ACADEMIC CHALLENGE IN MIDDLE SCHOOL:
TEACHER PERCEPTIONS AND STUDENT REACTIONS

A Dissertation

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by

Sara M. Fulmer

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Julianne C. Turner, Director

Graduate Program in Psychology
Notre Dame, Indiana
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Currently, a contradiction exists between theories of motivation, which emphasize the positive influence of academic challenge on student motivation, and research, which has found contradictory results regarding this relationship. The purpose of this dissertation was to investigate the perceived and actual effects of academic challenge on students' motivation through a multi-perspective and multi-methodological approach. Study I examined middle school teachers' views about implementing challenging instruction while participating in a whole-school professional development initiative. Current education policy and reform advocate for increasing the level of challenge in K-12 classrooms in order to maximize students' learning and academic success. A grounded theory analysis revealed teachers' feelings about challenge, the pressures that affected their decision to implement challenging instruction, and teachers' use of instructional
practices to challenge students. Classroom observations were also analyzed to explore whether teachers' comments were related to differences in their use of challenging instruction. Teachers perceived 19 different pressures related to implementing challenging instruction, with pressures from students the most common across all subject areas. Some teachers were able to resolve pressures from students by having conversations with students about challenge, providing emotional and motivational support, scaffolding students' thinking, and increasing student autonomy. Implications for teachers' practice and professional development are discussed.

Study II investigated changes in middle school students' situational interest and affect during a moderately difficult reading task. The aim was to explore how changes in interest (topic and situational) and affect were related to students' fluency throughout the task and perceived difficulty. Interest and affect were recorded at four time points: before reading, twice during reading, and after reading. Latent growth curve analysis showed that interest and affect had different patterns of decline during the task. The change in interest was predicted by perceived difficulty and fluency, whereas the change in affect was predicted only by perceived difficulty. Results of an autoregressive, cross-lagged path model indicated that fluency significantly predicted subsequent ratings of situational interest, and topic interest predicted fluency on the first section. These findings suggest that, in the context of moderate reading difficulty, perceived difficulty and fluency have divergent effects on different motivational outcomes.
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INTRODUCTION

The characteristics of effective teaching have been a central focus in a long and extensive history of educational research. Recently, research has begun to focus on strategies that not only increase students' learning, understanding, and skills, but also encourage and sustain students' motivation (Brophy, 2010; Guthrie, Wigfield, & Perencevich, 2004; Reeve, 2009; Wentzel & Wigfield, 2009). Providing students with appropriately challenging work is one instructional strategy that is theorized to increase both learning and motivation. From a cognitive learning perspective, instruction that requires students to use their current knowledge to explore new, and increasingly complex, problems encourages an active construction of understanding, connections among concepts, and deeper learning (Jonassen, 1999; Merrill, 2002; Schwartz et al., 1999). From a motivational perspective, challenging tasks arouse curiosity and have positive outcomes for students' interest, effort, and feelings of competence because students can observe the growth in their knowledge and skills as a result of their own efforts (Berlyne, 1966; Clifford, 1990; Csikszentmihalyi, 1991; Deci & Ryan, 1985).

There is extensive theoretical support for challenge as a favorable condition for motivation. In the 1950s, theories of motivation began to focus on the influence of task- or environmental-related features. For example, Atkinson (1957) and White (1959) suggested that individuals are more likely to seek out tasks that are unfamiliar, novel, and create mild frustration or fear. These tasks increase interest because of their potential for
learning something new and, as a result, increasing feelings of competence. Similarly, Berlyne (1954, 1963) suggested that curiosity increases when situations are complex, novel, unfamiliar, surprising, or puzzling. This curiosity fosters arousal, retention, and persistence with exploring a stimulus. Thus, Atkinson, White, and Berlyne drew our attention to the advantages of novel and unfamiliar tasks for motivation. For most learners, novelty and unfamiliarity increase the level of challenge or difficulty of a task.

Recent theories of motivation have built on these foundational ideas, further specifying the role of task challenge in motivation. In particular, Csikszentmihalyi (1991) suggested that challenge is optimal when there is a balance between one's skills and the challenge of the task. Tasks at this level of challenge contribute to flow and an enduring motivation to learn. Flow is characterized by intense concentration, involvement, enjoyment, and intrinsic motivation, or the desire to engage in the task for its own sake. If the level of challenge is low, individuals experience apathy, boredom, and relaxation, depending on their level of skill. These emotions contribute to a decrease in engagement, as students lack the intrinsic motivation to engage in or persist with the task.

Deci and Ryan's (1985) cognitive evaluation theory also proposes a positive relationship between challenge and intrinsic motivation. Contexts that provide reachable challenge and that satisfy the needs for competence and autonomy facilitate intrinsic motivation. Additionally, individuals who are intrinsically motivated are more likely to seek out challenging or novel tasks because of their desire to explore, learn, and enhance their skills and knowledge (Ryan & Deci, 2000).

Aside from intrinsic motivation, a moderate level of challenge has also been theorized to have positive outcomes for students' expectancies of success, value,
attention, confidence, and self-efficacy. For example, Wigfield and Eccles' (2002) expectancy-value theory suggests that perceived moderate task difficulty has a positive effect on students' expectancies of success (whether one feels capable of completing a task) and value of a task (whether one deems a task as relevant, useful, or interesting), which in turn affect their achievement-related choices. Keller's (1987) ARCS model of motivation specifies that motivation can be characterized by four components: attention, relevance, confidence, and satisfaction. Relevant to the notion of challenge, Keller proposes that attention is increased by tasks that involve perceptual arousal (e.g., tasks that are novel or incongruous with one's current understanding). Furthermore, Keller states that tasks should offer achievable challenges in order to increase students' feelings of confidence. The reciprocal relationship between self-efficacy and challenge was also theorized by Bandura (1994). In particular, challenging oneself, or setting and reaching increasingly higher personal standards, contributes to increased self-efficacy, or the belief that one is capable. In turn, higher self-efficacy leads to greater persistence and expectancy of success, particularly in the face of challenging tasks or failure. Individuals with higher efficacy are also believed to perceive challenge as an opportunity, rather than a threat.

Therefore, several theories of motivation suggest that achievable challenges increase and sustain motivation because students are more interested in tasks that require novel ways of thinking, and students will feel more competent after accomplishing a task they perceived as difficult. Challenging tasks are also proposed to increase motivation through supporting students' attention, commitment, involvement, and persistence.
Despite the strong support for a positive relationship between challenge and motivation, empirical studies question this proposition.

Research on the influence of challenge on motivation is conflicting, with some studies reporting that students have negative reactions to challenge. In particular, students who perceive a task as difficult have reported lower interest (Durik & Matarazzo, 2009; Li, Lee, & Solmon, 2007), less happiness (Moneta & Csikszentmihalyi, 1996), and more negative affect, such as anxiety, anger, and boredom (Acee et al., 2010; Efklides, 2002; Efklides & Petkaki, 2005; Pekrun, Goetz, Titz, & Perry, 2002). Research has also found that students' preferences for challenging tasks declines around middle school (Lepper, Corpus, & Iyengar, 2005; Harter, 1981). Students of all ages try to manage or reduce the ambiguity and risk of intellectually demanding tasks by offering limited and vague responses to avoid making mistakes (Doyle, 1983). It is important to note that task-related characteristics, other than challenge, can buffer the negative outcomes of challenge on motivation, such as when a task is intrinsically motivating or goal-directed (Abuhamdeh & Csikszentmihalyi, 2012) and whether the student is interested in the topic of the task (Fulmer & Frijters, 2011). Thus, research is needed to better understand the relationship between challenge and motivation and the factors that may buffer the effects of challenge on motivational outcomes.

The finding that students' motivation declines during challenging tasks poses a dilemma for classroom teachers. As challenge is necessary for students to advance their knowledge and skills, students' negative reactions to challenge present an obstacle for teachers who are trying to motivate them and help them learn. There is some research suggesting that teachers are skeptical that particular groups of students (e.g., low-
achieving students, low-SES students, students with low interest or effort) are capable of engaging in challenging work and higher-level thinking (Newmann, 1992; Spillane, 2001). However, we have yet to understand whether teachers perceive a decline in students' motivation when engaging in challenging tasks and whether teachers can help reverse these declines. Therefore, despite the theoretical recommendations to provide students with challenging tasks, it appears that both students and teachers may be resistant to challenge in the classroom.

Given this background, the following studies were designed to explore academic challenge using a multi-perspective and multi-methodological approach. The studies address the perspectives of middle school teachers and reactions of middle school students in order to broadly understand the perceived and actual effects of challenge on students' motivation. The studies also use multiple methodologies to explore different aspects of challenge within a variety of contexts.

**Rationale**

A multi-perspective and multi-methodological design affords a number of potential advances to theory and research in the field of motivation. The multi-perspective approach acknowledges the complexities of academic challenge and the potential differences in students and teachers' perceptions of challenge as an instructional strategy. In order to understand the motivational outcomes of academic challenge, it is important to identify how teachers and students react to challenge. Through combining these perspectives, this research can lead to suggestions for teachers to implement challenging instruction effectively and support students' motivation during challenging
tasks. This research also sheds light on current theories of motivation by broadening our understanding of how the relationship between challenge and students' motivation is perceived and experienced, and the factors affecting this relationship.

A multi-methodological approach to understanding motivation has been suggested, but rarely implemented (for a review, see Fulmer & Frijters, 2009). In particular, Fulmer and Frijters (2009) suggest utilizing methodologies that focus on both the individual and context, and that combine the strengths of self-report with measures that overcome its limitations. These studies focus on teachers' and students' perspectives and behaviors using qualitative, observational, and experimental approaches, providing a more comprehensive picture of how challenging instruction is utilized by teachers and experienced by students. These studies also explore academic challenge in classroom contexts and during a reading task. This use of authentic contexts to understand challenge increases the generalizability and potential usefulness of the findings for educators.

Increasing our knowledge about challenge as an instructional strategy is particularly important, as both challenge and motivation are necessary for advancing students' knowledge and skills. Although theories of achievement motivation suggest that academic challenge is positively related to motivation, we have yet to fully understand whether teachers and students share this perspective and why their perspectives might differ from theory. Thus, the overall aim of these studies was to integrate the reactions of teachers and students to challenge in order to understand academic challenge and its relationship to student motivation.
Overview of The Studies

This investigation of academic challenge in middle schools is comprised of two studies. Study I examined middle school teachers' perceptions of challenging instruction, including how their students might react to increasing the level of challenge in their classrooms. Drawing from meetings over one school year, a grounded theory approach was used to understand the reasons why teachers would or would not implement strategies to challenge their students' thinking and effort. This study also examined teachers' comments about their feelings towards challenge and their reports of how they used instructional practices related to challenge in their classrooms. Classroom observations were also integrated to explore whether teachers' comments during the meetings were related to their use of instructional practices that supported challenge.

Study II used an experimental design to investigate middle school students' reactions to a challenging task. In particular, this study analyzed the trajectories of students' situational interest and affect during a moderately difficult reading task. This study explored the unique influences of students' perceived difficulty of the task and their fluency during the task on both the change and level of interest and affect.
There is a consensus across education policy and research that providing challenging work for all students is desirable and beneficial for their learning and academic success. For example, U.S. policy documents and reform pedagogy argue that instruction must involve high expectations and challenging academic standards from elementary to high school (Darling-Hammond, 2007; National Research Council, 2011). The National Commission on Teaching and America’s Future (1996) declared that “Students must do more than learn new facts or cover more chapters, they must learn to integrate and apply their knowledge in more complex ways to more difficult problems” (p. 13). Similarly, reform movements in the disciplines stress the importance of inquiry, higher-order thinking, problem solving, and intellectually rigorous content for optimal learning (Newmann, King, & Carmichael, 2007; Schneider, Krajcik & Blumenfeld, 2005; Spillane, 2001). This aligns with recent research showing that cognitively demanding learning environments enhance students' content-specific knowledge and general

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1 Study I has been accepted for publication by the University of Chicago Press on 03/28/2013 for publication in The Elementary School Journal. The citation is as follows: Fulmer, S. M., & Turner, J. C. (in press). The perception and implementation of challenging instruction by middle school teachers: Overcoming pressures from students. The Elementary School Journal.
cognitive abilities, such as verbal intelligence and reasoning (Becker, Lüdtke, Trautwein, Köller, & Baumert, 2011).

Although there is agreement that challenging instruction is an important educational objective, we know very little about how teachers perceive this instructional goal and whether teachers regard challenging instruction as relevant and possible in their classrooms. The aim of this study was to investigate teachers’ perceptions of challenge as an instructional goal. In particular, we examined the factors that influenced middle school teachers’ decisions to use practices characteristic of challenging instruction.

**Defining Challenging Instruction**

In general, challenge refers to tasks that are matched to, or slightly beyond, students' abilities (Csikszentmihalyi, 1991). However, adjusting task difficulty to the ability level of individual students would be an onerous task for any educator. Instead, teachers can use instructional practices that probe higher-level thinking within classroom tasks. We define these practices as *challenging instruction*.

Challenging instruction encourages students to think conceptually and analytically, rather than procedurally. In classrooms characterized by challenging instruction, teachers engage in interactive discussions with students by asking higher-level and open-ended questions and requiring students to explain and justify their responses (Kazemi & Stipek, 2001; Newmann, 1992; Silver, Mesa, Morris, Star, & Benken, 2009; Stipek, 2002). Thus, in contrast to I-R-E discourse (teacher's *initiation*, student's *response*, teacher's *evaluation*; Mehan, 1985), students demonstrate their understanding through extended responses. In addition, challenging instruction provides
opportunities for students to construct knowledge, rather than reproduce information, by synthesizing ideas, making connections, and applying their knowledge in novel and complex ways (Newmann, 1992; Newmann et al., 2007). In this way, challenging instruction encompasses strategies used in inquiry-based instruction, problem-based learning, and constructivist-based teaching (e.g., Barrows, 1985; Edelson, Gordin, & Pea, 1999).

