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Using experience sampling methodology to understand how educational leadership students solve problems on the fly

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Abstract

Purpose – The purpose of this paper is to report on a pilot study of the emotional states associated with educational leadership students' attempts at problem solving "on the fly" in their schools and organizations.
Design/methodology/approach – Experience sampling methodology (ESM) was used to study 375 "problem-perceiving moments" in leadership students using iPod touches, followed by individual cognitive interviews (CIs).
Findings – Students reported higher levels of intrinsic motivation and cognitive engagement when solving new vs old problems. Students experienced both more positive and more negative emotions when attempting to problem solve than when reporting that they were not solving problems, yet lower levels of self-efficacy coupled with insufficient time to reflect on their leadership goals while at work. Consistent with previous research, students reported engaging in metacognitive and reflective activities more frequently while with supervisors and colleagues. In the CIs, students' narrative descriptions generally supported the quantitative analysis. For example, students described "putting out fires," and discussed multi-tasking as a deterrent to problem solving. They also talked about balancing the emotional "highs and lows" throughout their day as well as the role of social affirmation in the problem solving process.
Research limitations/implications – While the limitations of this small pilot study include a small sample using self-report data, the implications for educational leadership faculty are to explicitly integrate psychological research into leadership courses to expand students' knowledge of creative problem solving and focus on building their self-efficacy.
Originality/value – Even though students might not perceive they are good at problem solving, faculty can help them learn how to regulate their emotions and create teamwork conditions for constructively vetting problems. In turn, this kind of instruction and research can enhance leadership students' persistence as problem solvers, which may help prevent leadership burnout and turnover.

Keywords Research, Emotions, Leadership development, Problem solving, Creative thinking, Cognitive interviews, Experience sampling methodology
Paper type Research paper

The capacity to perceive and solve problems is a necessary and advantageous skill of educational leaders (Milstein and Kruger, 1997; Orr, 2006; Perez *et al.*, 2011; Schmidt-Wilk, 2011) that requires high levels of emotional management (McDowelle and Buckner, 2002; Weick, 1996). Problem-solving orientations have been linked to

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a higher degree of program implementation and continuation in schools (Louis *et al.*, 1981), and effective problem solving has also been related to a leader's ability to initiate organizational change and preserve survival (Reiter-Palmon and Robinson, 2009). Despite this research, few empirical studies have investigated the emotional and cognitive experiences of leadership students as they go about day-to-day problem solving in their roles as educational leaders. This paper reports on a pilot study using experience sampling methodology (ESM) and cognitive interviews (CIs) to study the cognitive and emotional states associated with students' abilities to sense difficulties (Torrance, as cited in Kerr and Gagliardi, 2003), or to problem solve "on the fly."

The importance of problem solving in educational leadership

The influence of school leaders is second only to instruction for improving student outcomes (Council of Chief State School Officers (CCSSO), 2008), making it critical to research how leaders mentally approach their daily leadership practice (Neck and Manz, 2010). This includes building an empirical understanding of school leaders' beliefs in their own ability to do their jobs (i.e. self-efficacy; Dee *et al.*, 2003; Edwards *et al.*, 2002; Tschannen-Moran and Gareis, 2004) as well as their ability to problem solve effectively (Law *et al.*, 2003; Leithwood and Steinbach, 1995). Effective implementation of leadership charge such as promoting student learning and staff growth (CCSCO, ISLLC standard 2) can be complicated by administering new programs and state and federal mandates, thus requiring constant problem solving.

Thus, problem solving has re-emerged as an important ability for school leaders, and is an increasingly valued framework in leadership preparation (Basadur, 2004; Fullan, 2002; Hunter *et al.*, 2011; Milstein and Kruger, 1997; Orr, 2006; Perez *et al.*, 2011; Puccio *et al.*, 2007; Rickards, 1993; Sandler *et al.*, 1972; Stenmark *et al.*, 2011; Sternberg, 2004, 2005a, b; Tomlinson, 2004). This framework has roots in cognitive science, and in situated cognition scholarship (Brown *et al.*, 1989; Scardamalia and Bereiter, 2006). Problem solving has been defined as a "type of thinking embedded in activity" (Leithwood *et al.*, 2003, p. 69) that requires "*sensing* difficulties, *problems*, gaps in information, missing elements [emphasis added]" (Torrance, as cited in Kerr and Gagliardi, 2003, p. 16). The way a leader thinks and feels about problems is considered to be an indicator of her external behavior (Leithwood and Steinbach, 1995). That is, how a leader conceptualizes problems influences how she ultimately solves problems and effectively leads an organization. However, little research has emphasized the initial phases of problem identification (Pretz *et al.*, 2003), and the corresponding emotions (Brown, 2000) that undergird such learning in leadership preparation programs (Simpson and Marshall, 2010). Once problems are perceived, steps to solve them include "making guesses or formulating hypotheses about these deficiencies; testing and retesting them; and finally in communicating the results" (Torrance, as cited in Kerr and Gagliardi, 2003, p. 16).

A combination of environmental factors, situational issues, personality, and experience play a part in a leader's ability to problem-solve (Cuban, 2001), but his or her emotional state in the cognitive process of problem solving is important and underemphasized in research. Strong negative emotions or emotional "numbness" can block a person's ability to derive creative solutions to problems (Isaksen *et al.*, 2011). For example, a leader who reports feeling overwhelmed or withdrawn and isolated might not be able to handle uncertainty in the work environment or be receptive to new ideas from other colleagues, supervisors, and supervisees. Consider how newly minted leaders embrace their jobs with energy and enthusiasm, but often become bogged

down in the daily slog of trying to negotiate persistent educational, social, and organizational problems, which organizational scientist Karl Weick (1996) aptly phrased as "fighting fires." Thus, high anxiety while problem solving may, in fact, lead to leadership turnover, making it important to unpack the way aspiring leaders perceive problems. As Weick (1996) noted, leaders often describe how they solve and manage problems in their jobs using strong emotional language, e.g. "fighting fires," "burning passion," but research in this area is sparse. While few people would refute that good solving problem abilities are a requisite part of effective leadership, there is a pressing need to study factors involved in the problem-solving process in leadership preparation.

Theoretical framework

Situated cognition theory (in education) and problem solving research (in psychology) inform the current study. Brown *et al.* (1989) emphasized the situational nature of cognition and learning, arguing that "emergent problems and dilemmas" can only be understood relative to context (p. 35). Understanding how school leaders authentically solve problems, then, is contingent upon the activities they are engaged in. This makes the act of problem solving especially suitable for using ESM, which examines multiple survey reports over time, as opposed to retrospective survey accounts. Scardamalia and Bereiter (2006) lend additional support to the importance of the contextual nature of problem solving by emphasizing understanding as emergent, discourse as collaborative, and knowledge advancement as idea improvement. For this study, four parts of the problem-solving process were discerned to help isolate the actual features of problem solving, and to understand the implications of past research for studying how school leaders solve problems in the moment: the importance of recognizing problems, the importance of setting aside sufficient and quality time to do so, identifying and classifying types of problems, and the necessity of complex emotional effort.

