But emphasize on going whenever its wanted. Also encourage teachers to make referals if they see any significant outlyers such as behaviour grades, attendance in a student. This is an aspect of monitoring progress
-parent involvement: encourage parents "that are able" to be involved in school activities and invite them to events such as family dinners with teachers once a year in the cafeteria. Request for updates from parents if any significant changes are occurring at home.
-community involvement: Require community service as a way to graduate each year and have students present on their volunteering accomplishments as a way to encourage others to do the same.

2. Originality

Definition: the extent to which the plan is original and creative.

Things to look for:

- **Unexpected:** Did the participant approach the problem in a novel, imaginative, unpredictable, or innovative manner?
- **Elaborative/Descriptive:** Did the participant provide a rich answer—one that helps the reader to visualize the solution for addressing the problem?

Rating Scale

1 – Poor originality. The plan is very predictable and is given in basic terms with no elaboration. The plan only uses bare ideas and is commonplace and ordinary.

> At the end of each term, students should be tested on how they learn best. The following term they should be placed in class rooms that fit their learning style (ie auditory visual or kenisthetic) they then all need to be taught the same material in the formats they understand best.

2 – Poor to average originality. The plan presents ideas in a slightly unique manner. The plan mostly provides common ideas that do not reflect much elaboration or description.

> We will incorporate new ideas that improves the student's and faculty's satisfaction at school. Students will be allowed to choose the classes they want to take and two of them has to be a core class. Teachers will allow students to work together. One day every week will be dedicated to team building by competing in a competition. The grade with the most wins will get to choose a weekend field trip to go on that is funded by the school. Tests will be taken monthly. Based on the material taught for that month. Students will have no time limit to finish these tests and no test will be scheduled three days apart from each other. Students that end the semester with a 3.5 GPA or higher will be recognized and be awarded with gift cards and other incentives.

3 – Average originality. The plan contains something that makes it different from the typical plan. The approach is original and contains some descriptive information. Description and elaboration are present but not entirely complete.

> Oklahoma Excel can "achieve academic excellence" by working to increase student motivation. Motivation will ultimately drive the students to work harder to succeed on exams and increase graduation rates. They key to this creating the ideal classroom climate. The first step is outlining acceptable behavior and reinforcing it to ensure that students aren't distracted from learning. Also, teachers should vary their styles of teaching to engage students, increasing their motivation. This includes purposeful teaching, in which interactive methods such as game shows, role play, and puzzle learning can be utilized. However, a more structured approach at times, such as lectures or socratic seminars, can refocus attention on the content itself. In order to make this possible, we need to find the best teachers we can recruit and give them training in how to improve the classroom climate. Teachers could have a week long retreat every summer before the school year begins to learn about new teaching techniques, boosting morale for the teachers. A similar kind of retreat could be offered for the students so they can make friends and learn how to work productively. In this way, teachers and students can come together with a morale boost in the beginning of the year, improving engagement and motivation.

4 – Average to excellent originality. The plan contains something that makes it different from the typical solution. The approach is original and contains some descriptive information. Description and elaboration are present but not entirely complete.

5 – Excellent originality. The plan is exceptionally unique. The participant includes characteristics or details that make the plan unique to him/her. The plan clearly reflects an unexpected understanding approach to the problem and goes beyond the norm and presents new ideas that are highly descriptive.

> The ultimate goal for Oklahoma Exel is to learn by experience and grow creativity. With that being said, our foundation will be based on a "teamwork" system. There will be no heiarchy around faculty and students. Teachers will be used more as a resource rather than the source of all information. This will encourage students to work together and really research topics that are unknown to them rather than just being taught the bullet points to memorize. Teachers will be there to help, rather than command/order assignments. Assignments will include case studies, personal and research essays, and hands-on projects. Students will be more involved in the decisions of the school and will not be treated as children, but as students. There will be elite clubs to raise motivation and drive. But, there will be a type of club for everyone. So there will be a leadership club, an academic club (one for each subject, a creativity club and so on. Each club will be elite so it will hold value, therefore increase self-confidence in the students. Students, and teachers, will attend psychotherapy counciling sessions each month to ensure psychological health and promote productivity. This will relieve stress, help students feel cared for and decrease the sense of heiarchy, sense faculty will be participating as well. This school will be appositive, motivated, free, creative, and productive learning environment. All of this will increase scores on the standardized tests.

3. Elegance

Definition: the degree to which the participant's plan is articulately arranged in a succinct way.

Things to look for:

- **Flow**: Do all parts of the plan fit together smoothly? Does it flow seamlessly?
- **Refinement**: Is the plan easy to follow and well-refined? Is the plan focused well so that it uses the minimal number of elements to operate?
- **Clever**: Was the plan well-designed and cleverly put together?