Challenging instruction supports learning through encouraging students to activate and integrate their prior knowledge in the current task (Winne, 1979). Instructional practices that increase challenge through teacher-student dialogue (e.g., interactive discussions, uptake of students' ideas) facilitate students' reading comprehension (Applebee, Langer, Nystrand, & Gamoran, 2003; McKeown, Beck, & Blake, 2009) and learning of scientific language, discourses, and practices (Rosebery & Warren, 2008). Research also suggests that challenging instruction and higher-level thinking are related to increases in students' engagement, interest, and positive emotions (Csikszentmihalyi, 1991; Deci & Ryan, 1985; Newmann, 1992; Stipek, 2002).

Intellectually challenging tasks have a tendency to be more meaningful and valuable to students because they emphasize self-directed thinking, providing an opportunity for students to feel proud of their accomplishments (Newmann, 1992). Challenge can also increase students' feelings of competence because students can discern the improvements in their understanding that were achieved through their own efforts (Clifford, 1990; Stipek, 2002). However, for challenging instruction to be effective, students must perceive challenges as attainable.
The role of social interaction in challenging instruction. Tharp, Estrada, Dalton, and Yamauchi (2000) describe teaching as “assisted performance,” emphasizing the joint and interpersonal nature of the endeavor. Vygotsky’s (1978) concept of teaching in the zone of proximal development (ZPD) exemplifies the importance of assistance and teacher-student interaction in the context of challenge. As he describes it, the teacher does for students what they cannot yet do for themselves, enabling the student to complete the task. Interacting with a student in the ZPD entails first helping the child understand the end product or goal—what might a solution look like?—and then orchestrating a range of supports to "pull" students toward greater competency by "filling in the gaps" in their understanding (Wood, Bruner, & Ross, 1976). These supports include engaging the student’s attention, simplifying the task so that the learner can complete it, keeping the student engaged through some combination of "zest and sympathy," pointing out which features of the task are relevant, controlling frustration, and demonstrating solutions when the learner can recognize them (Wood et al., 1976, p. 98). Effective challenging instruction, then, seems to necessitate social interaction that may include cognitive (e.g., strategies), social (e.g., discourse, intersubjectivity), and motivational or affective (e.g., encouragement) support (see also Lepper & Woolverton, 2002; McNeill, Lizotte, Krajcik, & Marx, 2006).

Challenging Instruction in U. S. Schools

Despite the support for challenging instruction from education policy and research, American K-12 classrooms in all content areas are characterized by low challenge. In a study of 62 teachers across six states, only 31% of middle and high school
students were in social studies classes that provided moderately challenging instruction (Saye, 2011). Research suggests that social studies teachers typically lecture on factual information and provide tasks that require students to gather and recite information, rather than use inquiry methods that would support students’ construction of understanding (Levstik, 2008; Saye, 2011). Similarly, science instruction in K-12 classrooms has been characterized as low in intellectual rigor, with teachers asking questions that point to a correct answer and giving tasks at a lower level of difficulty relative to students’ understanding (Weiss, Pasley, Smith, Banilower, & Heck, 2003). Reading instruction also tends to focus more on skills, devoting less time to comprehension (Snow, 2002). Finally, instruction in middle school mathematics classrooms is often cognitively undemanding (Cogan, Schmidt, & Wiley, 2001; Hiebert et al., 2005). This may be due, in part, to the strong tradition in mathematics instruction of focusing on procedures and correct solutions (rather than concepts), practicing and reviewing problems, and teacher control of student learning (Thompson, 1992). Compared to other content areas, it may be more difficult for math teachers to scaffold students’ thinking and foster higher-level discourse due to students’ misconceptions and (sometimes unclear) explanations (Franke et al., 2009). Thus, mathematics may present a "special case" in relation to challenging instruction (Turner & Meyer, 2009). Although the issue of low challenge may be attributed to several factors, this study focuses specifically on how the pressures teachers perceive affect their decision to implement challenging instruction.
Pressures Perceived by Teachers

Teachers' perceptions of various pressures from above, within, and below influence their instructional practices (Pelletier, Seguin-Levesque, & Legault, 2002; Reeve, 2009; Taylor, Ntoumanis, & Smith, 2009). Thus far, pressures have been investigated only with respect to teachers’ use of autonomy-supportive practices, involvement, and support (e.g., Deci, Spiegel, Ryan, Koestner, & Kauffman, 1982; Pelletier et al., 2002; Taylor & Ntoumanis, 2007; Taylor et al., 2009). However, we expected that these pressures would also influence teachers' decision to provide challenging instruction.

Pressures from above. In the last two decades, U. S. educational policy and practice has centered on high-stakes testing and mandated curricula, generating increased pressure and accountability for student performance (Boote, 2006; Reeve, 2009; Ryan & Brown, 2005). Pressures from above are detrimental to teachers' use of autonomy-supportive instruction. For instance, teachers tend to be more controlling when they feel evaluated by administrators or colleagues (Leroy, Bressox, Sarrazin, & Trouilloud, 2007; Pelletier et al., 2002; Taylor et al., 2009), pressured by the curriculum (Pelletier et al., 2002), and responsible for students performing to high standards (Deci et al., 1982; Flink, Boggiano, & Barrett, 1990). Pressures from above may also be related to less challenging instruction. During an intervention with math teachers, the pressure of standardized testing inhibited some teachers’ use of strategies to teach conceptually because of the perception that a focus on teaching basic skills and procedures was most effective in raising test scores (Turner, Warzon, & Christensen, 2011). Teachers who feel pressured to prepare students for high-stakes tests are also less likely to teach for understanding and
provide opportunities for collaborative and self-directed learning (McNeil & Valenzuela, 2000).

**Pressures from within.** Teachers' self-efficacy, intrinsic motivation for teaching, and theories about instruction and learning present an internal obstacle that reduces their likelihood of attempting new strategies. For example, teachers with low efficacy and subject-area knowledge are more likely to perceive new instructional strategies as a threat to be avoided, rather than a challenge to be met (Gregoire, 2003). Similarly, math teachers are less likely to implement new strategies if they have inadequate content and pedagogical knowledge and have difficulty inferring students' understanding from their responses (Santagata, 2009).

Teachers may also resist new strategies because their current ideas about instruction cause them to perceive strategies as implausible or unhelpful for student learning (Gregoire, 2003; James & McCormick, 2009; Stipek, Givyn, Salmon, & MacGyvers, 2001). For example, math teachers who endorse traditional practices, such as the use of extrinsic motivators and procedurally-based instruction, have greater difficulty implementing practices that support students' autonomy and competence (Turner et al., 2011). Although pressures from within have not been studied in relation to challenging instruction, high school teachers who participated in a university-school collaboration to raise teachers' expectations for student achievement reported low feelings of efficacy and an unwillingness to change practices (Weinstein, Madison, & Kuklinski, 1995).

**Pressures from below.** The perception that students are unmotivated, disengaged, or incapable can also have detrimental effects on teachers' instructional choices (Newmann, 1992; Weinstein et al., 1995). Teachers tend to be more controlling when
they believe that students are behaviorally disengaged (Skinner & Belmont, 1993) and extrinsically, rather than intrinsically, motivated (Pelletier et al., 2002). According to Doyle (1983), students attempt to manage the ambiguity and risk of demanding tasks by asking the teacher for more explicit instructions and offering fewer and shorter responses. Students' strategies may be perceived by teachers as disengagement or an indication that the task is too difficult for students' current abilities.

Teachers may be reluctant to offer challenging instruction if they view ability as fixed, rather than malleable (Dweck, 2006) and, as a result, believe that students will be frustrated by or incapable of higher-order thinking (Newmann, 1992; Turner et al., 2011). In a study of how elementary school math teachers responded to a policy initiative calling for challenging instruction, teachers were skeptical that low-achieving students could do higher-level thinking, and believed that students’ behavior and lack of interest would undermine their efforts to teach challenging content (Spillane, 2001). In addition, teachers thought that intellectually rigorous content would impair students’ performance on state tests and that students must first master the basics before they could approach more complex thinking (although Newmann, Bryk, & Nagaoka [2001] have shown the opposite).

Therefore, the pressures teachers perceive from above, within, and below influence their instructional practices. However, this research has predominantly used self-report surveys to ask teachers about a specified list of pressures (for an exception see Taylor et al., 2009), or has manipulated pressures from above experimentally (Deci et al., 1982; Flink et al., 1990), limiting what we know about teachers' perceptions. The present study takes a new look at teachers' views of challenge and pressures by grounding our
understanding in teachers' perceptions and experiences, which they disclosed during professional development meetings. We also extend the current research on teachers' perceived pressures, which has primarily focused on autonomy-support, to the context of challenging instruction, providing a novel perspective on the problem of low challenge in U.S. schools.

**The Present Study**

In this study, we sought to learn how middle school teachers thought about and enacted strategies related to challenging instruction. The broad research questions at the outset of the study were: 1) What concerns do teachers express when they are encouraged to use strategies related to challenging instruction?; and 2) How are these concerns resolved, such that teachers are able to successfully implement the strategies? Our preliminary questions were general and open in order to provide flexibility in exploring these concepts through an inductive data analysis approach (Strauss & Corbin, 1998).

These questions arose during a whole-school professional development initiative that involved a partnership between the research team and the teachers and administrators at one middle school. The goal of the professional development was to highlight instructional practices that could enhance student engagement. In particular, we provided teachers with strategies related to challenging instruction during several meetings, and discussed how these strategies could support students' motivation. As we engaged teachers in discussions about challenging instruction and encouraged teachers to try the strategies in their classrooms, it became apparent that some teachers had reservations about the feasibility of the recommended practices. Thus, we used a grounded theory
analysis to gain a deeper understanding of teachers’ concerns with offering challenging instruction, which capitalized on the richness of our qualitative data.

After completing the grounded theory analysis of teachers’ comments during the meetings, we examined classroom observation data from two teachers. The purpose of this post hoc analysis was to investigate whether teachers' expressed views about challenging instruction: 1) were consistent with their observed instructional strategies related to challenge; and 2) were related to differences in teachers' use of challenging instruction.

Method

Participants. All teachers (N = 34; 23 female, all Caucasian) from one middle school in the Midwest participated in the professional development initiative. Teachers represented all subject areas: language arts (n = 10); mathematics (n = 6); social studies (n = 6); science (n = 3); and physical education, arts, and computers (n = 9). The school enrolled 620 students in grades six through eight (approximately 90% Caucasian). These students had the lowest SES and standardized test scores of the three middle schools in the district, with 36.7% receiving free or reduced lunch.

Data sources. Between October and March, the principal investigator (second author), with support of the research team, led 16 meetings of three types: 4 workshops, 4 subject-area meetings, and 8 grade-level meetings (see Table 1 for the schedule of meetings). The school principal visited most meetings for 5-10 minutes, primarily listening to the discussion and occasionally mentioning student statistics (e.g., number of students failing) as a rationale for implementing the strategies. The three-hour workshops
occurred in October and January. The same workshop was held twice during a single day, with half of the teachers attending each session. During these workshops, teachers were provided with generic strategies related to challenging instruction that could be effective for increasing challenge in all subject areas. These strategies included: 1) focus on learning and thinking, rather than answers (e.g., ask higher-level questions, encourage extended responses, uptake students’ ideas, help students connect to larger concepts), 2) support and scaffold students’ effort (e.g., press students' understanding), and 3) increase the length and quality of student-student and teacher-student discussion. The principal investigator also discussed how challenging instruction could increase students' interest and feelings of competence. Teachers were given additional resources related to challenging instruction, such as Reinhart's (2000) article on fostering students' independent thinking. Because the strategies were generic, we also offered subject-specific support for implementing the strategies. For the last 30 to 60 minutes of each workshop, teachers gathered in small groups with their subject-area colleagues to integrate the strategies into their lesson plans. During this time, the research team met with groups to offer support and advice, as well as to answer teachers' questions about implementing the strategies in their classrooms.

The 30-minute subject-area meetings occurred in November (social studies), January (math), February (science), and March (social studies), and were attended by all teachers who taught the subject area. These meetings provided opportunities for teachers to discuss the strategies presented at the workshops in relation to their subject matter content. The 30-minute grade-level meetings, with separate meetings for sixth, seventh,  

2 The language arts and physical education/arts/computers meetings were not recorded, so they were not included in the analysis.
### TABLE 1

**TIMETABLE OF WORKSHOPS, SUBJECT-AREA MEETINGS, GRADE-LEVEL MEETINGS, AND CLASSROOM OBSERVATIONS**

<table>
<thead>
<tr>
<th>Month</th>
<th>Classroom Observations</th>
<th>Subject-Area Meeting</th>
<th>Grade-Level Meetings</th>
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<tbody>
<tr>
<td><strong>September</strong></td>
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<tr>
<td><strong>October</strong></td>
<td>Workshops</td>
<td>Subject-Area Meeting (Social Studies)</td>
<td>Grade-Level Meetings (6th, 7th, and 8th grade)</td>
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<tr>
<td><strong>November</strong></td>
<td>Classroom Observations</td>
<td></td>
<td>Grade-Level Meetings (6th &amp; 7th grade)</td>
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<tr>
<td><strong>December</strong></td>
<td></td>
<td>Subject-Area Meeting (Math)</td>
<td></td>
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<tr>
<td><strong>January</strong></td>
<td>Workshops</td>
<td></td>
<td>Grade-Level Meetings (6th, 7th, &amp; 8th grade)</td>
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<td><strong>February</strong></td>
<td>Subject-Area Meeting (Science)</td>
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</tr>
<tr>
<td><strong>March</strong></td>
<td>Classroom Observations</td>
<td>Subject-Area Meeting (Social Studies)</td>
<td></td>
</tr>
</tbody>
</table>

and eighth grade teachers, occurred in November, December, and February, and were each attended by approximately 10 teachers who represented all subject areas.\(^3\) During both the subject-area and grade-level meetings, teachers were guided to discuss the successes and difficulties they were having with implementing the strategies. Teachers attended all meetings that were relevant to their subject-area and grade. As an example, a seventh grade science teacher attended two workshops, one subject-area meeting, and three grade-level meetings.

**Qualitative data analysis.** The 16 audiotaped meetings were transcribed and entered into Atlas.ti 6.2 to structure and code the data. The unit of coding was the speech turn—defined as an uninterrupted stream of speech—because of the importance of

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\(^3\) The eighth-grade meeting from December was not recorded, so it was not included in the analysis.
context in understanding teachers’ perceptions. Analysis followed a grounded theory approach to code for themes that emerged from the data (Strauss & Corbin, 1998). All transcripts were read through in their entirety by the first author for a general overview, and speech turns referring to challenge were highlighted. Both authors independently read through the highlighted transcripts and, using open coding, identified key concepts within teachers’ views of and experiences with challenge. The authors met regularly to discuss and reach consensus on coding categories.