The act of perceiving a problem is paramount to generating effective solutions to that problem. Getzels emphasized that it is critical to examine how a person initially perceives a dilemma, before he or she transforms it into a "productive" problem. Problem recognition has been identified as the first of several stages in problem finding (Pretz *et al.*, 2003; Reiter-Palmon and Robinson, 2009). Being a good problem solver includes knowing how to delegate and prioritize work activities so that one can proactively examine productive problems, as opposed to working in a mostly reactive psychological state. Thus, basic tasks that require low capability and are not important might detract from more important tasks that draw upon higher levels of cognitive engagement and concentration (Isaksen *et al.*, 2011) and the ability to effectively develop real-world solutions (Davidson, 2003).

The claim that small tasks might detract from opportunities for high levels of cognitive engagement implies that problem recognition requires sufficient time, methods, and levels of cognitive effort for deconstructing experiences and generating good solutions (Bridges, 1992; Cuban, 2001). Leaders often attend to many different "global" or large problems, while at the same time dealing with basic, everyday tasks, such as running professional development workshops and meetings. Because these tasks might pull a leader's psychological state in multiple directions, this points toward the need to examine what tasks are considered basic vs global. Therefore, spending time with basic tasks, multi-tasking, or a fragmented psychological state might not be conducive to generating enough quality cognitive effort for effective problem solving. It is also important to examine whether particular weekdays, times of day, and lengths of time are factors in intellectually and emotionally contemplating problems in order to

reflect upon them and proactively transform dilemmas into productive problems. A leader's self-efficacy in problem solving might diminish over the course of a day, or over the course of a week when tasks might pile up and detract him or her from being able to set aside sufficient time and energy to problem solve.

In addition to understanding the opportunities and limitations of leadership tasks for problem solving, the nature and classification of a problem is relative to each person. For example, when implementing a new evaluation system, a leader might perceive the task of evaluating a teacher as a problem whereas another leader might not perceive that very same task as a problem. This points toward the need to gain insight into each leader's approach to perceiving problems. Consonant with Csikszentmihalyi's (1990) approach to examining flow and creativity, problem identification, and classification would depend on individual levels of interest, challenge, ability to concentrate, and belief in his or her ability to solve problems.

Second, a problem might be considered new or old depending on the leader's perception. Past research has made distinctions between "routine, well-structured problems" (Bridges, 1992) or "familiar" (Cuban, 2001) problems vs "non-routine, ill-structured problems" (Leithwood and Steinbach, 1995), indicating that these non-routine, ill-defined problems might present more difficulty to solve (Copland, 2000; Pretz *et al.*, 2003).

The rapid ebb and flow of daily leadership activities can be unpredictable (Leithwood and Steinbach, 1995; Weick, 1996) and thus involve quickly changing emotions during the workday (Beal and Weiss, 2004). This further points to the importance of examining the fluctuations in leaders' workday and workweek. A common thread among creative problem solvers is their emotional effort or "work." However, research is not entirely clear on the whether negative or positive emotions best enhance problem solving (Schwarz and Skurnik, 2003) as it depends on the nature of the task at hand. Positive emotions have been linked to creative behavior in leaders, teams, and followers (Amabile *et al.*, 2004; Atwater and Carmeli, 2009; Avolio and Gardner, 2005; Isen *et al.*, 1987; Zhou and George, 2003), which builds on positive psychology studies of the role emotions play (Goleman *et al.*, 2001; Mayer *et al.*, 2004). For example, Amabile *et al.* (2004) found that team managers also affect team members' feelings: unsuccessful team managers micromanaged and withheld information, resulting in employees' negative feelings, which ultimately stymied their creativity. This implies that managers and leaders are in positions to influence employees' feelings, which can impact the implementation of creative ideas at work. Creative persons may experience joy or find a deep pleasure in problem solving. Part of this joy and excitement is due to the challenging nature of the work: Csikszentmihalyi (1990) described flow as a state of enjoying the task, and suspending an awareness of task constraints and time. In some instances, Csikszentmihalyi refers to flow as the creative process, thereby implying that problem solving involves positive emotions. Shaw and Runco (1996), however, suggested that the creative process involves trying something new which can be frightful; one person might find a "problem" to be difficult while another may find it more enjoyable.

Zhou and George (2003) contended that understanding one's own emotions can help leaders transform negative affect into opportunities for problem solving to enhance organizational effectiveness and employee affect. But leadership scholars have also criticized the field for not examining negative affect in addition to positive affect (Gooty *et al.*, 2010). Emotions are a critical part of social experience as conceptualized by Dewey (1894, 1895), and the social context can be conducive to getting input for problem solving (Davidson, 2003). Emotional experiences in problem solving fall

within a continuum of negative to positive emotions: mild negative emotions such as dissatisfaction might drive a person to solve a problem whereas strong negative emotions such as extreme stress might throw a person off course for finding a good solution to a perceived problem (Isen *et al.*, 1987; Schwarz and Skurnik, 2003). In terms of positive emotions, the feelings of enjoyment and cognitive challenge propel a person to sustain interest and intrinsic motivation (Csikszentmihalyi and Hunter, 2003). But, low challenge and skill levels have been associated with eventual boredom – and even anxiety – in a task. A person needs to feel sufficiently challenged in order to be optimistic and happy (Csikszentmihalyi and Hunter, 2003), which create the requisite conditions for problem solving in a creative manner, and yet extreme happiness might promote complacency and even a lack of empathy for another colleague or student's problem, so that it does not get solved.

To summarize, perceiving problems, or the ability to sense and alleviate difficulties (Torrance, as cited in Kerr and Gagliardi, 2003), has been researched extensively and has been associated with educational administration skills. However, it has not been researched systematically at leaders' initial phase of perceiving problems, with regard to sufficient opportunities for problem recognition, the identification and classification of problems, and the leaders' momentary emotional experience.

The primary research methods for examining leaders' problem identification and classification have been limited to think-aloud strategies (Leithwood and Steinbach, 1995), problem-based learning (PBL) (Bridges, 1992; Copland, 2000), or, with non-leader subjects, experimental tasks solving word problems (Pretz *et al.*, 2003). These methods are based on recalling past experiences, pretending to encounter problem-solving experiences in the context of a case-based simulation, or solving more abstract, intellectual puzzles. As Davidson (2003, p. 165) remarked, "solving these puzzles does not require the same motivation, social interaction, preparation time, restructuring, and solution procedures that individuals need to solve significant, real-world problems." Past research thus fails to examine the truly situated nature of immediate encounters with problems during the workday and workweek in the workplace, thus indicating the need to employ research methods that capture daily attempts at problem solving, such as ESM. This ESM study attempts to address this gap.