Rating Scale

1 – Poor elegance. The plan lacks flow and focus. There are a number of ideas gathered together without order. Plan is very difficult to follow.

-Get experienced teachers
-group learning
-fun classroom environments
-good counselors
-incentives for good grades
-parent/teacher association
-small sports clubs
-strict code of conduct
-places on school campus that make student feel more comfortable
-college planning for seniors
-resources for students that might have money trouble
-non-lecture courses as well as lecture courses that students can choose from
-off periods
-longer lunches
-easy ways for parents to get involved

2 – Poor to average elegance. The plan reflects some organization of ideas, but at times is difficult to follow due to lack of focus.

3 – Average elegance. The plan shows good organization of ideas and they mostly fit together and are orderly. There may be too many unnecessary details regarding some ideas while other critical things are neglected.

Achieving academic excellence won't happen overnight. I believe the first step in doing so would be improving teaching strategies. Allowing for a variety of teaching strategies will help reach out to every student that has a different learning personality. Many students are audio, visual or any other type of learner so improving teaching strategies to help every student is a must Another thing is process improvement ideas. Allowing room for improvement and suggestions will help the school thrive and help academic excellence. Special activities will also help. By allowing our students time to relax and have fun, this will increase their drive to learn. Student motivation is very important in pushing students to want to achieve great things later on in life. Monitoring progress is also important in that focusing on the future and leading students in the right direction will increase academic excellence.

4 – Average to excellent elegance. The plan is easy to read and follow. The flow and focus of the plan make it easy to comprehend and it seems to fit well together. However it is not flawless, there are unnecessary ideas or missed points.

5 – Excellent elegance. The plan is easy to read and follow. The ideas flow together smoothly, are directly related to the problem and cover the critical elements of the plan. The adequate amount of detail is provided without being over the top. The plan is well thought out and organized.

The teachers hired at the school will be those with a strong resume and lots of experience. These teachers will conduct "hands-on" teaching to the students using fun and memorable ways for the students to learn. The teachers will also be required to attend workshops/conventions to learn different or more dynamic ways to teach. Just like the students, the teachers are learning too.

The school will have after school clubs for the kids based on their interests. Any student can start a club as long as their idea is appropriate. The school will also have sports teams, but to participate on these teams, the students must keep their grades at a B average or higher. They must also complete study hours every week.

After school tutoring will also be offered to students who are struggling, have questions or simply want more practice. The tutoring will be taught by teachers so that the students feel comfortable since they are familiar with the teachers. In addition to the tutoring, there will also be standardized test workshops. These workshops will help kids score better on these tests so they become better test takers and have a more competitive resume when applying for college.

Speaking of college, an academic advisor will be available to all the students. This advisor will have a strong college application, and inform them of financial aid opportunities like FAFSA and scholarships. They will also be responsible for organizing field trips to local universities and inviting representatives from all different universities to come speak to the students.

At the school we want the students to feel safe and have a sense of camaraderie among their classmates. In order to do this, a diversity training class will be required for all students. This workshop will teach kids to embrace each others differences instead of judge each other for them. This workshop will be similar to the one required here at OU. Feeling safe and accepted by your peers is vital to having a good high school experience and to foster an environment conducive to learning which is why this workshop is important.

To track the students progress, they will be tested regularly. This will give the students more test taking experience and will give the teachers an idea of what they need to improve on. The students will also be surveyed in order to find out how the school and teachers can better the students experience.

Appendix B

School Speech Ratings:

1. Perceived Utility

Definition: the extent to which the vision is realistic and useful for this particular domain.

Things to look for:

- How well do you think the ideas in this plan would work?
- Would people do extra work to implement the ideas in this plan?
- Would this plan cause change?
- Will this school be successful?
- Will this school provide students with opportunities for social and academic success?

Rating Scale

1 – Poor plan utility. The plan has very low utility, would not cause change, and would not be successful. The ideas are very unrealistic. No focus on encouraging followers to participate in implementation of the plan. Students attending this school would not find social or academic success.

> Achievements in Academics is No longer the Primary focus. We Administrators have devised a new model that we believe will cause Acedemic Success by increasing Student Satisfaction, motivation, and Resources. by increasing these three things the Acedemic Success will also increase, resulting in a symbiotic relationship between School and Student.

2 – Poor to average plan utility. The plan has some utility, but ideas are mostly unrealistic and most likely unsuccessful causing minimal change. The plan would potentially encourage followers, but most likely would not result in any active help of implementing the participant's plan. Students attending this school would find little to average academic and social success in this school.

3 – Average plan utility. The ideas are logical and somewhat realistic; a number of key issues may still be missing or vague and the plan may cause some change and be somewhat successful. The plan would probably encourage followers to minimally engage in implementing the plan, but encouragement would have a medium impact on followers. Students attending this school would find average academic and social success in this school.