Axial coding was used to construct broader categories based on codes that were related to a similar topic or theme, resulting in three broader categories: 1) perceived pressures related to challenging instruction, 2) positive affect about challenge, and 3) reported use of challenging instruction. Speech turns could have multiple codes, both across the broader categories and within each category. The first author read through the transcripts several times to ensure that all instances of the codes were located. A random selection of four meetings (one workshop, two grade-level meetings, and one subject-area meeting) were then coded for perceived pressures by another researcher. Inter-rater reliability was analyzed using Cohen's Kappa. The average inter-rater reliability for the two raters across all perceived pressures codes was Kappa = .74, indicating substantial agreement (Landis & Koch, 1977). Cohen's Kappa was high for codes representing pressures from above (Kappa = .81) and below (Kappa = .78), and moderate for codes representing pressures from within (Kappa = .65). The first author and additional coder met to discuss contradictory codes and reach a consensus.

The perceived pressures related to challenging instruction category was coded when teachers explicitly stated an obstacle to challenging students or a reason for not
implementing a suggested strategy. Because Pelletier et al. (2002) and Reeve’s (2009) theoretical divisions of pressures from above, within, and below provide a systematic approach to understand the sources of teachers’ pressures, we organized our codes into these groups. As mentioned by Entwistle and Entwistle (1991), the validity of coding is strengthened when codes are matched with prior research, while accurately describing the reality of the participants. Sample quotations for each pressure can be found in the Appendix. Coding pressures from above and below was typically straightforward because teachers explicitly stated the pressure (e.g., “time”, “effort”) or a synonym. However, some instances of pressures, particularly those from within, were inferred based on teachers’ comments and the context of the speech turn. For example, low efficacy was inferred if teachers mentioned not knowing how to implement a strategy or achieve a particular motivational or learning outcome, with phrases such as, “that’s a hard thing for me to do,” “I can’t”, and “I don’t know how to do this.”

Positive affect about challenge was coded when teachers discussed the value or importance of challenging students (e.g., “I think it is motivating to give them… ways to get better and challenge them”), excitement about trying a strategy to challenge students (e.g., “Kids have opinions. And in math, we are all just talking numbers. But there’s so much that they’re thinking that I don’t see in math. I think I’m going to try to do a roundtable [discussion].”), or awareness about the positive outcomes of challenge:

(I told students) you have to tell us why that’s the right answer… Instead of just, “20 and I don’t know why …,” I’m getting things like… “20 is the common denominator because that’s the least common multiple of 4 and 5.” [emphasis in the original]

Negative affect was not coded because it was difficult to disentangle whether teachers were directing their negative affect at the idea of challenging students, the
pressures, or the professional development more generally. Furthermore, negative affect was common among only three teachers (two math and one social studies).

Reported use of challenging instruction was coded when teachers used sufficient detail to describe a strategy they had recently implemented to challenge students’ thinking, regardless of the success of the strategy. The strategy did not have to be one suggested by the research team.

Classroom observations: Participants and data sources. Eight teachers were observed during the school year, which included two teachers from each of language arts, social studies, science, and math. The two math teachers, CI and AH, were selected for the analysis of classroom observations for three reasons. First, these teachers made substantial contributions to the meeting discussions and are quoted multiple times in the qualitative analysis. Knowledge of how these teachers thought about the strategies, what pressures they perceived, and how they discussed these concerns provided a rich context for understanding their observation data. Five of the remaining six observed teachers rarely spoke during the meetings and, consequently, are not quoted in the qualitative analysis. Second, CI and AH differed in their reports of using challenging instruction during the meetings. AH mentioned numerous pressures but never stated that he used challenging instruction. CI consistently reported resolving pressures and challenging her students. Consequently, through analyzing their classroom observations, we could discern whether the dissimilarity in their comments during the meetings was related to differences in their instruction. Third, we selected these two teachers because they taught the same subject area. This allowed us to compare how two math teachers, who attended
the same professional development meetings, made different instructional decisions regarding challenge in their classrooms.

Observations were selected from three time points that corresponded to the timeline of the professional development meetings: September (before challenging instruction was introduced), November (after the first workshop), and March (after the final meeting). During each observation, two observers rated a number of teacher practices on an observation instrument. For this analysis, four of these practices were selected that corresponded to the challenging instruction strategies presented during the meetings. *Opportunities for cognitive autonomy* (coded present/absent) was coded when teachers asked questions or provided tasks that encouraged multiple interpretations or strategies. *Press for understanding* (coded present/absent) was coded when teachers pushed students to think more deeply by asking for explanations and encouraging self-evaluation. *Student construction of knowledge* (coded from 0 = not observed to 2 = enacting) was defined as the degree to which students were producing knowledge in the classroom, rather than receiving or reproducing intact knowledge from the teacher. *Opportunities to work on content* (coded from 0 = weak to 2 = strong) was considered strong when the task required students to connect ideas to meet criteria, and weak when the task was procedural or focused on practicing one skill.

**Findings and Discussion**

In this section, we discuss the pressures teachers reported, followed by an analysis of how some teachers resolved these pressures. We then present the classroom observation data for the two math teachers. Teachers who are quoted more than once
have been given pseudo-initials (characteristics of these teachers are provided in Table 2).

### TABLE 2

**CHARACTERISTICS OF TEACHERS WHO ARE QUOTED MULTIPLE TIMES**

<table>
<thead>
<tr>
<th>Initials</th>
<th>Subject Area</th>
<th>Sex</th>
<th>Years of Teaching Experience</th>
<th>Number of Perceived Pressures Reported</th>
<th>Number of Reported Use of Challenging Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>LE</td>
<td>Science</td>
<td>F</td>
<td>21</td>
<td>22</td>
<td>11</td>
</tr>
<tr>
<td>AH</td>
<td>Math</td>
<td>M</td>
<td>15</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>EB</td>
<td>Math</td>
<td>M</td>
<td>21</td>
<td>36</td>
<td>0</td>
</tr>
<tr>
<td>MA</td>
<td>Social Studies</td>
<td>F</td>
<td>29</td>
<td>26</td>
<td>2</td>
</tr>
<tr>
<td>CI</td>
<td>Math</td>
<td>F</td>
<td>29</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>EJ</td>
<td>Language Arts</td>
<td>M</td>
<td>9</td>
<td>3</td>
<td>9</td>
</tr>
</tbody>
</table>

**Pressures reported by teachers.** Teachers referred to pressures 273 times across the 16 meetings, with contributions by 30 teachers (two arts/physical education/computers and two language arts teachers never stated a pressure). Teachers reported 19 different pressures that impeded their use of strategies to challenge students. The number of different pressures reported by each teacher ranged from 0 to 12 ($M = 4.50, SD = 3.77$). Because some teachers repeatedly mentioned the same pressures, the total number of pressures reported by each teacher across all meetings ranged from 0 to 36 ($M = 8.03, SD = 8.88$). The most commonly reported pressures were a lack of student effort (45 instances by 17 teachers), student resistance to challenge (32 instances by 16 teachers), and time constraints (24 instances by 10 teachers; see Table 3). Pressures from below

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*4 A total of 486 speech turns were analyzed. The number of speech turns per teacher ranged from 1 to 35 ($M = 14.29, SD = 9.75$). Math teachers contributed the highest number of speech turns.*
were the most common (136 instances, 49.8%), with fewer reported pressures from above (72 instances, 26.4%) and within (65 instances, 23.8%).

**Subject area differences.** Although pressures from below were the most common source of pressures in every subject area, there were subject-area differences in specific pressures and the number of pressures reported (see Table 3). Math teachers contributed the majority of pressures (101 out of the 273 pressures, or 37.0%) and the greatest variety, mentioning 18 of the 19 different pressures. They reported more pressures from above (especially time constraints and standardized testing) compared to other subject areas, suggesting that math teachers may have been more sensitive to students' performance on high-stakes tests. Math teachers were also more likely to discount the value and practicality of offering challenging instruction by suggesting that challenge may hinder students' learning or achievement. Language arts teachers, who face similar testing requirements, rarely reported standardized testing or the curriculum as obstacles to challenging students. Compared to other subject areas, social studies teachers focused more on pressures from the curriculum and low efficacy regarding content. These teachers were adjusting to a new curriculum during this school year, which likely intensified these two pressures.

**Pressures from above.** The most frequently mentioned pressures from above were time constraints, curriculum, and standardized testing. When given the suggestion to implement group discussions, a language arts teacher was concerned that “the only way to get a discussion to work is for everyone to sit in a circle. It takes a good half hour to get this set up.” Similarly, LE, a science teacher, was concerned that “it takes more time” to develop deeper understandings, worrying that she would not be able to simultaneously
### TABLE 3
FREQUENCIES OF TEACHERS’ REPORTS OF PERCEIVED PRESSURES, POSITIVE AFFECT ABOUT CHALLENGE, AND USE OF CHALLENGING INSTRUCTION ACROSS ALL MEETINGS BY SUBJECT AREA

<table>
<thead>
<tr>
<th>Pressures from Below</th>
<th>Math $n = 6$</th>
<th>Science $n = 3$</th>
<th>Lang. Arts $n = 10$</th>
<th>Social Studies $n = 6$</th>
<th>Arts/PE/Comp. $n = 9$</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of effort</td>
<td>17 (4)</td>
<td>12 (3)</td>
<td>5 (3)</td>
<td>7 (4)</td>
<td>4 (3)</td>
<td>45 (17)</td>
</tr>
<tr>
<td>Resistance to challenge</td>
<td>5 (4)</td>
<td>7 (2)</td>
<td>5 (4)</td>
<td>10 (4)</td>
<td>5 (2)</td>
<td>32 (16)</td>
</tr>
<tr>
<td>Achievement/ability level</td>
<td>5 (2)</td>
<td>3 (2)</td>
<td>4 (3)</td>
<td>5 (3)</td>
<td>1 (1)</td>
<td>18 (11)</td>
</tr>
<tr>
<td>Developmental readiness</td>
<td>7 (3)</td>
<td>--</td>
<td>--</td>
<td>6 (3)</td>
<td>--</td>
<td>13 (6)</td>
</tr>
<tr>
<td>Lack of knowledge/skill</td>
<td>--</td>
<td>3 (3)</td>
<td>2 (2)</td>
<td>4 (3)</td>
<td>3 (2)</td>
<td>12 (10)</td>
</tr>
<tr>
<td>Lack of interest</td>
<td>4 (3)</td>
<td>2 (2)</td>
<td>1 (1)</td>
<td>3 (3)</td>
<td>--</td>
<td>10 (9)</td>
</tr>
<tr>
<td>Learning styles</td>
<td>1 (1)</td>
<td>2 (1)</td>
<td>1 (1)</td>
<td>2 (2)</td>
<td>--</td>
<td>6 (5)</td>
</tr>
<tr>
<td><strong>Total by Subject Area</strong></td>
<td>39</td>
<td>29</td>
<td>18</td>
<td>37</td>
<td>13</td>
<td>136</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pressures from Above</th>
<th>Math $n = 6$</th>
<th>Science $n = 3$</th>
<th>Lang. Arts $n = 10$</th>
<th>Social Studies $n = 6$</th>
<th>Arts/PE/Comp. $n = 9$</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time constraint</td>
<td>17 (4)</td>
<td>1 (1)</td>
<td>1 (1)</td>
<td>3 (2)</td>
<td>2 (2)</td>
<td>24 (10)</td>
</tr>
<tr>
<td>Curriculum/standards</td>
<td>3 (3)</td>
<td>--</td>
<td>1 (1)</td>
<td>15 (5)</td>
<td>--</td>
<td>19 (9)</td>
</tr>
<tr>
<td>Standardized testing</td>
<td>11 (3)</td>
<td>--</td>
<td>1 (1)</td>
<td>1 (1)</td>
<td>--</td>
<td>13 (5)</td>
</tr>
<tr>
<td>Parent or peer influence</td>
<td>3 (3)</td>
<td>1 (1)</td>
<td>4 (4)</td>
<td>2 (2)</td>
<td>--</td>
<td>10 (10)</td>
</tr>
<tr>
<td>Administration or the “system”</td>
<td>2 (1)</td>
<td>1 (1)</td>
<td>--</td>
<td>3 (2)</td>
<td>--</td>
<td>6 (4)</td>
</tr>
<tr>
<td><strong>Total by Subject Area</strong></td>
<td>36</td>
<td>3</td>
<td>7</td>
<td>24</td>
<td>2</td>
<td>72</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pressures from Within</th>
<th>Math $n = 6$</th>
<th>Science $n = 3$</th>
<th>Lang. Arts $n = 10$</th>
<th>Social Studies $n = 6$</th>
<th>Arts/PE/Comp. $n = 9$</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low efficacy with pedagogy</td>
<td>7 (3)</td>
<td>4 (1)</td>
<td>2 (2)</td>
<td>2 (2)</td>
<td>2 (2)</td>
<td>17 (10)</td>
</tr>
<tr>
<td>Need for control</td>
<td>2 (1)</td>
<td>2 (2)</td>
<td>2 (2)</td>
<td>4 (2)</td>
<td>3 (1)</td>
<td>13 (8)</td>
</tr>
<tr>
<td>Hinder students’ learning/achiev.</td>
<td>8 (3)</td>
<td>1 (1)</td>
<td>1 (1)</td>
<td>1 (1)</td>
<td>--</td>
<td>11 (6)</td>
</tr>
<tr>
<td>Low efficacy with content</td>
<td>1 (1)</td>
<td>--</td>
<td>--</td>
<td>7 (3)</td>
<td>--</td>
<td>8 (4)</td>
</tr>
<tr>
<td>Misinterpretation of strategy</td>
<td>3 (3)</td>
<td>--</td>
<td>2 (2)</td>
<td>1 (1)</td>
<td>--</td>
<td>6 (6)</td>
</tr>
<tr>
<td>Perceive fixed ability/motivation</td>
<td>2 (2)</td>
<td>--</td>
<td>3 (2)</td>
<td>2 (1)</td>
<td>--</td>
<td>7 (5)</td>
</tr>
<tr>
<td>Subj.-specific ideas about instr.</td>
<td>3 (3)</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>3 (3)</td>
</tr>
<tr>
<td><strong>Total by Subject Area</strong></td>
<td>26</td>
<td>7</td>
<td>10</td>
<td>17</td>
<td>5</td>
<td>65</td>
</tr>
</tbody>
</table>

| Total Pressures by Subject Area | 101 | 39 | 35 | 78 | 20 | 273 |

| Positive Affect about Challenge | 15 | 26 | 16 | 30 | 17 | 104 |
| Reported Use of Challenging Inst. | 8 | 19 | 16 | 22 | 17 | 82 |

*Note:* Data is formatted as follows: The first number is the total number of responses, and the number in parentheses is the total number of teachers mentioning that pressure.  
*Note:* Arts/PE/Comp. includes music, art, family and consumer science, computers, world language, careers, physical education, and wellness.
cover more content and probe students' thinking more deeply. AH, a math teacher, thought that if he taught concepts in more depth, it would take time from other topics and there would be “things [students] are not getting exposed to.”