ESM is a method for contacting participants to report on their real-world activities multiple times a day, over a period of several days (Hektner *et al.*, 2007), as opposed to collecting retrospective information on experience through one-time surveys, for example. The hypotheses are stated here coupled, supported by the literature review:

H1. New problems (Copland, 2000; Cuban, 2001) will be associated with higher levels of cognitive engagement (as indicated by concentration and perceptions of challenge and importance of the task) and intrinsic motivation (as indicated by enjoyment, interest, and desire to be completing the task), compared to prevalent problems and non-problem moments.

H2. Problem-solving moments will be more strongly associated with positive work attitudes (including feeling cooperative, responsible, caring, proud, friendly, and productive) compared to non-problem moments.

H3. A high frequency of basic types of tasks (Isaksen *et al.*, 2011) will correspond to reduced opportunities for problem solving attempts.

H4. In the presence of others (vs being alone), leadership students will experience enhanced self-efficacy to solve problems (Davidson, 2003), as indicated by feeling that they have the abilities to deal with the situation, they are succeeding at what they were doing, and that they are in control of the situation.

H5. Leadership students will perceive problems to be more difficult as time progresses in the workday and in the workweek.

Methodology

The purpose of the present study was to examine the self-reported, momentary emotional experiences of leadership students' attempts at solving problems while engaged in leadership activities over the course of five days. We adopted a contextual research approach advocated by Avolio (2007, p. 29) who suggested attention to the "proximal context" of how leaders work, as opposed to a laboratory setting. The ESM was used to gather multiple reports of momentary experience from a purposive sample of 15 leadership students. Once the leadership students completed the ESM surveys, they participated in individual CIs.

Sample

A convenient, purposive sample of seventeen leadership students enrolled in an educational research design course in an educational leadership EdD program at a mid-Atlantic private research university were recruited in a course session, and fifteen decided to participate in the study. Nine leadership students managed programs in higher education or served in senior leadership positions; three leadership students were clinical instructors in higher education programs who helped manage programs and thus held emergent leadership responsibilities; and three leadership students worked in K-12 administration. While this sample is small, we focussed our data collections on the sample of moments, which included 375 distinct "problem perceiving" moments taken from the population of all possible moments during the workdays of each of the leaders.

Development of survey items

For the current pilot study, a list of survey items was drafted based on three well-known experience sampling forms from the 500 family study (Schneider and Waite, as cited in Hektner *et al.*, 2007) and the sloan study of youth and social development (Csikszentmihalyi and Schneider, as cited in Hektner *et al.*, 2007). Then, eight leadership faculty members with both K-12 and higher education experience generated feedback regarding the survey.

Thirteen negative and positive emotional terms were identified for the study's ESM survey based on the positive and negative affect scale (Watson *et al.*, 1988): "happy, cooperative, responsible, frustrated, strained, caring about work, caring about colleague/student, irritated, relaxed, stressed, proud, friendly, and productive." Items that did not seem relevant to leadership practice, e.g. "jittery" and "hostile," were eliminated. Next, we used 18 emotional terms from the 500 family study (Schneider and Waite, as cited in Hektner *et al.*, 2007) and the sloan study of youth and social development (Csikszentmihalyi and Schneider, as cited in Hektner *et al.*, 2007). Of these 18 terms, six were eliminated in order to make the survey brief enough to answer. In order to include empathy, the term "caring" was included. During the

initial piloting of the survey, the term "caring" was confusing. Therefore, the term "caring" was specified with greater granularity: "caring about work" and "caring about colleagues/students." Table I includes the final survey items used in the study.

Piloting the ESM survey using software compatible with mobile devices

An electronic version of the ESM survey was created and piloted using two types of mobile applications. The survey was tested for one week with three people (the first author, a learning and technology professor, and a mobile learning coordinator). At the end of that week, the first author obtained feedback for clarifying the wording and sequence of each item. Finally, the second version of the ESM survey was piloted by the same people over approximately four weeks.

Phase 1: ESM surveys

iPod Touch handheld computers were loaned to the students during an orientation. Students were trained on using the iPods and completing the survey. The iPod alarm sounded at a random time within each of five two-hour blocks of time during each of the five workdays of the study, Monday through Friday. The alarm signaled each student to complete a survey, which took approximately three to –four minutes. See Figure 1 for a screenshot of one survey question. The first author monitored the response in real time on her computer to ensure the questions were answered completely, and contacted each student if they were slow to respond. The 15 leaders completed approximately 25 surveys each, yielding 375 survey responses, which resulted in a 100 percent response rate. The time-of-day and date were automatically recorded as the student completes each survey.

Question	Response options
Time of day	Automatically collected
Date	Automatically collected
As you were beeped, what was the main thing you were doing?	See Table II for categories
Does this activity involve a challenge or problem that is:	New, prevalent, NA (does not apply)
Who were you with?	See Table II for categories
As you were beeped, were you feeling:	
Happy, frustrated, strained, irritated, relaxed, stressed, cooperative, responsible, caring about work, caring about colleague/student, proud, friendly, productive	0 not at all to 3 very much (answered for each emotion term)
Did you enjoy what you were doing?	0 not at all to 3 very much
Was this activity interesting?	0 not at all to 3 very much
How well were you concentrating?	0 not at all to 3 very much
Did you feel in control of the situation?	0 not at all to 3 very much
How challenging was the main activity?	0 not at all to 3 very much
Did you have the abilities to deal with the situation?	0 not at all to 3 very much
Was the activity important to you?	0 not at all to 3 very much
Were you succeeding at what you were doing?	0 not at all to 3 very much
Did you wish you were doing something else?	0 not at all to 3 very much
If you were talking to others …	
Did they care about what you were saying?	0 not at all to 3 very much
Were you able to express your opinion?	0 not at all to 3 very much
Did others really listen to you?	0 not at all to 3 very much

Table I.
ESM survey questions and response options

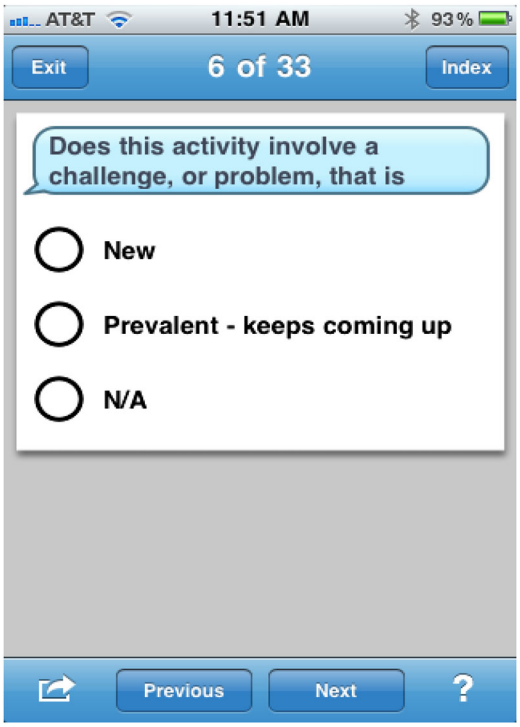


Figure 1.
Screenshot of ESM survey question No. 6 (33 questions total), using SurveyDeck mobile software on an iPod touch

Leadership students' open-ended responses to the survey questions regarding their current activities and thoughts were coded into six categories:

(1) organizing, communicating and executing;

(2) managing interpersonal relationships;

(3) teaching and learning;

(4) metacognitive and reflective;

(5) financial issues; and

(6) maintenance.