> As you may or may not have been aware, the state of Oklahoma is currently ranked 47th in the nation for academic performance on standardized tests and 49th in educational funding. Our goals at Oklahoma Excel School are to put the state of Oklahoma, our state into the top 5 of both of these aspects. To accomplish this, we plan on introducing new methods of teaching that will increase the academic achievement of students while making the classroom more enjoyable. As a result of these new methods, we expect our students to obtain better interpersonal skills, attend class more regularly with an enthusiasm that has not been seen in schools.

4 – Average to excellent plan utility. Many of the ideas presented are realistic and logical; however some ideas are unrealistic or poorly thought out but would probably result in a good amount of change and be successful generally. The plan would most likely result in motivated followers who

would actively engage in implementing the plan. Students attending this school would find good academic and social success in this school.

5 – Excellent plan utility. The plan is very realistic and useful presented in a well-thought out manner, would cause a great deal of change, and be very successful. The encouragement is exceptionally convincing and would most likely result in motivated, active followers. Students attending this school would find high levels of academic and social success in this school.

> Oklahoma has come a long way in education. From the one room school houses to new and exciting ideas for better education for our children. Testing in Oklahoma schools have proven that traditional teaching is not always the best way to educate. We have the opportunity to explore alternative methods that may lead our children to a higher understanding of the world we live in, giving them more opportunities to improve themselves, their communities and the world. Why not take a chance and act on these exciting ideas for the greater good of our children and future. Oklahoma Excel School is a mixture of traditional and new teaching methods, teaching not only facts, but how to apply knowledge. Instead of their nose in a textbook, they will be interacting, helping each other, debating each other, in the process of mastering new material that will prepare them for college, future jobs, or anywhere life may lead them. To encourage you to look into our future and prepare for a new breakthrough in education.

2. Affective Reaction

Definition: the degree of attractiveness of the plan. Attractiveness represents the extent to which a follower would likely be intrigued, appealed, or interested in the ideas presented in the plan.

Things to look for:

- Would people find this plan attractive and exciting?
- Do you think most people would want to attend this school?
- Would most people consider this school better than the average high school?

Rating Scale

1 – Very low affective reaction. People would not be attracted or excited by this plan. People would not consider this school more attractive than the average school. People would not want to attend the school described in this plan.

> At this school we plan to teach new strategies to your children so that have higher academic achievement and will stand a better chance in life. Here at OEHS we care about your child's success we're not just here for the money. They are our future so we want to make them smart and capable at doing whatever they want to do. So hopefully you will send your child to this school and let there dreams come true. Thank you for your time, Principal Boren.

2 –Low affective reaction. People would be very minimally attracted or excited by this plan. People would mostly consider this school less attractive than the average school. People would most likely not want to attend the school described in this plan.

3 – Moderate affective reaction. People would be somewhat attracted or excited by this plan. People would consider this school about as attractive as the average school. People would be somewhat interested in attending the school described in this plan.

> Parents and students a change is in place. A new foundation for the Oklahoma Excel School is here. We have found some of the smartest, gifted and most talented teachers in the country. High schools have looked and depended on us for our success. The state is counting on us for it's academic reputation. This school will be competitive and challenging. Students, your knowledge and your potential will be put to the test. You will come out of this school being the world's brightest people that depend on it. This result will depend on your effort for success. Parents, your time has finally come to see your children become new people. Depending on their efforts, your children will be recognized nation-wide and give the brightest reputation to your family's name. In return for your children's success all we ask is for your support, support that will help benefit Oklahoma Excel and the future of students that will come onto campus. Thank you very much. You all are blessed to be here.

4 – High affective reaction. People would be attracted or excited by this plan. People would consider this school more attractive than the average school. People would be interested in attending the school described in this plan.

5 – Very high affective reaction. People would be very attracted or excited by this plan. People would consider this school much more attractive than the average school. People would be very interested in attending the school described in this plan.

> A great philosopher once said, “know thy self.” It seems today that our children hardly know themselves at all. If you could tell your daughter or son how talented at…say…art. Would they believe you and pursuer the arts and master them? No. Probably not. They would probably sit in front of a T.V. screen after finishing their homework, which was how to memorize the definitions of words they probably already know. What has happened to the quality of education? Of learning? How can we as parents and teachers be satisfied with teaching and encouraging a minimum standard? I have thought on this for a long time and wish to reveal a humble solution in order to let children begin to learn what they are capable of. First, I would propose to use a method where children work in groups together and receive a grade together. This motivates kids to perform like the others and thereby increasing performance through motivation. Research says that this method helps kids to become better at math, classroom appropriate behavior and have exceeded the standardized test scores. Secondly, I would want to establish a twice a week academic controversy. This also leads into philosophy’s rhetoric by making sure students know their material in order to participate in a debate. Overall, these methods will help to improve your child’s education.