Pressures from time constraints were often discussed in connection with pressures from the curriculum. Because of the breadth of the math curriculum, EB stated that he “just can’t [teach the curriculum] right without sacrificing. There’s just too much.” It was the social studies teachers who most often reported pressure from the curriculum. For example, MA said that she could not implement new strategies because she was trying to “work myself through this first year [of the new curriculum].” Another teacher felt that because of the new curriculum, she did not have time to "stop and think about what you've [the research team] presented to us" and integrate the strategies.

The pressure of standardized testing was most frequently expressed by EB, who thought that teaching to the mathematics standardized test was the only option because the “school system... prays to the test score.” On multiple occasions he asked, “Do you want to teach it right, or do you want to teach it for the test?” He thought that teaching conceptually “won’t translate into positive results on those tests” because “it takes more time to develop deeper understandings, and [students] may just really, really know that trapezoid... But we didn't get to the [other] triangles and that's on the standardized test.”

**Pressures from within.** The most common pressures from within were low efficacy with pedagogy, teachers' need for control, and the perception that challenging instruction would undermine students' learning or achievement. MA expressed low efficacy with the assessments in the new social studies textbook, which required higher-level thinking compared to assessments from prior years. She said, “I have a hard time
telling if it’s a crappy question or if it’s good but hard. Is it good to have two answers that are so close that there are good arguments for both?... This is really hard.” LE, a science teacher, had challenged her students to design the columns and rows of a table, rather than complete a pre-labeled table. While some students “took it as a challenge and asked questions, others were closing down. They were starting to hate this assignment.” She expressed low efficacy with providing appropriate support while maintaining high challenge when she said, “I thought the first couple hours I did it, it was too challenging and wasn't beneficial... Maybe I wasn't doing it as properly as I should've. Maybe they needed more cues.”

Pressures from a need for control over classroom discussions were mentioned by teachers in all subject areas. CI described a lesson where she challenged her students to discover math theorems on their own using manipulatives, rather than using the textbook as a source:

I had them make a parallelogram… I said, “Try to discover some things about the angles and sides and diagonals.” That’s all the instruction I gave... They found out all but one theorem that was listed in that section that I would’ve just told them... They discovered them all on their own. It was the neatest thing! [emphasis added]

She mentioned that it was “hard to give up that [idea of] I’m supposed to tell them.” Teachers also expressed a need for control when we suggested that group work could promote thoughtful discussion. A wellness teacher was concerned with changing his classroom arrangement from rows to groups because, “I’m very controlling and I didn’t want them talking when I’m talking.” When trying to provide students with more time to discuss ideas, a language arts teacher found it difficult to “sit back and just let them sort through their own thoughts, because they [their thoughts] are not right.”
Finally, some teachers thought that challenging instruction and teaching “the big ideas” could undermine students' learning of detailed factual knowledge. LE was concerned that “when you do the big deeper understanding units… are they getting all the intricacies of it? Are they getting the 18 parts of the cell?... I don’t feel convinced that they are.” AH perceived that open-ended discussions to explore a new math concept could result in students learning incorrect information. If students heard incorrect ideas, he thought they would develop “misconceptions” that would be irreversible, because even when students “figure out that [wasn’t] the right way, they’re still going to remember it the way they first saw it.” He endorsed a transmission theory of learning, assuming that students learn what they hear first and from being told correct answers.

**Pressures from below.** Pressures from below were mentioned by 82% of teachers, with the most common pressures from students' lack of effort, resistance to challenge, and achievement level. Related to a lack of effort, EB felt that if he tried to use higher-order questioning, students would “disengage and just start chatting.” Other teachers suggested that students would not participate in open-ended discussions because they were “lazy” and “not willing to give effort.” CI thought that students put in less effort when challenged “as a defense mechanism… you don’t try then you can’t fail.” Teachers also perceived that challenging tasks prompted resistance from students. Teachers felt pressured by students’ negative reactions to challenge, such as students “shutting down”, being “afraid they are going to fail”, and feeling “uncomfortable,” “embarrassed,” and “incompetent.” Teachers also thought that students disliked the ambiguity of open-ended questions and discussions because they “want the easiest way to come up with an answer” or want the teacher “just to tell them [the answer].” Surprising to teachers was
that both high- and low-achievers resisted challenge. Because teachers considered high-achievers able to meet challenges, they were discouraged that these students seemed “stressed” and “frustrated” when engaging in challenging tasks. Teachers remarked that low-achieving students often said, “I can’t do this” when faced with challenge.

Therefore, teachers reported numerous pressures that affected their decision to implement challenging instruction. Although several of the pressures mentioned, such as time, curriculum, and standardized testing, have been found in prior research (Pelletier et al., 2002; Spillane, 2001; Taylor et al., 2009), we identified an overwhelming impact of pressures from below. This was surprising given that pressures from above related to high-stakes testing, new standards, and teacher performance evaluations are intensifying in the United States. We have identified two major reasons why our distribution of pressures differed from previous studies.

One potential reason is the context in which our data were obtained. In particular, we analyzed teachers' spontaneous reports about pressures during professional development meetings. This allowed us to identify a greater range of pressures and more information about the implications of these pressures for instruction compared to prior research, which has typically measured a limited number of pressures on self-report surveys. For example, though past research identified student motivation as a pressure from below (Pelletier et al., 2002; Skinner & Belmont, 1993), we found that teachers perceived several distinct issues related to student motivation, including students' resistance to challenge and lack of effort and interest. In addition, the group meeting context offered teachers the opportunity to engage in extended conversations about pressures and reflect on pressures mentioned by colleagues. It is important to note that
teachers may have perceived additional pressures that they did not report for various reasons. It may be that some teachers do not perceive certain pressures, are less affected by pressures, or are less likely to mention pressures in the context of meeting with colleagues and researchers.

Another reason why our distribution of pressures may have differed from previous studies is our focus on challenging instruction. It is possible that studies concerning autonomy-supportive instruction (Pelletier et al., 2002; Taylor & Ntoumanis, 2007) did not find a higher salience of pressures from below because students may be more receptive to opportunities for autonomy compared to challenge. This confirms prior research suggesting that students resist challenge through their attitudes, behaviors, and negative emotions (Newmann, 1992; Spillane, 2001). Furthermore, teachers in this study identified pressures that related specifically to challenging instruction (e.g., students' resistance to challenge and ability to take on challenging tasks), suggesting that pressures can be unique to particular instructional practices.

**How teachers resolved pressures from below.** Although some teachers resisted the suggestion to implement challenging instruction, many teachers expressed a positive attitude towards challenge and reported using challenging instruction. Because pressures from below were the most common source of pressures, our goal was to explore how teachers resolved these pressures. To achieve this objective, we searched for speech turns where pressures from below co-occurred with *positive affect about challenge* and/or *reported use of challenging instruction*. Pressures from below, positive affect about challenge, and reported use of challenging instruction co-occurred in the same speech turn 22 times from 15 different teachers, who represented all subject areas. Pressures
from below and positive affect co-occurred in an additional 13 speech turns\(^5\), and were
mentioned by nine different teachers, six of whom were represented in the previous
group. These speech turns were analyzed for themes of how teachers resolved pressures
from below. Four themes emerged: 1) providing emotional or motivational support, 2)
scaffolding students' thinking, 3) increasing student autonomy, and 4) initiating whole-
class conversations.

**Providing emotional or motivational support.** Teachers found it useful to convey
confidence in students during challenging tasks to help them “feel comfortable.” When a
world languages teacher asked students to pronounce new vocabulary, they would often
say, “I can’t say that.” She would tell students, “I bet you can if you try.” Once students
tried, she would comment to the student, “I knew that you were smarter than you knew
yourself.” She also reminded students that “part of learning is making mistakes. You
have to be able to risk that to learn.” Similarly, when students said, “I can't do this”, a
language arts teacher talked to students “about the word *yet*. They can't do it yet, and that
they will eventually be able to…. You’re going to learn it.” She noticed that students
“relaxed a little bit. I think it’s helped them think, ‘Well, I *will* be able to do it’”
[emphasis in the original]. Another language arts teacher had a similar attitude with
students who resisted, telling students, “I might push you, but [you’re] not going to do
anything beyond what I know you can do.” When students put in the effort, they realized,
“I can do this. It wasn’t… nearly as bad as I thought it would be.”

**Scaffolding students' thinking.** Teachers used scaffolding and modeling to
support students during challenging tasks. EJ, a language arts teacher, supported low-

\(^5\) Pressures from below and reported use of challenging instruction never co-occurred without
positive affect about challenge.
achieving students through structuring class discussions in a “pyramid model.” He encouraged low-achieving students to participate early in the discussion, as his goal was to “bump them” to higher-level questions “as they feel more comfortable” and to model questioning so they learn how to “formulate these types of questions” on their own. Although other teachers suggested that low-achievers would be unable to participate in class discussions, EJ involved all students in higher-level thinking. LE recalled a science lab activity where she increased the level of challenge by not allowing students to ask her closed-ended questions and limiting the number of questions they could ask to three. Students were “stressed they could only ask good questions” and were looking at other students' papers, “trying to find an answer.” When one student asked which of her two answers was correct, LE responded, “I’m not going to answer that question. You have to ask me a question about leading me to the answer and I’ll help you get there.”

**Increasing student autonomy.** Teachers also addressed pressures from students through offering autonomy. A math teacher reported pressures from students' lack of effort during group work. She noticed that when students talked about math problems in groups, they would decide that they “don’t really have to think” because they could copy answers from others. She gave students the responsibility of ensuring that all group members would be “able to answer the question” and would “have to tell us why that’s the right answer.” She found that students were giving her “much better responses and they’re working together as a group a whole lot better.” A social studies teacher noticed that giving students opportunities to make decisions resolved the pressure from a lack of student interest. He felt that students “don’t care” about the revolutionary war, so he gave a challenging final assessment that asked students to show relationships among 40 words
about the war “in any way they wanted.” His students “actually thought it was pretty neat” and “understood how things related… what was going on [and] who was involved.”

**Initiating whole-class conversations.** When students resisted, some teachers initiated a conversation about the purpose of the activity or the feelings students were experiencing. For example, CI related an occasion when she wanted to elicit more ideas from students. Her students, who were used to guidance from her on whether they were correct or not, complained when CI did not immediately evaluate their contributions. Her students asked, “What do you want us to say?” CI discussed her reason for using the strategy, stating that she wanted “to hear the reasons of why you’re thinking this… I said, I’m trying to get these ideas out. We kind of talked about the process.” After this discussion, students’ participation was “flowing a little bit more” and they had “some beautiful explanations.” When a music teacher noticed her students giving up on a difficult piece of music, she talked “to the kids about that feeling… when you’re about to learn something, it’s uncomfortable… [I asked] what is causing them that frustration?”

This strategy seemed to be particularly valuable for both teachers and students. For teachers, these discussions resolved pressures from students’ resistance and disengagement by gaining their cooperation in the activity. Students also learned that their teacher was supportive of their efforts and acknowledged their negative feelings (Reeve, Bolt, & Cai, 1999). This confirms Dweck’s (2006) suggestion that an important role for teachers is to explain the purpose of the activity. Teachers’ use of scaffolding, modeling, and motivational support also highlight the effectiveness of social interaction and teacher assistance in the context of challenge (Lepper & Woolverton, 2002; McNeill et al., 2006; Vygotsky, 1978; Wood et al., 1976).
Classroom observations of two teachers. After noticing the considerable disparities in teachers' comments during the meetings, we wondered whether teachers who reported using challenge did, in fact, do so in their classrooms. It is possible that teachers may have falsely or inaccurately reported using the recommended strategies because of the context of meeting with colleagues and researchers. Thus, we examined classroom observation data from two teachers (CI and AH) to understand whether their comments during the meetings were related to their use of challenging instruction.

As shown in Figure 1, AH rarely used strategies that promoted challenge. During all observations, students independently answered a warm-up question that required a single procedure to find a correct answer (e.g., “.075 * .23” in September) and, therefore, did not offer students the opportunity to connect ideas or construct knowledge. Students were asked to write the answer on the board and explain their answer. However, students were not pressed to discuss their thinking beyond a computational explanation (e.g., “5 times 10 is 50, carry the 5...”). If a student answered incorrectly, AH told the class the right answer without discussing why the student's answer was incorrect. AH also asked procedural questions to verify students' understanding (e.g., “What do we need to make sure to do when adding decimals?”). In November, AH introduced the topic of probability by asking students how to figure out the number of combinations of ingredients one could put on a pizza. Students did not respond, so he provided a list of four ingredients and told students they had two minutes to figure out the number of combinations of two ingredients. After noticing that students did not have enough time to solve the problem, AH wrote the answer on the board and asked, “Everybody understand
that?” Similarly, when AH asked an open-ended question (“What do box and whisker [plots] do for us?”), he answered the question before students had time to respond.

![Bar Chart](image.png)

Figure 1. Observation ratings of opportunities to work on content, student construction of knowledge, press for understanding, and opportunities for cognitive autonomy for two teachers (CI and AH) in September, November, and March. Each observation included two or three separate activities (e.g., warm-up question, worksheet, group work) during the class period. Values represent the average across the number of activities.