The first author coded hundreds of open-ended responses using a more fine-grained categories, and then asked a colleague to examine and code select examples of open-ended responses, Finally, the categories were condensed in consultation with the second author. The frequencies with which these types of activities were reported are given in Table II. The first category included tasks such as setting up meetings and responding to inquiries through phone, e-mail, and meetings. The second category included meetings with staff members to help them develop their skills and oversee job tasks. The third category included time spent teaching a class or taking a class. Metacognitive and reflective activities represented ways that leadership students spent time thinking, talking about and considering the efficacy of their own leadership approach. Financial issues referred to managing budgets and larger financial issues, and maintenance referred to ways leaders met their basic needs eating and transporting to and from work.

	n	%
Problem involvement		
New problem	112	29.8
Prevalent problem	166	44.1
Not a problem	98	26.1
Leadership activities		
Organization and communication	120	32.9
Interpersonal	45	12.3
Teaching	77	21.1
Metacognitive	56	15.3
Financial	21	5.8
Maintenance	46	12.6
Interacting with		
No one (alone)	198	53.4
Supervisor	18	4.9
Administration colleagues	80	21.6
Faculty	15	4.0
Student(s)	36	9.7
Staff	24	6.5

Notes: $n = 376$ total responses. Percentages given are of the non-missing responses

Table II.
Frequencies of problem involvement, activities, and interactive partners

Phase 2: CIs

CIs were used to evaluate the quality of survey responses (see Beatty and Willis, 1997; Willis, 1999; Willis and Miller, 2011) as a post-hoctool for probing how students understood the ESM survey questions, and to elaborate on their emotions during problem-perception. CI's were conducted either face to face, with Skype, or on the phone if leaders worked in distant locations. Because leadership students have busy schedules, we also wanted to give them a chance to recollect how they attempted to solve problems during the time period of five days while completing ESM surveys, and to report if they experienced significant or unusual personal or professional issues that may have affected their self-reporting of emotions. Pseudonyms are used to ensure anonymity and confidentiality. As soon as the students completed the surveys, one interview was conducted with each of them, lasting approximately 30-60 minutes in length. Interviews were audio-recorded and detailed notes were taken. Each response to the interview questions was written as a narrative summary for each student (referred to as a case analysis in Willis, 1999). Interviews were then transcribed and coded. Interview themes were discussed with colleagues to ensure the findings and resulting inferences were accurately grounded in the data. Once the analysis occurred within the qualitative approach (CIs) and quantitative approach (ESM survey responses), analysis also occurred between the two approaches (Creswell, 2003, p. 220) as explained below.

Results

This section is organized according to the hypotheses. For each hypothesis, quantitative analysis of the survey responses is presented with the relevant qualitative analysis of the CIs, suggested by Creswell (2003).

Preliminary ESM analyses: measurement of constructs

Positive and negative emotions. A principal components analysis with varimax rotation was conducted on the 13 emotion items (see Table I for the list of these items). Two

constructs (positive work attitude and negative emotions) were clearly identified by Eigen values >1 and by scree; these factors accounted for 60.3 percent of the variance. Rotated loadings of each item on its principal factor were all above 0.55, with no item loading onto more than one factor. The positive work attitude construct was computed as the average of cooperative, responsible, caring about work, caring about colleague/student, proud, friendly, and productive. Reliability, as measured by Cronbach's α internal consistency coefficient, was 0.83. The negative emotions construct was computed as the average of happy (reversed), frustrated, strained, irritated, relaxed (reversed), and stressed. Cronbach's α for this scale was 0.89.

Cognitive experience. Items that reflected students' cognitive experience included the student's level of enjoyment, interest, concentration, control of the situation, challenge, importance, perception of ability to do the activity, perception of succeeding at the activity, and desire to participate in the activity (see Table I for exact item wording). These items were included in a principal components analysis with varimax rotation. Three constructs were clearly identified with Eigen values >1 and by scree; these factors were labeled self-efficacy, intrinsic motivation, and cognitive engagement, and they collectively accounted for 70.7 percent of the variance. Rotated loadings of each item on its principal factor were all above 0.70, with no item loading onto more than one factor.

The self-efficacy construct was computed as the average of control and perceptions of ability and success. Cronbach's α for this scale was 0.75. The intrinsic motivation construct ($\alpha = 0.79$) was computed as the average of enjoyment, interest, and desire to participate (reversal of "wish to be doing something else"). The cognitive engagement construct ($\alpha = 0.73$) was computed as the average of concentration, challenge, and importance.

Cognitive and emotional experiences of problem solving (analyses for H1 and H2)

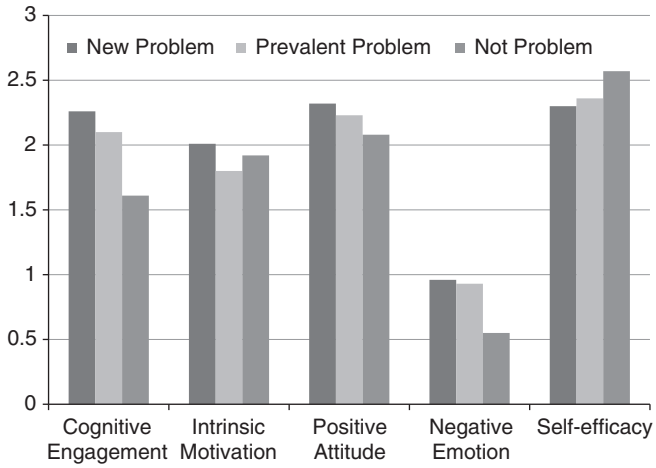
ESM analyses of problem types. Table II presents the frequencies with which students reported dealing with a new problem, prevalent (ongoing) problem, or no problem at all when they were signaled. To examine the relationship between problem involvement and momentary cognitive and emotional experience, two dummy variables were created, one to represent moments when students indicated working on a new problem, and one representing moments when they were working on a prevalent or ongoing problem. The omitted reference category included moments when they indicated not working on any problems. The two dummy variables were entered into a set of multi-level mixed regression models in which each emotion and cognitive experience variable was a dependent variable. In the multi-level models, responses (Level 1) were nested within individuals (Level 2), and the problem involvement dummy variables were treated as time-varying (i.e. Level 1) covariates. The intercept was random and thus allowed to vary for each individual. In order to compare the experience of new problems to that of prevalent problems, a second set of models were also estimated, in which prevalent problems was the omitted reference category. Estimated coefficients from these models are presented in Table III.

Estimated means from the first set of models were computed from the fixed coefficients estimated in each model. The mean for no problem involvement is equal to the intercept. The mean for each of the other problem involvement categories (i.e. new or prevalent) is equal to the sum of the intercept and the coefficient for the corresponding dummy variable for that category. Estimated means are graphed in Figure 2. Compared to no-problem moments, new problems, and prevalent problems both corresponded with significantly higher levels of cognitive engagement, positive

Problem type	Cognitive engagement	Intrinsic motivation	Positive work attitude	Negative emotion	Self-efficacy
Intercept[a]	1.61***	1.92***	2.07***	0.55***	2.57***
	0.09	*0.12*	*0.10*	*0.11*	*0.08*
New Problem[b]	0.65***	0.09	0.25***	0.42***	−0.27**
	0.08	*0.11*	*0.07*	*0.08*	*0.08*
Prevalent problem[b]	0.49***	−0.13	0.16*	0.39***	−0.21**
	0.07	*0.10*	*0.06*	*0.08*	*0.07*
New problem vs prevalent[c]	0.16*	0.21*	0.09	0.03	−0.06
	0.07	*0.09*	*0.06*	*0.07*	*0.07*

Notes: β coefficients are provided, with standard errors in italics. [a]Represents the level of the experience variable for the omitted reference category, No Problem; [b]compared to omitted reference category, No Problem; [c]in a separate set of models, in which prevalent problem was the omitted reference category. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table III.
Coefficients in multi-level models predicting experience by problem type



Notes: New problems and prevalent problems both significantly differ from non-problem moments on all measures graphed except intrinsic motivation. New problems significantly differ from prevalent problems only on cognitive engagement and intrinsic motivation

Figure 2.
Cognitive and emotional experience of educational leaders by type of problem involvement

work attitude, and negative emotions. New problems and prevalent problems also led to significantly lower levels of self-efficacy. New problems were associated with higher levels of intrinsic motivation and cognitive engagement than prevalent problems, but neither type of problem moment differed from non-problem moments on intrinsic motivation. Thus, *H1* is fully supported for cognitive engagement but only partially for intrinsic motivation. *H2*, that positive emotions would be more strongly associated with problem than non-problem moments, was supported; however, negative emotions were also more strongly associated with problem than non-problem moments.

Qualitative analysis: emotional descriptions of problem solving, e.g. "putting out fires" and "walking on eggshells"

In the CIs, many leadership students used strong emotions such as "draining," "frustration," and "surprising" to describe how they "put out fires" and "walk on eggshells" while problem solving. When describing the problem-solving process, one student explained that she had a strong initial reaction, by thinking, "Oh my G-d, are you serious?!" when she first learned about ongoing problems that she believed should not exist in the first place. Consistent with this type of reaction, another student said that she usually exclaimed, "Are you kidding me?" Other students disclosed that they first felt frustrated and then returned to the problem to clarify the nature of the problem. Next, they referred back to their experience by asking themselves, "What did I do before?" One student said that she mediated her frustration by telling herself that "irate" students' source of anger stemmed from disappointment in themselves, even if the anger was directed at her: "Of course, negative ones [moments] are the ones staying in your mind as you drive at home at night." The firefighting metaphor (Weick, 1996) was also used by another student to describe her administrative role, "You're almost in a, like a fire fighter, you're always just putting our fires, reacting to situations as they develop whether they're student driven or university driven, or whatever."

Activities associated with problem solving (analyses for H3)

ESM analysis. A cross tab at the signal level showed that identification of problem-solving moments occurred in only 23.9 percent of maintenance activities but in over 75 percent of all of the other types of activities, $\chi^2(5,\ n=365)=76.6,\ p<0.05$. The activities with the highest proportion of problem solving moments were metacognitive and reflective and dealing with financial issues; over 90 percent of the moments students spent in these activities were also identified as problem-solving moments. At the person level, sample size is small ($n=15$), so statistical power is low. Nevertheless, the percentage of time students spent on new problems was positively associated with the percentage of time they spent on metacognitive and reflective activities, $r=0.527,\ p<0.05$. These results provide evidence consistent with *H3*, that a high frequency of basic tasks will provide reduced opportunities for problem solving.

Qualitative analysis: descriptions of activities that are a deterrent to effective problem solving

When leadership students were asked to describe the nature of their work in the CIs, multi-tasking was referred to as a prevalent activity and was identified as a deterrent to deep reflection needed for effective problem solving and honing one's metacognitive abilities. For instance, one student said:

> I can just multitask a lot. So usually, I am on the phone sending emails and I may have staff in and out of my office […]. I feel bad when I am doing it […] even if I do pretend to give them my full attention […] which is interesting because I may have been pretending to listen to them […] And I am sitting there and I can just be on my cell phone, "uh-huh, uh-huh, uh-huh." Trying to rush them through whatever is the problem is and not giving them my undivided attention because I know I have some other things to do.

She also added that her multi-tasking can affect her perception of the importance of a student's problem, "And I guess, when it comes to bite me is when it [the problem] is more important to them than when I thought it was." Another student, who is an assistant principal, stated that his six managerial duties "chews up [his time]" which can make him prone to "knee-jerk reactions." He described further that multi-tasking

made it challenging to take the time to review the problem before reacting to it, to be proactive about solving problems, and to compartmentalize problem solving so that it did not influence his family time.

Effects of the presence of others (analyses for H4)

ESM analysis. As seen in Table II, students reported being alone slightly more than half of the time. Colleagues in administration were their most frequent interaction partners. Figure 3 presents the estimated means from the multi-level models testing whether differences in students' emotional experience occurred across different types of interaction partners. Being alone was the omitted reference category. Analyses showed that students experienced significantly higher levels of cognitive engagement while with supervisors and students than when they were alone. See Table IV for coefficients. Positive work attitudes were also higher with supervisors and students than when alone. Intrinsic motivation was higher with supervisors, colleagues, and faculty than when alone. Compared to being alone, being with students was accompanied by higher levels of self-efficacy. Finally, there were no significant differences in negative emotions across the different types of interaction partners. This pattern of results suggests, in accord with *H4*, that the presence of others may facilitate problem solving.

A χ^2-analysis showed no significant patterns of social interaction to correspond to dealing with a new problem, prevalent problem, or no problem. Different types of activities, however, did correspond to different patterns of social interaction, $\chi^2(9, n = 295) = 53.4,\ p < 0.001$. Organizing, communicating, and executing were more often done while alone, whereas managing interpersonal relations was done more often while with faculty, staff, or students. Metacognitive and reflective activities were most frequent while with supervisors and colleagues in administration.