Like AH, CI began class with a warm-up question; however, students worked in groups to solve complex word problems. In September, CI was discussing algebra and gave each group a different phrase from a nursery rhyme (e.g., “The cow jumped over the
Students were asked to give a unique value to vowels, consonants, and capital letters, and their phrase must add up to $2.00. During all observations, CI pressed students to think deeply and offered cognitive autonomy by asking students to explain their strategies (“How did you figure it out?” and “Who can explain how they did the problem?” in November) and why their answer was correct (“Why are they corresponding angles?” in September). CI also pressed students to reflect on what they had learned (“What did you discover that you didn't know before?” and "What did you find out about correspondence and interior angles?” in September), requiring students to think and connect ideas beyond the information in their textbooks.

CI encouraged students to discuss their thinking when they were struggling (“What did you do if you couldn't solve it?”). CI also offered cognitive autonomy by prompting her class to think about different methods to solve problems: “[Student name] has a good question. What if you answer it this way?” (November). When discussing solution methods, CI emphasized critical thinking about the process, rather than the answer, by asking, “What did you think about this method?” and “What was better about it?” CI’s use of challenging instruction was reflected in her moderate to high scores across all four strategies.

Overall, the observation data were consistent with these teachers' statements about challenging instruction. AH, who never mentioned using challenging instruction, rarely used strategies that challenged students' thinking. Instead, he relied on strategies characteristic of traditional mathematics instruction, such as having students practice procedures and solve problems that required a single correct answer (Thompson, 1992). Likewise, some of AH's comments during the meetings implied a more traditional view
of instruction (e.g., his view that students learn from being told correct answers). Prior research has found a relationship between traditional views about mathematics instruction and the use of more traditional practices, such as focusing on answers and giving students less autonomy (Stipek et al., 2001; Turner et al., 2011). Thus, AH's instructional choices and disinclination to implement challenging instruction may be partially attributable to an endorsement of traditional mathematics instruction, as well as his perception of numerous pressures from above and below.

In contrast, CI reported using challenging instruction during the meetings and implemented these strategies in her classroom. As CI was already providing opportunities for cognitive autonomy in September, it was evident that she possessed certain characteristics that increased both her willingness and effectiveness with challenging instruction. CI diverged from traditional instructional approaches, recognizing that students construct mathematical knowledge by grappling with uncertainty rather than by identifying correct answers (Stipek et al., 2001). Her willingness to attempt new strategies may have also been due, in part, to higher efficacy and a deeper understanding of mathematics (Gregoire, 2003; Santagata, 2009; Stipek et al., 2001). In line with this notion, CI was both autonomous and comfortable in making instructional decisions that diverged from the textbook (Warfield, Wood, & Lehman, 2005). In the following sections, we discuss the implications of this study for teachers' practice and professional development.
Implications for Teachers' Practice

Two factors in particular seem important in explaining why some teachers reported greater success with implementing challenging instruction and gaining students' participation in challenging activities. First, successful teachers encouraged students' learning and motivation through supportive interactions with their students. In particular, teachers mentioned using modeling and scaffolding to facilitate students' understanding and guide students through challenges (Vygotsky, 1978; Wood et al., 1976). Teachers also described how they interacted with students to express care, support, and encouragement, such as through discussing students' concerns, conveying confidence in their abilities, and providing students with opportunities to take control over their learning (Reeve et al., 1999). These strategies likely encouraged students' persistence because they perceived their teacher as caring about their feelings, trusting of their ability to accomplish the task, and supportive of their efforts (Butler, 2012). Because challenge is inherently risky and threatening for students, positive teacher-student interactions and a trusting teacher-student relationship may be particularly important for teachers' successful use of challenging instruction. This idea was expressed by EJ, who said, “teachers need to find a way to connect with students... show [students] that you care, and they will run through a wall for you.”

The second reason why some teachers were successful in implementing challenging instruction was likely due to their own motivation. Teachers who reported implementing challenging instruction, similar to teachers who did not, perceived various pressures from above, within, and below related to challenging their students. Thus, although almost all teachers perceived pressures, the impact of these pressures on
teachers' reported instructional choices varied. Teachers may have been motivated to attempt the strategies for several reasons, including higher efficacy and prior experience with the strategies, or an underlying goal to increase students' engagement and learning. Previous research has identified teacher motivation as a mediator between perceived pressures and instruction (Leroy et al., 2007; Pelletier et al., 2002; Taylor & Ntoumanis, 2007). Additionally, teachers who reported attempting the strategies discovered that students were capable of higher-level thinking and that students could be motivated by challenge when provided with appropriate support. Observing positive student outcomes likely motivated teachers to continue using the strategies (Guskey, 2000; Turner et al., 2011). Future research should continue to address the characteristics of teachers and professional development programs that increase teachers' willingness to attempt new strategies. Also, as our analyses were largely based on teachers' self-report, further research should inquire into challenging instruction in classrooms. This includes measuring students' perceptions of the classroom environment, analyzing student-teacher dialogue during classroom activities, and observing instruction in a greater number of classrooms.

**Implications for Professional Development**

Our message to teachers was that challenging instruction could support students' motivation. However, given the overwhelming prevalence of pressures from below, it was apparent that many teachers perceived the opposite: that challenging instruction could hinder student motivation. This may have occurred for a number of reasons. As in prior research, teachers identified several pressures that influenced their instructional
choices, including low efficacy regarding pedagogy and content and their underlying ideas about learning, motivation, and instruction (Gregoire, 2003; Santagata, 2009). Aside from the pressures from above, within, and below, there may have been unintended pressures from the professional development itself that influenced teachers' perceptions of and willingness to implement challenging instruction. For example, teacher participation in the professional development was not voluntary, so some may have felt controlled. It is also possible that teachers who had been expressing lower expectations for their students may have felt uncomfortable or threatened by the focus on challenge. In addition, the strategies we provided, such as asking higher-level questions, were generic and required teachers to make specific application to their curriculum. Some teachers may have needed more modeling, subject-specific support, and concrete feedback to understand the value of the strategies and use them effectively. Finally, although we provided rationales for these practices (e.g., why challenge could increase student motivation), teachers may have felt that their personal experience contradicted research evidence and that these practices would not be successful in their own classrooms. A prevalent notion among teachers is that research is not necessarily applicable to teaching because of its complex, situational, and improvisational nature. This viewpoint continues to be a barrier to improving instructional methods, and subsequently, classroom instruction (Ball & Forzani, 2009; Hiebert & Morris, 2012). Further research should focus on the reasons for this dichotomy between research and practice, which may be partially based on a lack of shared language or experience (Stigler & Thompson, 2012).

Helping teachers reflect on, cope with, and resolve the pressures they perceive is likely to increase the effectiveness of a professional development program. Based on
teachers' overwhelming focus on students' resistance and disengagement, addressing pressures from below is a valuable place to start. As several pressures from below reflect a lack of student motivation (e.g., low effort or interest), perhaps the most productive way to help teachers overcome pressures from below is through instructional strategies that both improve classroom instruction and increase students' motivation. Giving teachers opportunities to reflect on the connections between their instruction and students' motivation also makes it possible for teachers to learn why certain instructional strategies can support their efforts to raise expectations for students.

In this study, we explored how middle school teachers responded to a professional development initiative to support student motivation through offering challenging instruction. Although our study was based on teachers from one school, our data revealed detailed information regarding the numerous pressures that teachers perceive from above, within, and below related to increasing challenge in their classrooms. This study also differed from others, however, in the significance that teachers accorded to pressures from their students. While some teachers overcame students' resistance and implemented challenging instruction, the impact of these pressures on teachers' instructional choices may be contributing to low levels of challenge in some classrooms. Setting high expectations for students is an important goal, but it may depend upon a deeper understanding of teachers’ ideas about motivation, learning, and instruction, and teachers' sensitivity to their students’ development and experience. Therefore, contextualizing theory into classroom instruction remains a challenging endeavor.
STUDY II:

CHANGES IN INTEREST AND AFFECT DURING A DIFFICULT READING TASK: RELATIONSHIPS WITH PERCEIVED DIFFICULTY AND READING FLUENCY

Several theories of achievement motivation propose that challenge—defined as task difficulty that is matched to or slightly beyond one’s ability—increases motivation and engagement (Csikszentmihalyi, 1991; Deci & Ryan, 1985; Wigfield & Eccles, 2002). The value of challenge for learning is also well established, as tasks that are slightly beyond learners’ current knowledge and abilities maximize their achievement outcomes (Clifford, 1990; Vygotsky, 1962). However, despite this contention that some difficulty is advantageous, limited research has explored students’ motivation during moderately difficult, authentic academic tasks. Thus, this study investigated how students’ situational interest and affect changed during a moderately difficult reading task. To further our understanding of the relationship between task difficulty and motivation, this study also examined how the changes in students’ interest and affect were influenced by students’ difficulty with the task (reading fluency) and perceived difficulty.

6 Study II has been published by Elsevier in Learning and Instruction. The full citation is as follows: Fulmer, S. M., & Tulis, M. (2013). Changes in interest and affect during a difficult reading task: Relationships with perceived difficulty and reading fluency. Learning and Instruction, 27, 11-20, doi: 10.1016/j.learninstruc.2013.02.001
Two Types of Task Difficulty

Task difficulty can be classified into two types: objective difficulty and subjective—or perceived—difficulty. Objective and perceived difficulty are related but distinct (Campbell, 1988; Efklides, Papadaki, Papantoniou, & Kiosseoglou, 1998) and, therefore, are likely to have dissimilar influences on motivational outcomes.

Nevertheless, studies rarely consider objective and subjective difficulty simultaneously (for exceptions, see Efklides et al., 1998; Mangos & Steele-Johnson, 2001; Maynard & Hakel, 1997). Furthermore, research on the relationship between perceived difficulty and on-task motivational processes is limited (Efklides, 2002; Efklides et al., 1998; Li, Lee, & Solmon, 2007). The present study considers both objective and perceived difficulty in the context of reading.

Objective difficulty. Objective difficulty in reading is assessed by readability, which is determined by the complexity of text features, such as sentence structure, cohesion, and word length (for a review, see Benjamin, 2012). In this study, readability was measured using the Lexile Framework for Reading, which establishes text difficulty based on sentence length and word frequency (Smith, Stenner, Horabin, & Smith, 1989). The Lexile Framework is a widely used scale with high construct and predictive validity (Benjamin, 2012). The advantage of the Lexile Framework is its ability to match a text, based on its level of readability, to a student’s current reading ability. Students obtain their own Lexile score (a range of 150 points) based on their responses to reading comprehension questions at various levels of text difficulty. Lexile suggests that students read texts within their range and up to 50 points above their range to ensure an appropriate level of difficulty (Lexile Framework for Reading, 2013). In this study, we
equated the level of objective difficulty (readability) across participants by selecting a story for each student that was 50 points above his or her Lexile range.

The objective difficulty of a text is also reflected in the accuracy of students’ reading fluency. Reading fluency is an indicator of students’ vocabulary knowledge, decoding, and word-recognition skills, and is strongly related to reading comprehension (O’Connor, Swanson, & Geraghty, 2010; Pikulski & Chard, 2005). Proficiency in oral reading fluency is categorized into three levels: frustration (≤92% accuracy); instructional (93–96% accuracy); and independent (≥97% accuracy) (Gickling & Thompson, 1985; Rasinski, 2011). The instructional level is characteristic of texts that are difficult but manageable, and is the most beneficial level for improving students’ reading fluency and vocabulary learning (O’Connor et al., 2002).

Although reading fluency is clearly affected by the objective difficulty of a text (e.g., readability, style, grammar), reading fluency is not an exact measure of objective difficulty. Similar to any measure of performance, reading fluency is also impacted by individual differences in background knowledge, strategy use, and engagement in the task. Consequently, although participants encounter the same level of readability, reading fluency will vary. In this study, we used the term objective difficulty to refer to the readability of the text, and reading fluency to refer to students’ performance.

**Perceived difficulty.** Perceived difficulty is a subjective evaluation of task difficulty that is influenced by cognitive, motivational, and emotional appraisals (Efklides, 2002). Perceptions of difficulty are partly based on assessments of objective difficulty, including the complexity and novelty of the task, performance on the task, and interruptions in cognitive processing and accessing required knowledge (Baird & Penna,
1997; Campbell, 1988; Efklides et al., 1998). Additionally, perceived difficulty is influenced by individual characteristics, such as students’ interest in the task, goals for the task, willingness to expend effort, and their perceptions of value, relevance, and control (Baird & Penna, 1997; Efklides et al., 1998). Perceptions of difficulty also depend on the relationship between the individual and task, including students’ perceptions of whether they have the knowledge and skills to cope with the complexity of the task, and the outcomes of their strategies and effort (Deci & Ryan, 1985; Silvia, 2005).

Thus, the same level of objective difficulty is likely to be interpreted by students in various ways. We calibrated the task to be moderately difficult because tasks that are slightly beyond learners’ current abilities are considered optimal for both learning and motivation, due to the potential for knowledge acquisition, curiosity, and a sense of accomplishment (Berlyne, 1963; Csikszentmihalyi, 1991). However, some research has shown that demanding tasks can hinder students’ motivation, resulting in higher negative affect (Ahmed, van der Werf, & Minnaert, 2010; Kumar & Jagacinski, 2011) and lower interest and enjoyment, particularly when students have low topic interest (Fulmer & Frijters, 2011).

**Interest and Affect in the Context of Difficulty**

The present study focused on the motivational outcomes of situational affect and interest, which have both been positively linked to learning and other indicators of motivation, including effort, attention, self-regulation, and competence (Ainley, Hidi, & Berndorff, 2002; Hidi & Renninger, 2006; Izard & Ackerman, 2000; Pekrun, Goetz, Titz, & Perry, 2002). Situational affect is defined as students’ temporary affective state in
response to the task, and encompasses both moods and specific emotions (Linnenbrink, 2007). In this study, situational affect was measured on a positive–negative continuum. Although recent research has broadened the measurement of affective states to include specific emotions (e.g., proud, sad) and valence and arousal dimensions (e.g., Ainley, Corrigan, & Richardson, 2005; Pekrun, 2006), we measured students’ general affect for two reasons. First, our goal was to observe how affect changed during a brief task. We used a single measure of general affect, rather than measuring several specific emotions, as we anticipated that students might not experience a particular emotion (e.g., bored, happy) at each measurement point throughout the reading task. Missing data or consistently low ratings of emotions would create difficulty in observing change over time. Second, we focused solely on emotional valence, as our goal was to understand whether and how students’ experience with the task prompted change in their positive outlook. Supporting this rationale, students at this age may have trouble differentiating the valence and arousal aspects of emotions (Linnenbrink & Pintrich, 2003).

*Situational interest* is a temporary state that develops from particular environmental or contextual cues (Hidi & Harackiewicz, 2000; Hidi & Renninger, 2006). With reading, situational interest is generated by the content and characteristics of the text, including coherence, informational complexity, and ease of comprehension (Schraw, Bruning, & Svoboda, 1995). We also assessed topic interest, which is defined as students’ triggered interest based on the particular topic of the text (Ainley et al., 2002).

Some authors have argued that interest is an emotion (Ainley et al., 2005). Because students’ level of interest may factor into their affect, we expected that interest and affect would be related. Despite some similarities, interest and affect are distinct both
in their degree of specificity and also in the nature of the properties themselves. Interest can be thought of as a relational property. That is, interest is contingent on, and varies in relation to, certain contextual features (e.g., task content). The task is a necessary component in one’s evaluation of both topic and situational interest. Affect, however, can be understood more precisely as a dispositional property—subject to emotional, cognitive, and contextual factors. The wide range of factors influencing situational affect may be prioritized differently depending on the individual and context. Accordingly, we expected to find some differences between interest and affect during the reading task.

Although situational interest and affect are influenced by students’ perceptions of and experience with a task (Ainley et al., 2005; Krapp, 2002), much of the research on interest and affect during academic tasks is cross-sectional and does not account for stability or change over time (Pekrun & Schutz, 2007). One exception is Ainley et al.’s (2002, 2005) research on the changes in middle and high school students’ affective responses as they read multiple texts. Based on this research, they concluded that students’ emotions change, even during brief reading tasks. Similarly, Rotgans and Schmidt (2011) measured students’ situational interest on five occasions over the course of one day, and found that interest increased after students were presented with the problem, and then gradually decreased as students continued engaging in the learning tasks. The present study adds to the existing literature by exploring how students’ situational interest and affect changed during a brief, moderately difficult reading task. Furthermore, we investigated the unique influences of perceived difficulty and reading fluency on the changes in interest and affect, while also equating the level of objective difficulty across participants relative to each student’s reading ability.
Reading fluency and its relationships with affect and interest. Research on reading fluency has primarily focused on its relationship with reading self-concept among elementary school students. For example, longitudinal studies have found reciprocal relationships over time between reading fluency and self-concept, such that higher fluency predicts higher self-concept for reading, and positive reading self-concept predicts greater developments in fluency and other reading skills (Aunola, Leskinen, Onatsu-Arvilommi, & Nurmi, 2002; Quirk, Schwanenflugel, & Webb, 2009). The few studies that have considered the directional relationship between reading fluency and motivational outcomes other than self-concept have mixed results. Studies with elementary school students have found reciprocal effects over time between students’ goal orientation and reading skills (Lepola, Poskiparta, Laakkonen, & Niemi, 2005) and students’ task-avoidant behaviors and reading skills (Onatsu-Arvilommi & Nurmi, 2000). However, Quirk et al. (2009) found that reading goals and reading fluency were not directly related over time. The present study addresses the gap in the literature by investigating reading fluency in middle school students and its relation to interest and affect. This study also takes a novel approach by exploring these processes in the context of a reading task, rather than over a longer period of time such as a semester or school year.

Perceived difficulty and its relationships with affect and interest. Research has found that higher perceived difficulty is related to less positive affect and happiness (Moneta & Csikszentmihalyi, 1996), and more negative affect, including anxiety, anger, and boredom (Acee et al., 2010; Csikszentmihalyi, 1991; Efklides & Petkaki, 2005; Pekrun et al., 2002). For example, Ahee et al. (2010) asked college students to recall
over- and under-challenging events and examined their self-reported emotions for these events. Students described feeling more anger, anxiety, hopelessness, and shame in over-challenging, compared to under-challenging, situations. It is important to note that students’ affect can also influence their perceptions of difficulty. Students who have a positive mood during a task are more likely to feel optimistic about their potential for success and may perceive the task as less difficult than students whose affect is more negative (Efklides & Petkaki, 2005).

With regards to situational interest, most of our understanding of its relationship with perceived difficulty is theoretically, rather than empirically based. For example, theories of motivation propose that perceived difficulty is positively related to higher task interest, which stems from increased arousal and attention (Berlyne, 1963; Wigfield & Eccles, 2002). This increase in interest should be particularly strong when students perceive that they can cope with the difficulty of the task (Csikszentmihalyi, 1991; Deci & Ryan, 1985; Silvia, 2005). Research has found that higher interest in a topic or domain is related to lower perceived complexity (Durik & Matarazzo, 2009) and can mask students’ awareness of difficulty (Renninger, Ewen, & Lasher, 2002). However, research also suggests that higher perceived difficulty is related to lower interest in and enjoyment of the task (Li et al., 2007).

**Research Questions and Hypotheses**

The present study investigated middle school students’ situational interest and affect over the course of a brief, moderately difficult reading task. The following research questions were addressed: (a) How do situational affect and interest change during the
reading task?; (b) How are affect and interest related?; (c) How do reading fluency and perceived difficulty influence the change in affect and interest during the reading task, and ratings of affect and interest immediately after reading?; (d) What is the direction of association between reading fluency and interest, and between fluency and affect during the reading task?

For the first research question, it was hypothesized that both interest and affect would decrease early in the reading task (Hypothesis 1). Because students were not told prior to the task that the passage would be beyond their reading ability, we expected to find an immediate decrease in interest and affect once students realized that the text was difficult. For the second research question, we predicted that interest and affect would be positively related, such that students who reported higher interest would also report more positive affect after the reading task (Hypothesis 2).

For the third research question, we hypothesized that higher perceived difficulty would be related to lower affect and interest (Hypothesis 3a). Research has previously found that perceived difficulty is associated with negative affect (e.g., Acee et al., 2010; Efklides & Petkaki, 2005), and we expected to find a similar pattern with interest (Li et al., 2007). Because of the limited research on reading fluency in this age group and in the context of a single task, our investigation was largely exploratory. However, we hypothesized that lower reading fluency would be detrimental for interest (Hypothesis 3b), based on the suggestion that students are more likely to lose interest when they have difficulty reading and comprehending a text (Deci & Ryan, 1985; Schraw et al., 1995; Wigfield & Eccles, 1992).
For the fourth research question, we expected that lower reading fluency would predict lower interest on the subsequent section of the text (Hypothesis 4a; similar to 3b, but establishes a causal direction). We also hypothesized that lower ratings of interest would lead to lower reading fluency on the subsequent section, because lower interest may cause students to exert less effort or use less effective reading strategies (Hypothesis 4b). Supporting this hypothesis, previous studies have found a reciprocal relationship between situational interest and other measures of performance, such as exam or course grades (Harackiewicz, Durik, Barron, Linnenbrink, & Tauer, 2008). Although control-value theory proposes that emotions influence performance (Pekrun, 2006), existing evidence for this relationship—particularly in the case of positive emotions—is both limited and conflicting (Linnenbrink, 2007; Linnenbrink & Pintrich, 2002; Pekrun, Elliot, & Maier, 2009). Thus, our investigation of the directional associations between reading fluency and affect attempted to clarify these discrepancies.

Method

Participants. Participants were sixth and seventh-grade students from one middle school in the Midwestern United States (N = 91, 45 female; \( M_{\text{age}} = 12.50, SD = .76 \)). The majority of students were Caucasian (85.7%), with 4.4% African-American, 3.3% Hispanic, and 6.6% multi-racial.

Reading passage selection. The Lexile Framework for Reading (Smith et al., 1989) was used to select a text for each student at a level of 50 points above his or her Lexile range to provide a moderate level of difficulty (Lexile Framework for Reading, 2013). The Lexile scale is an equal-interval scale, meaning that the amount of growth in
ability required to move from a 400 to 500 on the scale represents the same increase in
ability as moving from 850 to 950. Therefore, the discrepancy between reading ability
and objective difficulty (readability) was equal across students.

Students’ Lexile scores were gathered from school records. The Lexile Book
Search (www.lexile.com/fab/) was used to derive a list of books for each student’s score,
and a book with an age-appropriate topic was randomly selected. An equal number of
fiction and non-fiction books were chosen to appeal to a variety of interests. Passages of
approximately 500 words were randomly selected from the book and the Lexile Analyzer
(www.lexile.com/analyzer/) was used to confirm the Lexile score of the passage. Each
passage was printed on three sheets of paper (Page 1: 180 words; Page 2: 205 words;
Page 3: 115 words). The title and a short description were printed on an additional page.

Measures. Interest and affect. Interest and affect were measured at four time
points: once before reading, twice during the task, and once immediately after reading.
Before reading, students were presented with the title and short description of the text and
rated their topic interest on a 4-point scale ("I expect this story to be interesting," Ainley
et al., 2002). During and after the reading task, students rated their situational interest on
the same 4-point scale ("I would describe this story as interesting").

At all four time points, affect was measured with the item, “How do you feel right
now?” on a 4-point scale from "bad" (1) to "good" (4). Students used a slider to pinpoint
how they felt on the continuum and scores were calculated to one decimal place. Previous
studies have used single-item measures on a positive–negative continuum to assess the
valence dimension of affect (e.g., happy–sad, Linnenbrink & Pintrich, 2003; Moneta &
Csikszentmihalyi, 1996). The wording of this item is also consistent with Ainley et al.’s
(2002, 2005) measure of emotions during reading tasks, which asks participants to show "how you are feeling."

**Perceived difficulty.** After reading, students responded to the item, "I thought this story was difficult" on a 4-point scale. Similar single-item measures have been used in prior research (e.g., Baird & Penna, 1997; Efklides et al., 1998; Li et al., 2007).

**Reading fluency.** During the reading task, the experimenter recorded students' errors on a separate copy of the reading passage. Errors included mispronunciations, omissions, substitutions, transpositions of word pairs, and pauses or struggles lasting longer than three seconds (Shinn & Shinn, 2002; Wright, 1992). Reading fluency was calculated by dividing the number of errors by the total number of words attempted, and converting the result to a percent (percentage of correctly read words). Reading fluency was also calculated at three time points during the task, which corresponded with the assessments of interest and affect: after Page 1; after 150 words of Page 2 (section A); and after Page 2 (section B).  

**Procedure.** Participants completed the reading task and all measures individually in a quiet room at their school while the experimenter was present. Students responded to all measures on a laptop computer. Students were first given the title and description of the passage and rated their topic interest and affect. Students were given Page 1 of the text and told to read the story aloud. After Page 1, they completed measures of their situational interest and affect. Students then read the first 150 words of Page 2 (section A) and were stopped to complete measures of their situational interest and affect. Students read the remainder of Page 2 (section B) and were asked if they would like to continue or

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7 Reading fluency for Page 3 is not included in the analyses because students were given the option to stop reading after Page 2; thus, some students did not read Page 3.
stop reading. If students wished to continue, they were given Page 3 and told that they could stop at any point. Upon deciding to stop or after Page 3, students rated their situational interest, affect, and perceived difficulty of the task.

**Model specification.** Mplus version 6 (Muthén & Muthén, 1998-2010) was used to estimate all models. To investigate the patterns of change in interest and affect during the reading task, four unconditional latent growth curve models were tested: 1) intercept only; 2) intercept and unconstrained growth; 3) intercept and linear slope; and 4) intercept, linear, and quadratic slope. Time was centered at the final time point, as we were interested in predicting the levels of interest and affect immediately after reading, rather than before students began reading. We used latent growth curve modeling because of its greater power in detecting change over time compared to repeated measures ANOVA, and its ability to model both inter- and intraindividual differences in intercepts and slopes (McArdle & Epstein, 1987).

Next, the latent growth curve models for interest and affect were combined into a parallel process growth model to test the concurrent relations among the intercepts and slopes of interest and affect. Following this step, fluency and perceived difficulty were added as time-invariant covariates on the intercept and growth factors of interest and affect. This conditional latent growth model examines the relationships of reading fluency and perceived difficulty with individual differences in students' reports of interest and affect after reading and the change over time. There were no missing data.

An autoregressive, cross-lagged path model was fitted to assess the extent to which interest and affect ratings predicted reading fluency at subsequent time points, and fluency predicted interest and affect at later time points (see Figure 2). This model allows
for an estimation of the causal associations between variables over time, controlling for the autoregressive influence of each variable with itself over time. In Figure 2, autoregressive effects are represented as single-headed arrows from a given variable at one time point to the same variable at the next time point (a paths). Contemporaneous correlations between interest and affect at the same time point are denoted as double-headed arrows (b paths). Cross-lagged effects are represented by diagonal single-headed arrows, with interest and affect predicting later fluency (c and e paths, respectively), and fluency predicting later interest (d paths) and affect (f paths).

Figure 2. Autoregressive, cross-lagged path model of reading fluency, interest, and affect during the reading task.

Results

Descriptive statistics and manipulation check. On average, students correctly pronounced 94.25% of words read (SD = 4.08). Guidelines for reading fluency suggest that 93-96% accuracy represents an instructional level of difficulty (Gickling & Thompson, 1985; Rasinski, 2011). This confirms that the texts were moderately difficult.
Although the amount of objective difficulty was equal across participants, individuals expressed a range in their perceptions of difficulty. Generally, students perceived the task as moderately difficult ($M = 2.35, SD = .89$). Students who perceived the task as more difficult made more errors (lower reading fluency) while reading, $r = -.39, p < .001$.

Means, standard deviations, and correlations for all variables appear in Table 4. Reading fluency was significantly related to interest before reading, $r = .31, p = .003$, suggesting that students who were more interested in the topic made fewer errors while reading. Perceived difficulty was significantly and negatively related to interest after reading ($r = -.21, p < .05$), and affect during and after the reading task ($r = -.28$ to -.31, all $p$'s < .01).