Qualitative analysis: descriptions of working with others to "make things good" and "be on top of [one's] game"

In the CIs, many leadership students described a strong sense of professional satisfaction in helping students, which appealed to their personal desire to improve the

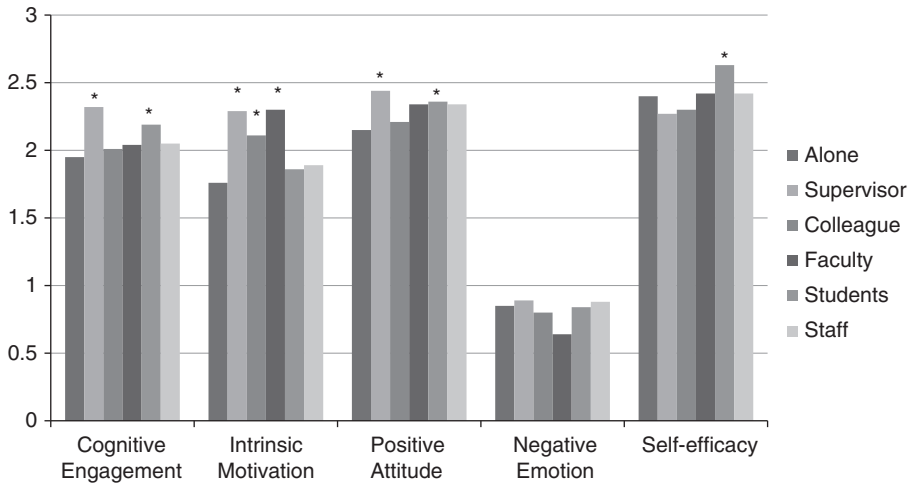


Figure 3.
Emotional experience of educational leaders when with each type of interaction partner

Note: Bars topped by asterisks represent significant differences from when alone

Interaction partner	Cognitive engagement	Intrinsic motivation	Positive work attitude	Negative emotion	Self-efficacy
Intercept[a]	1.95***	1.76***	2.15***	0.85***	2.40***
	0.09	*0.10*	*0.10*	*0.10*	*0.06*
Administrative supervisor	0.37*	0.53**	0.29*	0.04	−0.13
	0.14	*0.18*	*0.11*	*0.14*	*0.14*
Administrative colleagues	0.06	0.35***	0.06	−0.05	−0.10
	0.08	*0.10*	*0.06*	*0.08*	*0.08*
Faculty	0.10	0.54**	0.19	−0.21	0.02
	0.17	*0.20*	*0.13*	*0.16*	*0.16*
Students	0.24*	0.10	0.21*	−0.01	0.23*
	0.11	*0.14*	*0.08*	*0.11*	*0.10*
Staff	0.10	0.13	0.19	0.03	0.02
	0.13	*0.16*	*0.10*	*0.13*	*0.12*

Table IV.
Coefficients in multi-level models predicting experience by interaction partners

Notes: β coefficients are provided, with standard errors in italics. [a]Represents the level of the experience variable for the omitted reference category, being alone. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

quality of peoples' lives. This confirmed the ESM responses indicating that positive work attitude and self-efficacy was higher when they were with supervisors and students than when they were alone. Several students viewed themselves as embedded in extant social networks, wanting to "make things good" and "be on top of my game." For example, one student expressed how he did not want to damage his work performance and his reputation. When describing how he felt during problem-solving instances, he said that he was nervous, worried, and sought affirmation from others in the field. Another student also depicted his problem-solving process as nested within the context of social dynamics, but more so because he was a supervisor and less so about pleasing others. He conveyed that he felt a large amount of responsibility for the 55 employees who relied upon him. Other students perceived themselves as part of a larger role – connecting organizations to other departments and units within a university setting. When describing the social nature of how she worked with others to get feedback, one student said:

> I'm always less confidant if I've done it by myself without anyone else. So that was a – it's like sort of the overarching [thing] that week that was so stressing for me. Like I've spent so much time by myself, I have no idea if this makes sense at all. And then I have to go present it to the administration.

Patterns in the workday and workweek (analyses for H5)

ESM analysis. We examined how emotional experience varied based on which day of the week it was by analyzing another set of multi-level models with dummy variables representing each day of the week. Wednesday was chosen as the omitted reference day due to its location in the middle of the workweek. Coefficients from these models are presented in Table V. There were no differences among the days of the week on cognitive engagement and intrinsic motivation. Mondays were significantly lower than Wednesdays (and the lowest of any day) on positive work attitude, and Mondays were significantly higher (the highest of any day) on negative emotions. Wednesday was the day with the highest levels of self-efficacy, and Thursdays were significantly lower (the lowest of any day).

Day of week	Cognitive engagement	Intrinsic motivation	Positive work attitude	Negative emotion	Self-efficacy
Intercept[a]	2.04***	1.87***	2.29***	0.75***	2.48***
	0.11	*0.12*	*0.11*	*0.11*	*0.08*
Monday	−0.04	−0.07	−0.15*	0.25**	−0.13
	0.09	*0.12*	*0.07*	*0.09*	*0.09*
Tuesday	0.05	0.08	−0.09	0.08	−0.03
	0.09	*0.11*	*0.07*	*0.09*	*0.09*
Thursday	−0.09	0.05	−0.07	0.12	−0.21*
	0.10	*0.12*	*0.08*	*0.10*	*0.09*
Friday	−0.11	0.18	−0.06	−0.01	−0.07
	0.11	*0.14*	*0.08*	*0.11*	*0.10*
Saturday	−0.28	−0.25	−0.23	−0.05	−0.00
	0.20	*0.25*	*0.15*	*0.19*	*0.19*

Notes: β coefficients are provided, with standard errors in italics. [a]Represents the level of the experience variable for the omitted reference day, Wednesday. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table V.
Coefficients in multi-level models predicting experience by day of week

To test whether the relationship between problem involvement and emotional experience varied by day of week, interaction effects were tested by including a term for the product between each day of the week dummy variable and a dichotomous problem/no problem dummy. There was a significant interaction between Wednesday (vs all other days) and problem involvement (vs no problem), $p = 0.044$, such that self-efficacy was higher on Wednesdays only for moments with no problem involvement. During problem involvement, self-efficacy dropped and did not differ between Wednesdays and other days. There were no other significant interaction effects. Thus, there is no evidence supporting the contention in *H5* that problems would be perceived as more difficult as the week progressed.

To examine whether time of day produced variation in emotional experience, we divided the workday into four segments: morning (9:00 a.m.–11:00 a.m.), midday (11:01 a.m.–1:00 p.m.), early afternoon (1:01 p.m.-3:00 p.m.), and late afternoon (3:01 p.m. to the end of the day). In the multi-level models, morning was used as the omitted reference category. Coefficients from these models are shown in Table VI. Analyses showed no time-of-day differences in cognitive engagement, intrinsic motivation, or negative emotions. For positive work attitude, late afternoon had the lowest levels, significantly lower than morning, which had the highest levels. Morning was also highest in self-efficacy, whereas early afternoon was the lowest and significantly different from morning. There were no significant interaction effects between time of day and problem involvement on emotional experience. If problems are not necessarily seen as more difficult at the end of the day, as suggested by *H5*, they do appear to be less enjoyable at that time. Early, rather than late, afternoon appears to be the most difficult time of day for problem solving.