**Change in situational interest and affect during the reading task.** The patterns of change in interest and affect during the reading task were estimated using latent growth curve modeling. For interest, the unconstrained growth model provided the best fit to the data, $\chi^2(6) = 11.91, p = .06$, RMSEA = .10 (.00 - .19), CFI = .97 (see Figure 3). This is indicative of adequate to good model fit (Hu & Bentler, 1999; MacCallum, Browne, & Sugawara, 1996). Results indicated that most of the change in interest occurred between the assessment of topic interest and the first measure of situational interest, and was characterized by a decrease ($\lambda$'s = -3.00, -0.02, -0.28, 0.00). The variance for the intercept and slope were both significant, indicating that between-person predictors could be added to explain variation.

A quadratic growth model for the change in affect provided excellent fit, $\chi^2(4) = 3.53, p = .47$, RMSEA = .00 (.00 - .15), CFI = 1.00 (see Figure 4). Participants reported an immediate decline in affect, the rate of which decelerated over time. Significant variances
TABLE 4
MEANS, STANDARD DEVIATIONS, AND BIVARIATE CORRELATIONS FOR ALL VARIABLES

<table>
<thead>
<tr>
<th></th>
<th>Interest 1</th>
<th>Interest 2</th>
<th>Interest 3</th>
<th>Interest 4</th>
<th>Affect 1</th>
<th>Affect 2</th>
<th>Affect 3</th>
<th>Affect 4</th>
<th>Fluency</th>
<th>Perc diff</th>
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<td>.70***</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interest 4</td>
<td>.44***</td>
<td>.70***</td>
<td>.79***</td>
<td>1</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affect 1</td>
<td>.23*</td>
<td>n.s</td>
<td>n.s</td>
<td>.32**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affect 2</td>
<td>.28**</td>
<td>.34**</td>
<td>.36***</td>
<td>.39***</td>
<td>.56***</td>
<td>1</td>
<td></td>
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<tr>
<td>Affect 3</td>
<td>.27*</td>
<td>.27**</td>
<td>.44***</td>
<td>.42***</td>
<td>.47***</td>
<td>.77***</td>
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<tr>
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<td>.32**</td>
<td>.48***</td>
<td>.47***</td>
<td>.46***</td>
<td>.72***</td>
<td>.80***</td>
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<td></td>
</tr>
<tr>
<td>Fluency</td>
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<td>n.s</td>
<td>n.s</td>
<td>n.s</td>
<td>n.s</td>
<td>n.s</td>
<td>n.s</td>
<td>n.s</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Perc diff</td>
<td>n.s</td>
<td>n.s</td>
<td>n.s</td>
<td>-.21*</td>
<td>n.s</td>
<td>-.31**</td>
<td>-.28**</td>
<td>-.30**</td>
<td>-.39***</td>
<td>1</td>
</tr>
</tbody>
</table>

|M  | 3.09 | 2.77 | 2.92 | 2.82 | 3.45 | 3.22 | 3.23 | 3.33 | 94.25 | 2.35 |
|SD | .78  | .84  | .86  | .93  | .57  | .61  | .64  | .71  | 4.08  | .89 |

Note: ***p < .001; **p < .01; *p < .05.

Note: Interest/Affect 1 is the pre-reading measure. Interest/Affect 2 and 3 are during the reading task. Interest/Affect 4 is immediately after the reading task. Perc diff is perceived difficulty.
Figure 3. Latent growth curve model of students' interest with unstandardized (and standardized) coefficients.

for the intercept and linear slope parameters suggested that we could evaluate change by adding between-person predictors. Because the variance for the quadratic slope was not statistically significant, between-person predictors were not added to predict the quadratic slope.

**Interest and affect as related processes.** To test the relationships among the intercepts and slopes of interest and affect, we fitted an unconditional parallel processes model by combining the growth models for interest and affect. The fit of the unconditional parallel processes model was good, \( \chi^2_{(20)} = 36.02, p = .02, \text{RMSEA} = .09 (.04 - .14), \text{CFI} = .96. \) As shown in Figure 5, there was a significant covariance between the intercepts of interest and affect (unstandardized coefficient = .20, \( p < .001 \)), suggesting that students who reported more positive affect after reading also had higher interest after reading. The intercept of interest was also significantly related to the linear slope of affect (unstandardized coefficient = .03, \( p = .04 \)). Students with a slower decline in affect

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reported higher interest after reading. Furthermore, the intercept and slope of interest were positively related (unstandardized coefficient = .08, \( p = .003 \)), indicating that students with a slower decline in interest while reading had higher interest after reading. The same was true for the relationship between the intercept and linear slope of affect (unstandardized coefficient = .07, \( p < .001 \)).

**Predicting the intercept and change in situational interest and affect.** Next, perceived difficulty and fluency were added to the parallel processes model to predict both intercepts, the slope of interest, and the linear slope of affect. After constraining all non-significant paths to zero, model fit was good, \( \chi^2_{(37)} = 59.41, p = .01, \) RMSEA = .08 (.04 -.12), CFI = .95. This model is presented in Figure 5. Perceived difficulty was negatively associated with the slope of interest (unstandardized coefficient = -.07, \( p = .03 \)) and linear slope of affect (unstandardized coefficient = -.06, \( p = .02 \)). Students who
Figure 5. Final latent growth curve model with parallel processes, with perceived difficulty and reading fluency predicting the intercepts and slopes of interest and affect. were positively related (unstandardized coefficient = .08, $p = .003$), indicating that perceived the task as more difficult reported a stronger decrease in both interest and affect during the task. Perceived difficulty was also negatively related to the intercept of affect (unstandardized coefficient = -.26, $p = .001$) and marginally related to the intercept of interest (unstandardized coefficient = -.15, $p = .10$); thus, students who perceived the task as more difficult reported lower affect and interest after reading. Reading fluency was significantly and negatively related to the slope of interest (unstandardized coefficient = -.03, $p < .001$), suggesting that individuals who were more fluent reported a greater decline in interest. This unexpected finding is discussed in the following section.
The direction of associations among reading fluency, interest, and affect. The autoregressive, cross-lagged model including all paths provided excellent fit to the data, $\chi^2_{(16)} = 16.55, p = .42, \text{RMSEA} = .02 (00 - .10), \text{CFI} = 1.00.$ After restricting all non-significant paths to zero, model fit was excellent and was not significantly different from the model including all paths, $\chi^2_{(23)} = 23.02, p = .46, \text{RMSEA} = .00 (00 - .09), \text{CFI} = 1.00.$ The final model is shown in Figure 6. Confirming findings from prior analyses, interest and affect were significantly correlated at each time point.

When examining the directional relationship from reading fluency to subsequent interest or affect, fluency during the first page was a significant negative predictor of interest after Page 1 (unstandardized coefficient $= -.05, p = .004$). Reading fluency during Page 2 section A significantly and positively predicted interest upon completion of this
section (unstandardized coefficient = .03, $p = .03$), and marginally predicted affect upon completion of this section (unstandardized coefficient = .02, $p = .06$). This marginal finding was the only significant association, in either direction, between reading fluency and affect. In terms of the directional association from interest to later fluency, higher interest before reading (topic interest) predicted greater fluency on Page 1 (unstandardized coefficient = 1.43, $p = .01$). Overall, these findings suggest that the role of reading fluency during the reading task was primarily as a predictor of subsequent situational interest.

Similar to the unexpected finding regarding reading fluency and the slope of interest, fluency during Page 1 negatively predicted interest after Page 1. We can better understand this relationship in two ways. First, when examining changes in interest based on reading fluency groups (Figure 7), students with higher fluency reported significantly higher interest before reading and a marked decrease in interest between the pre-reading and Page 1 time points. At the same time, students with the lowest reading fluency reported an increase in interest. As a result, all students, regardless of reading fluency, reported statistically similar levels of interest after Page 1 and for the remainder of the reading task. Thus, the negative relationship between reading fluency and interest after Page 1 was due, in part, to the differences in topic interest related to fluency.

Second, this unexpected relationship is also the byproduct of a statistical idiosyncrasy, known as a classic suppression effect (Conger, 1974). It is important to note that interest and reading fluency after Page 1 were not significantly correlated at the bivariate level. Classic suppression occurs when the addition of a predictor (reading fluency) that was not originally correlated with the outcome (interest after Page 1)
causes: 1) the relationship between the other predictor (topic interest) and outcome to strengthen in a positive direction; and 2) the relationship between non-significant predictor (reading fluency) and the outcome to strengthen in a negative direction.

Because reading fluency and topic interest were significantly and positively correlated, including both predictors reduces the amount of unexplained variance in both predictors, causing their relationships with the outcome to strengthen. It is evident that the nature of the relationship between interest and reading fluency is complex and requires further exploration.

**Discussion**

This study aimed to further our understanding of the relationship between difficulty and motivation by considering the influence of perceived difficulty and reading fluency on students' interest and affect during a brief, moderately difficult reading task.

As previous studies have often included only one type of difficulty, we were particularly...
interested in identifying the unique effects of students' difficulty with the task (reading fluency) and perceived difficulty on two separate, but related, motivational outcomes, while also equating the amount of objective difficulty across students. By assessing interest and affect on multiple occasions in real-time, we also identified how motivation fluctuated as students engaged in a difficult reading task.

The first research question involved examining changes in situational interest and affect during the reading task. Confirming Hypothesis 1, students’ interest and affect declined, and most of this decline occurred immediately once students began reading. Although Rotgans and Schmidt (2011) found a gradual decline in situational interest over the course of one day, this quick decline was likely due in part to students’ discovery that the text was above their reading ability. This decrease in situational interest supports prior studies that have found a negative influence of high objective difficulty on positive affect (Kumar & Jagacinski, 2011) and interest (Fulmer & Frijters, 2011). After the initial decrease, students’ interest remained relatively stable and affect increased slightly after students stopped reading. This increase in positive affect may be the result of feeling relief or pride after finishing the task.

Our data also indicated that interest and affect were related (e.g., Ainley et al., 2005), but distinct, motivational processes. In response to our second research question, although interest and affect had different patterns of change, they were also highly interconnected, with students who expressed higher interest after reading also reporting higher affect after reading (Hypothesis 2). Extending this hypothesis, a steeper decline in affect during the reading task was related to lower interest after reading, suggesting that changes in general affect influenced students’ situational interest in the task.
The third major question in this study concerned the unique effects of perceived difficulty and reading fluency on the changes in—and final ratings of—interest and affect. Higher perceived difficulty was related to lower levels of interest and affect after reading, as well as steeper decreases in interest and affect during the reading task. These findings support our hypothesis of a negative relationship between perceived difficulty and both interest and affect, with stronger findings for affect (Hypothesis 3a). These findings also transcend our original hypothesis and prior cross-sectional research that has found a negative relationship between perceived difficulty and interest and affect (Acee et al., 2010; Efklides & Petkaki, 2005; Li et al., 2007), by showing that higher perceived difficulty predicts a decline in both interest and affect during a moderately difficult reading task.

We found both supporting and conflicting evidence for the two hypotheses (3b and 4a) regarding the relationship between reading fluency and interest. Making more errors while reading subsequently predicted lower ratings of interest on one section of the text, supporting our hypotheses and theories of motivation (Deci & Ryan, 1985; Schraw et al., 1995; Wigfield & Eccles, 1992). However, the opposite was also found on Page 1, with more fluent students reporting lower interest after this page. This unexpected finding was partly due to the positive relationship between topic interest and reading fluency on the first page (partial support for Hypothesis 4b), as well as a classic suppression effect. Although most research on the relationship between reading fluency and motivation has focused on elementary school students (Quirk et al., 2009), we found that reading fluency continues to be an important factor for students’ interest in the middle school years.
Because of these significant, though conflicting, findings with reading fluency, research should continue investigating its role in students’ on-task motivation.

**Limitations, implications, and future directions.** Our goal of understanding the on-task processes of interest and affect was met with some challenges. First, our measure of affect did not include specific emotions. Consequently, we do not know how particular emotions (e.g., pride, boredom, anxiety) may have contributed to the immediate decline and later increase in general affect. Future research should explore how specific emotions change during difficult tasks and the impact on motivational and learning outcomes. Furthermore, combining self-report with other measures of affect, such as physiological measures (e.g., skin conductance, heart rate) and observations of facial expression and body posture, would contribute to a deeper understanding of on-task emotional and motivational processes (Calvo & D’Mello, 2010; Fulmer & Frijters, 2009).

Second, our finding that interest declined once students began reading was confounded by the concurrent shift from assessing topic interest to situational interest. Consequently, we cannot identify how or whether this measurement shift contributed to the decrease in interest between these time points. It is thus important that research continues to investigate the development of interest during learning tasks, including why the level of reported interest may change across different types of interest.

Third, because perceived difficulty was measured retrospectively, we could not establish the direction of effects between perceived difficulty and students’ interest and affect. It is likely that students who were more interested in the task and experienced positive affect had a more favorable perception of the task and their ability to succeed (Efklides & Petkaki, 2005). We advise that future studies assess perceived difficulty at
multiple time points, and consider additional motivational components of perceived difficulty, such as cognitive ability and perceptions of competence and effort (Efklides et al., 1998; Efklides & Petkaki, 2005).

A final potential concern relates to the widely varied topics of the individual texts. Although other studies have favored a more standardized approach to the selection of texts, the use of various texts was essential to match text difficulty with students’ reading abilities. Moreover, because the topics were so diverse, there is little reason to believe that topic and difficulty co-varied; consequently, we can confidently consider topic as randomly assigned. Finally, these texts afforded us the opportunity to observe students’ interest in a text, of which they had no individual preference for—or prior knowledge of—the content. Students were given a text and then made judgments of their interest based on the title (topic interest) and their experiences while reading (situational interest). This mirrors a ubiquitous occurrence in classrooms—teachers assign a text, and students’ interest develops as they become familiar with the content.