Qualitative analysis: descriptions of balancing the "highs and lows" throughout the day
In the CIs, leadership students characterized the ebb and flow of problem solving throughout the day as balancing "highs and lows." For example, one student commented that:

> We have these highs and lows throughout the day. I have one person visit my office because they were suspended and they are upset and then the next student, half an hour later showing me all

Time of day	Cognitive engagement	Intrinsic motivation	Positive work attitude	Negative emotion	Self-efficacy
Intercept[a]	2.05***	1.94***	2.29***	0.80***	2.49***
	0.10	*0.12*	*0.11*	*0.11*	*0.07*
11:00 a.m.-1:00 p.m.	0.05	−0.05	−0.04	0.08	−0.10
	0.09	*0.11*	*0.07*	*0.09*	*0.08*
1:00 p.m.-3:00 p.m.	−0.08	−0.12	−0.07	0.02	−0.16*
	0.09	*0.11*	*0.07*	*0.08*	*0.08*
3:00 p.m.-6:00 p.m. +	−0.14	−0.01	−0.20**	0.04	−0.10
	0.09	*0.11*	*0.07*	*0.09*	*0.09*

Table VI.
Coefficients in multi-level models predicting experience by time of day

Notes: β coefficients are provided, with standard errors in italics. [a]Represents the level of the experience variable for the omitted reference time, 9:00 a.m.-11:00 a.m. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

> this great work […] So there is a balance to what I do too. So, I think really the highs really outnumber those low cases.

Another student also described how she tried to regulate these highs and lows in her staff and students: "You try to keep everybody happy and balanced. It is just a juggling game. It just never goes away." Still yet, a third student described this process of balancing student's highs and lows as not "being wounded by their moods." Lastly, another student described explicit efforts to follow-up with staff as a way to monitor their problem-solving abilities from past days, and support them:

> It's following up on Monday, you know, how did that game that you went to that we talked about on Friday go? I mean it's that taking it to the next level with them through a conversation or through sending them a short email that acknowledges, you know, a job well done on a situation or something like that. The helps them to feel good and, you know what, they're going to continue to work even harder for that.

Taken together, these quantitative (analysis of ESM survey reports) and qualitative (analysis of CIs) results show how the leadership students in this study approached the emotional nature of problem solving in educational organizations with staff, students, and supervisors, over the course of each day in a workweek. We discuss the results further in the following section.

Discussion of perceiving problems "On the Fly"

The purpose of this study was to examine the self-reported emotional states of 15 leadership students' problem solving on the fly while engaged in leadership activities over the course of five days. Confirming the common-sense notion that leaders handle problems all the time, problem perception was a major part of workday activities reported in the ESM surveys (75 percent) and was laden with both positive and negative emotions. This is consistent with results found in other ESM studies of flow at work (e.g. LeFevre, 1988; Schallberger and Pfister, 2001; To *et al.*, 2011) and leadership research on problem solving (Bridges, 1992; Cuban, 2001; Leithwood and Steinbach, 1995; Weick, 1996). With regard to what was considered to be a problem, leadership students identified only 23.9 percent of maintenance activities as problem-solving moments, but over 75 percent of all of the other types of activities were considered to be problem-solving moments. In particular, over 90 percent of the moments students

spent in metacognitive and reflective activities or dealing with financial issues were also identified as problem-solving moments. This seems to confirm Isaksen *et al.*'s (2011) assertion that problem solving is more associated with reflection than basic tasks such as maintenance.

The ability to perceive a problem was more nuanced than simply identifying a plethora of problems – perceiving problems on the fly corresponded in interesting ways with other cognitive and emotion variables. For instance, when students perceived both new and prevalent problems, they reported feeling challenged, experienced high levels of concentration, and perceived the problem to be important, with higher levels of these indicators of cognitive engagement for new problems than prevalent problems. Because the designation of a moment as involving problem solving was an individual subjective judgment, this association between problem solving and cognitive engagement is likely to involve reciprocal causation. Three other points are notable about this finding.

First both new and prevalent problems were associated with lower levels of success, control, and ability (self-efficacy) levels in these leaders. Thus, cognitive engagement was high during problem engagement, but self-efficacy was low. Because self-efficacy is related to empowerment, which can be fostered through teamwork (Dee *et al.*, 2003), perhaps the leadership students in this study experienced low self-efficacy because they were working in solitude half of the time. Moreover, because Edwards *et al.* (2002) stressed that teachers who think they can make a difference, do, it is important to explore ways to boost leadership students' self-efficacy because they too highly influence student-learning outcomes (CCSSO, 2008; Tschannen-Moran and Gareis, 2004). Therefore, when and why leadership students' self-efficacy levels change remains an important concern in leadership preparation.

Problem perception was associated with an upswing in cognitive effort but a downward spiral in believing one could be successful at creative problem solving. Although leaders experienced greater engagement and intrinsic motivation when encountering new problems than pre-existing problems, their self-efficacy for solving those problems was low regardless of whether the problem was new or not. Both types of problems presented the same difficulty level for developing the next phases of deriving and implementing solutions. This finding is inconsistent with previous literature indicating that new, or non-routine problems tend to be harder to solve (Copland, 2000; Cuban, 2001; Leithwood and Steinbach, 1995; Pretz *et al.*, 2003).

Third, we had anticipated that positive emotions are more highly associated with problem moments than non-problem moments. However, although this expectation was fulfilled, negative emotions were also stronger during problem moments than non-problem moments. Thus, the results showed that emotions played a complex role in problem engagement, a role that was also influenced by the social context. Interpersonal interactions with students, colleagues, and/or supervisors were related to high levels of students' positive work attitude, cognitive engagement, intrinsic motivation, and self-efficacy, which were confirmed in the CIs. But, this was not so for negative emotions, which did not depend on whether the leader was alone or not.

In addition to how the role of emotion plays out in new vs prevalent problem-perception and problem vs non-problem moments, we were interested in whether a high frequency of more basic types of tasks (Isaksen *et al.*, 2011) might indicate reduced opportunities for developing approaches to problem solving. The results confirmed that students spent only 15 percent of their time in "metacognitive and reflective activities." Indeed, in the CIs, students commented that multi-tasking "chewed" up their time so that their

ability to think deeply about problems was diminished. This clearly indicates limited time for developing adequate problem solving as cited by Pretz *et al.* (2003). If educational leaders spend most of their time with organizational maintenance and executing preconceived tasks, then how much of their time can be devoted to truly identifying the types of cues, patterns, and anomalies that are intrinsic to problem solving (Pretz *et al.*, 2003)? Because Bridges (1992) and Cuban (2001) emphasize that leaders need ample time and guidance for deconstructing experience and generating good solutions, this study indicates that leaders might need to build in more time and capitalize upon other methods such as collaborative discourse (Scardamalia and Bereiter, 2006) to engage in proactive problem solving. Leadership preparation curriculum can be used as a way to promote problem-solving capabilities of leadership students considering the lack of workplace time for such activities.