An interesting question to arise from this study concerns the optimal level of task difficulty. Our evidence suggests that optimal challenge is more complex than ensuring that tasks are matched to or slightly beyond students’ current ability levels (Csikszentmihalyi, 1991; Deci & Ryan, 1985), as constructing a task that met these requirements did not result in high and sustained interest or positive affect for most students. It may be that the optimal level of perceived difficulty is different than optimal levels of performance or objective difficulty. For example, although higher perceived difficulty was detrimental for interest, a higher number of errors were not disadvantageous for interest. Thus, it is critically important that researchers clearly define
the type of difficulty under investigation, as objective and perceived difficulty have
unique relationships with motivation. Similarly, research should also investigate how
students conceptualize and define the term difficult. For instance, students’ definitions of
difficult may be domain-specific. In math, difficulty may be tied to students’ ability to
complete a task or answer correctly, while in reading, difficulty may be more strongly
connected to students’ background knowledge and ability to comprehend the material.

In this paper, we explored the influence of perceived difficulty and reading
fluency on the change in middle school students’ situational interest and affect during a
moderately difficult reading task. This study highlights the consequences of high
perceived difficulty for students’ interest and affect, and the importance of reading
fluency for later situational interest. Because tasks that are beyond students’ abilities are
necessary for learning, research should continue to investigate how we can support
positive motivational outcomes during difficult tasks. This important goal includes
understanding the characteristics of the individual and task that minimize students’
perceptions of difficulty, and establishing effective strategies for teachers that lessen
students’ immediate negative reaction to difficult tasks.
GENERAL CONCLUSION

Academic challenge is necessary for learning. Correspondingly, several theories of motivation suggest that a moderate level of challenge is favorable for students' motivation (Berlyne, 1966; Clifford, 1990; Csikszentmihalyi, 1991; Deci & Ryan, 1985). However, prior research in academic contexts, though limited, has questioned the proposition that challenge and motivation are positively related (e.g., Acee et al., 2010; Durik & Matarazzo, 2009; Efklides & Petkaki, 2005). Thus, the goal of these two studies was to better understand the relationship between academic challenge and student motivation through integrating the perspectives of teachers and students, as well as qualitative, observational, and experimental methodologies. This multi-perspective and multi-method approach provided a more holistic representation of academic challenge by focusing on both the individual and broader context.

In particular, Study I used qualitative methods to highlight middle school teachers' perceptions of the feasibility of implementing challenging instruction in their classrooms. Study II identified how students' motivation changed during a moderately difficult reading task using an experimental design. The central finding connecting these two studies was that teachers' deep-seated beliefs that students would resist, disengage, and express disinterest during challenge (Study I) were consistent with the decline in students' interest and positive affect as they engaged in a moderately difficult task (Study II). Consequently, in contrast to theories of motivation, these studies suggest that
moderate challenge may not always be optimal for students' motivation. The following sections summarize the implications of these studies for theory and the classroom.

**Implications for Theory**

Incorporating the perspectives of both teachers and students enhanced our current understanding of the relationship between challenge and motivation. In particular, teachers' perspectives and students' reactions to challenge contradicted theoretical accounts of a positive relationship between challenge and motivation. Although there are several reasons for the conflict between theory and research, two potential reasons are discussed.

First, several theories of motivation and challenge are based on findings from non-academic tasks, such as sports or hobbies (e.g., playing chess or an instrument). Individuals are more likely to enjoy challenge in these contexts because they are engaging in goal-directed and intrinsically motivated activities and feel more competent in that domain (e.g., Abuhamdeh & Csikszentmihalyi, 2012). However, challenge in the classroom takes on a distinct meaning with different consequences. Although some students in Study II may have been intrinsically motivated during the reading task, students often engage in school tasks because of obligation or necessity, rather than by choice (Harter, 1978; Koestner, Zuckerman, & Koestner, 1987). Compared to self-selected hobbies or sports, academic tasks are less likely to be judged as relevant, meaningful, and related to one's goals.

Challenge in the classroom may also have different consequences than challenge in self-selected activities, particularly among middle school students. Early adolescents
report significant declines in their self-concepts of ability and interest in school (Eccles et al., 1983; Harter, 1981; Lepper et al., 2005). Simultaneously, middle school students experience a changing educational environment, involving increased teacher control and a greater emphasis on ability, competition, and evaluation (Eccles et al., 1993). As a result, middle school students have higher anxiety about schoolwork (Harter, Whitesell, & Kowalski, 1992) and are more concerned with self-evaluation and appearing successful and competent (Midgley, Anderman, & Hicks, 1995). Thus, middle school students may be more likely to resist challenge because of an increased fear of failure and the potential for embarrassment and ridicule in the presence of peers.

Another possible reason why these findings contradicted theories of motivation is because of the varied theoretical conceptualizations of challenge. For example, theories of motivation have described challenging tasks as those that are novel, unfamiliar, or complex (Atkinson, 1957; Berlyne, 1954, 1963; Deci & Ryan, 1985; Keller, 1987; White, 1959), and those that matched to or slightly above one's abilities (Csikszentmihalyi, 1991). While some theorists suggest that challenge creates mild frustration and fear (Atkinson, 1957; White, 1959), others propose that it is associated with the positive experience of flow (Csikszentmihalyi, 1991). In Study II, task difficulty was calibrated to a moderate level of difficulty, which was based on the theoretical notion that moderate difficulty—relative to one's ability—is optimal for student motivation (Csikszentmihalyi, 1991; Deci & Ryan, 1985; Wigfield & Eccles, 2002). However, findings suggested that this difficulty level may not have been optimal for students' motivation. To understand optimal difficulty, future studies should include a control group (e.g., participants who read texts at their ability level) or have participants read multiple texts at various levels of
difficulty relative to their ability. It is also imperative that future research clarifies the similarities and differences between challenge and difficulty in academic contexts from the perspectives of both teachers and students. Research should also focus on how students' notions of challenge and difficulty develop with age.

**Factors affecting the relationship between challenge and motivation.** In establishing the link between challenge and motivation in academic contexts, it is also important that we understand the factors that influence this relationship. In Study II, students' perceptions of task difficulty exerted a powerful influence on their interest and affect while reading, especially compared to the actual difficulty students experienced with the text. Although students' perceptions of difficulty may have been exacerbated by the salience of their errors due to reading aloud, this finding demonstrates the complexity of the relationship between challenge and motivation. When considering the impact of challenge, research should investigate the unique influences of both perceived and actual challenge on students' motivation and learning.

Furthermore, the relationship between challenge and motivation is likely affected by the timing of measurement during the task. The measurement of students' motivation at several stages during a reading task confirmed that motivation is situational and can fluctuate substantially in a brief amount of time (Study II). As students' perceptions of task difficulty are subject to change (Efklides et al., 1998), it is possible that the relationship between challenge (perceived or actual) and motivation may also fluctuate during a task. For example, at the beginning of a task, students may experience a sharp decline in motivation because the amount of challenge seems overwhelming, resulting in a negative relationship between challenge and motivation. However, if students begin to
experience success or receive support from their teacher, the relationship between challenge and motivation may become neutral or change to a positive direction. When a student successfully completes a challenging task, challenge and motivation may be positively related because students feel more competent and proud of their accomplishment. Thus, further research should integrate on-task measures of challenge, difficulty, and motivation to understand the causal relationship among these factors and how their relationships may change during academic tasks.

Finally, teachers’ use of strategies to support students’ motivation during challenge is expected to influence the relationship between challenge and motivation. Teachers found that students were more likely to engage in challenging tasks and enjoy these tasks when they received emotional or motivational support and when the teacher acknowledged their negative feelings or gave a purpose for the challenging activity (Study I). This leads to the following discussion on the implications of these findings for classrooms.

Implications for the Classroom

Through examining teachers’ perspectives on challenging instruction during a professional development program, we discovered that the well-supported initiative to increase challenge in U.S. classrooms is difficult for teachers to enact. Furthermore, teachers questioned the feasibility of implementing challenging instruction and were profoundly influenced by their perceptions of numerous pressures that affected their instructional choices. Learning directly from teachers illustrated the complexities of implementing challenging instruction in the middle school classroom, the perceived
consequences of challenge, and the potential reasons why challenge remains low in some U.S. elementary and middle school classrooms.

Because students have been acculturated to an instructional routine in which success is narrowly defined as correct answers rather than as thinking about and understanding concepts (Doyle, 1983), students' initial reactions to challenge are likely to be negative. Thus, motivating students to engage in challenge will likely require teacher support. During the discussions about challenging instruction, teachers suggested a number of effective solutions for supporting students' motivation during challenge, which integrated four best practices suggested by motivation research (e.g., Deci & Ryan, 1985; Eccles & Wigfield, 1995; Goodenow, 1993; Reeve et al., 1999). First, by showing respect for students' negative feelings and increasing opportunities for collaborative learning, teachers supported students' feelings of belongingness. Second, by providing students with ownership and increased control over their learning, teachers supported students' feelings of autonomy. Third, by encouraging students and expressing confidence in their abilities, teachers supported students' feelings of competence. Increasing students' feelings of competence is also likely to decrease their perceptions of difficulty, which can have a positive influence on their motivation during challenging tasks. This is because perceptions of task difficulty partly depend on students' self-assessments of whether they are capable of accomplishing the task.

Finally, by explaining the purpose and value of the task, teachers helped students appreciate the meaningfulness of the task. As students may be more likely to perceive challenging tasks as futile or invaluable because of the potential for failure, helping students see the relevance and value of the learning opportunity is an important role for
teachers (Assor, Kaplan, & Roth, 2002; Eccles & Wigfield, 1995). Particularly during challenge, teachers may need to scaffold both students' understanding (cognitive zone of proximal development) and their value and appreciation for the task (motivational zone of proximal development; Brophy, 1999).

Although Study I presented anecdotal evidence about how to support students' motivation during challenge, these various supports were not available for students who engaged in the difficult reading task in Study II. Thus, these studies did not empirically investigate the effectiveness of these strategies for students' motivation during challenge. Future research is needed to examine what forms of support are most effective and how these various strategies (e.g., giving students ownership, providing a rationale for the task, offering feedback and encouragement) influence students' perceptions of task difficulty, motivation for the task, and learning.

Because students often respond negatively to challenge, research should continue to focus on strategies that can both initiate and maintain students' motivation during challenging tasks. Similar to other best practices, the effectiveness of challenging instruction hinges on teachers' use of strategies that support several aspects of students' motivation and learning concurrently. Although these practices are more complex in their design and implementation, effective challenging instruction is a necessary step to improving students' learning and achievement.
APPENDIX:

QUOTATIONS OF TEACHERS' PERCEIVED PRESSURES RELATED TO
CHALLENGING INSTRUCTION

<table>
<thead>
<tr>
<th>Pressures from Above</th>
<th></th>
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<tbody>
<tr>
<td>Time constraint</td>
<td>“To do this problem here would take 9 weeks. Actually, half a year.”</td>
</tr>
<tr>
<td>Curriculum/standards</td>
<td>“I can’t even stop and think about what you’ve presented to us. With the new textbook… I feel like I can’t even sit down… and think, oh I could use this here.”</td>
</tr>
<tr>
<td>Standardized testing</td>
<td>“That’s the challenge with the testing that we do. Do you want to teach it right or do you want to teach for the test?”</td>
</tr>
<tr>
<td>Parent or peer influence</td>
<td>“They could’ve had a massive disagreement at lunch with someone in class. And they don’t even want to open their mouth for fear that they’re putting themselves out to be ridiculed.”</td>
</tr>
<tr>
<td>Administration or the “system”</td>
<td>“When I first started teaching we were big into higher-level thinking and thinking skills. We kind have gone away from (that)… we are skill based.”</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Pressures from Within</th>
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<tbody>
<tr>
<td>Low efficacy with pedagogy</td>
<td>“As I went on I thought the first couple hours I did it, it was too challenging and wasn’t beneficial. They were closing down too much. Maybe I wasn’t doing it as properly as I should’ve. Maybe they needed more cues.”</td>
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<tr>
<td>Low efficacy with content</td>
<td>“Sometimes when I read the directions for the activities, I don’t understand them. I’m thinking, how can I explain it to the kids when I don’t understand what they’re supposed to do.”</td>
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<tr>
<td>Need for control</td>
<td>“It’s hard for me to sit back and just let them sort through their own thoughts, because they [their thoughts] are not right.”</td>
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<tr>
<td>Perception of fixed ability or motivation</td>
<td>“Extrinsically motivating a student in hopes to build intrinsic motivation… Would you agree that there are some kids we cannot do that for?”</td>
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<tr>
<td>Strategies could hinder students' learning or achievement</td>
<td>“When you do the big deeper understanding units, my concern, are they getting all the intricacies of it?… I don’t feel convinced that they are.”</td>
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<td>Misinterpretation of strategy</td>
<td>“Make it easy so they can be successful and then build on it and challenge but know when it’s time to pull back and have an easy assignment so that they stay tuned in.”</td>
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<tr>
<td>Subject-specific ideas about instruction</td>
<td>“I feel pressure to cover the math curriculum. Science isn’t so bad. Math, horrendous. No way to cover it all.”</td>
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<td><strong>Pressures from Below</strong></td>
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<tr>
<td>Lack of effort</td>
<td>“Some kids come in with a little sign that says I’m only going to do this, ok, so don’t expect too much of me.”</td>
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<tr>
<td>Resistance to challenge</td>
<td>“Kids aren’t willing to give effort because they’re afraid they are going to fail.”</td>
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<tr>
<td>Developmental readiness</td>
<td>“[the questions] aren’t appropriate, they’re too hard for a sixth grader…They’re just not capable, a lot of them. Some of them are, but the majority of them just aren’t.”</td>
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<tr>
<td>Lack of interest</td>
<td>“They don’t want to be challenged. They don’t care.”</td>
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<tr>
<td>Lack of knowledge/skill</td>
<td>“They can’t write a sentence!... When I get the rough draft and it’s a fragment, I say, ‘this is not a sentence,’ and they say, ‘why not?’ So I keep having to be the language arts teacher and try to explain to them what a sentence is.”</td>
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<tr>
<td>Learning styles</td>
<td>“We have 180 kids a day. How do they all individually learn, I don’t know exactly, but that’s a piece of the puzzle.”</td>
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<tr>
<td>Achievement or ability level</td>
<td>“Those kids are struggling readers… so whenever they are faced with challenge or reading they think that is difficult, they tend to say, 'I can’t do this.’”</td>
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</tbody>
</table>
REFERENCES


Reeve, J. (2009). Why teachers adopt a controlling motivating style toward students and how they can become more autonomy supportive. *Educational Psychologist, 44*, 159-175.