With regard to the hypothesis that leadership students' self-efficacy would be enhanced while in the presence of others, students did report that social interactions helped them to think about their work. While social interaction did not appear to influence how students solved a new or prevalent problem, students did report engaging in metacognitive and reflective activities more frequently while with supervisors and administrative colleagues. Examples of such activities were mentally listing tasks, clarifying thoughts and ideas and considering ways of acting in a political and diplomatic manner. As implied earlier, this suggests that reflecting on and strategizing one's next leadership goal is fostered by discussion with colleagues and supervisors.

The patterns of problem perception during the workday and work week did not confirm our predictions. Leadership students felt most self-efficacious on Wednesdays and least on Thursdays. Students reported that they felt the least positive about their work on Mondays. Negative moods on Mondays have been reported before among full-time workers, and even among retirees (Zuzanek and Mannell, 1993). In the current study, students felt least cooperative, friendly, productive, proud, and responsible on Mondays; they also felt the most frustrated, irritated, strained, stressed, unhappy, and not relaxed. However, Wednesdays marked a turn-around point in students' belief in their leadership abilities (self-efficacy) only if they were not solving problems. Their self-efficacy slumped on Thursdays. Within each day, students' positive emotion and self-efficacy peaked in the morning, and dipped in the afternoon. The afternoon slide in mood is consistent with other ESM results (Weiss *et al.*, 1999).

In summary, the current study contributes an understanding of the psychological effort of perceiving problems in leadership students situated in the naturalistic conditions of daily workplace problem-perception, as opposed to the experimental study conditions used in past problem-solving research (Davidson, 2003). First, the study confirms the occupational reality that educational leaders spend most of their time encountering problems, or "fighting fires" (Weick, 1996) as captured through ESM. Contradictory to scholarship stating that non-routine, ill-defined problems present more difficulty to solve (Bridges, 1992; Copland, 2000; Cuban, 2001; Leithwood and Steinbach, 1995; Pretz *et al.*, 2003), the students in this study experienced the same amount of low self-efficacy when solving both pervasive and new problems. However, they also experienced greater intrinsic motivation and cognitive engagement in new problems than in pre-existing problems. Interpersonal interactions with students, colleagues, and/or supervisors were related to high levels of leaders' positive work attitudes, indicating that leaders got an emotional boost from working with others. Thus, the positive work attitudes accrued through interactions with students, colleagues, and/or supervisors indicate that creative team behavior will more likely

follow (Amabile *et al.*, 2004; Atwater and Carmeli, 2009; Avolio and Gardner, 2005; George and Zhou, 2002; Isen *et al.*, 1987), than it would from relationships based on negative work attitudes. Lastly, because students' positive work attitudes and self-efficacy peaked in the mornings, the morning might be a better time to work on solving problems and tackling difficult projects, as opposed to afternoons.

Limitations

The main limitation of this pilot study is the reliance on self-report surveys and CIs, which generated subjective reports of problem solving on the fly. Objective measures of problem solving were not used. Second, the sample was small and included leadership students in a variety of leadership positions. It is anticipated that this pilot study will provide a framework for conducting larger studies, which could use event sampling of problem-solving moments as opposed to random-sampling of events. For example, a larger sample would allow us to use HLM to examine within-person and between-person variance as in the ESM study conducted by To *et al.* (2011). In addition, observations of leadership students would help to counterbalance the self-report survey data collection method. For example, leaders could be shadowed to see how their autonomous vs socially affirming approaches work in social settings with various stakeholders. For future studies, a baseline measure of problem solving using a common problem scenario could be used before the ESM surveys are administered. Finally, using ESM generated insight into how leadership students were oriented to solving problems, which is a valuable perspective for faculty and for the students themselves. However, the study did not include the ramifications of their problem solving abilities, from the perspective of colleagues, supervisors to determine the success of their efforts as well as other impact factors such as the resulting quality of student-learning outcomes.

Implications for leadership programs

This ESM study builds a formative understanding of how fifteen leadership students attempted to solve problems on the fly, focussing on a sample of 375 problem-solving moments. Here we draw implications from the results for further leadership research and practice. First, the study helps to fill research gaps such as a bias on studying positive emotions and a lack of mixed methods studies in this area (Gooty *et al.*, 2010). By examining both negative and positive emotions, we were able to understand that problem-solving moments are infused with strong emotions of both kinds and that overall, students felt positive when interacting with students, colleagues, and/or supervisors. However, negative emotional states did not depend on whether the student was alone or interacting with others.

We propose that the simultaneous nature of mixed emotions during this process might offer what can be called psychological side benefits: problem perception and a mild sense of anxiety would appear to create a sense of purpose. And this sense of purpose might reinforce a student's engagement in problem solving, even if he or she does not report initially high levels of self-efficacy. This sense of purpose can be reified through social interactions. One of the most important findings of this study is that while students thought hard and were passionate about the problems they encountered, they did not believe that they could solve problems. This implies that leadership programs can play a role in helping build up teachers' and leaders' self-efficacy as a key foundation for problem solving abilities. Even when students might not have the best answer or solution to a problem, it is important to stick with

the problem-solving process and not to give up examining thorny issues from multiple angles. In addition, it might be important for students to create objectivity in how they regulate their emotions when solving problems. Faculty can help students sort out which problems are pleasurable challenges vs overwhelming dilemmas, and why, in their coursework and internships.

There are several ways to develop students' problem perceiving capacity in deliberate ways by using ESM data to fuse experiential learning techniques with in-class learning methods. At the beginning of a course or during a program orientation, faculty can present current, commonly faced leadership problem to students, and collect their individual narratives on how to solve that problem, as a baseline of their problem-solving ability. Then, ESM data can be collected on students' problem perceiving abilities throughout a term. Next, faculty could use PBL techniques suggested by Bridges (1992) or in classes. Leadership students could submit multiple surveys on their mood states and then faculty could analyze them retrospectively as mini case studies to see how their emotions fluctuate over a discrete period of time. In this way, tacit emotions become explicit and empirical. Faculty could work with students in courses to analyze how they regulate their emotions as the first step in problem solving, and then try to improve how they problem solve.

Mobile devices can help researchers collect data on students, whether they are in classes, internships or working at their respective schools. Touch screens make it easy to take surveys and are already used by many people who hold educational leadership positions. With regard to the limitations of mobile devices, setting alarm times on each device can be time-consuming and can bother students who were experiencing job stress. In conclusion, adapting and extending social-psychological research methodologies like ESM to organizational contexts as opposed to laboratory settings holds the possibility for advancing our knowledge about the role emotion plays in the context of leadership students solving real organizational problems. Further refinement of using ESM could enable leadership researchers to bridge the gap between policies that teach creative problem solving in leaders and the actual refinement and implementation of creative problem solving in leadership development programs. This research can be used to help students understand how to regulate their emotions and persist in developing useful solutions to workplace problems. In turn, this kind of teaching may help prevent leadership turnover in tumultuous organizational environments and build educational leadership students' perceptions of self-efficacy at problem solving.

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