SUPPORTIVE CLASSROOM CONTEXTS

FOR UPPER ELEMENTARY ENGLISH LANGUAGE LEARNERS

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A Dissertation

Presented to the Faculty of the Curry School of Education

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by

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APPROVAL OF THE DISSERTATION

This dissertation, ("Supportive Classrooms for Upper Elementary Latino English Language Learners"), has been approved by the Graduate Faculty of the Curry School of Education in partial fulfillment of the requirements of a Doctor of Philosophy.

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DEDICATION

My advisor, Dr. Natalia Palacios, has been a generous mentor, a constant advocate, and a boundless source of guidance and good ideas. I am deeply grateful to have been her student.

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I come from a family that prizes learning. Both my grandmothers, Jane Clark and Anne Banse, were teachers and Jane Clark remains a sharp, lifelong learner. My last conversation with my grandfather, Holland Clark, was about reading. All of my grandparents believed in my potential and loved me whether or not I lived up to it. While writing this dissertation I kept thinking about my paternal grandfather, Robert Banse, Sr. He died when I was seven; yet he made sure that all of his grandchildren, both those he knew and those he never met, could receive a quality education. I cannot articulate what his generosity has meant to me.

And finally, five plus years of studying child development has etched one lesson deep into my thinking: how powerful it is to have a loving parent. I have two: two parents who set a consistent bedtime, fed me, clothed me, told me to go outside, refused to let me play hooky (and I tried), tucked me in at night, drove me to ballet, and got me to school mostly on time. Two parents who read to me and made reading favorite books part of our family culture. Essentially, they loved each other and their children. All of this, I now realize, is an absolute miracle.

This dissertation is dedicated to my parents, Robert and Jane Banse.

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Instructionally sound, emotionally supportive classrooms are critical for upper elementary students' learning (Hughes, 2011; McCormick & O'Connor, 2015; Kazemi & Stipek, 2001; Roorda, Koomen, Spilt, & Oort, 2011). Less is known about how upper elementary teachers can tailor their classroom environments and instructional styles to support their English language learners' (ELL) needs. Approximately 10% of fourth and fifth grade students are ELL, approximately 75% of whom are Latino (Rusakoff, 2011). However, teachers across grade levels often lack the skills or support necessary to effectively teach Latino ELLs (Batt, 2008; Buysse, Castro, West, & Skinner, 2005; Fry & Gonzalez, 2008; Kena et al., 2016; Russakoff, 2011). Creating classrooms that fully support Latino ELLs goes beyond instruction, although instruction is certainly a foundational component of this process. Classrooms must also provide a context in which Latino ELLs can form positive relationships with their teachers and peers while feeling safe to learn (Gillander, 2007; Lucas, Villegas, & Freedson-Gonzalez, 2008; Yoon, 2008). In other words, upper elementary teachers require a comprehensive understanding of how to foster emotionally and instructionally supportive environments in classrooms with ELLs.

This dissertation is comprised of three studies, which each address different aspects of this issue. In the first study, I used quantitative data to test the possibility that highly caring, well-managed classrooms are supportive of Latino ELLs and their intrapersonal characteristics—namely, grit—in fourth and fifth grade. Based on the findings of the first study, I then used videotaped English Language Arts (ELA) lessons to produce qualitative case descriptions of how teachers demonstrate supportiveness in upper elementary classrooms with varying levels of English language proficiency and academic gains. Finally, I conducted an exploratory qualitative analysis, in which I examined how fourth and fifth grade teachers' instructional and emotional

support during mathematics instruction differed across classrooms with varying levels of English proficiency and academic gains.

Theoretical Framework

This dissertation stems from person-environment fit theory, which states that the interplay between an individual's characteristics and the individual's environment produces behaviors (Greene, 2014; Hunt, 1975). If individuals perceive that their environment fits well with their characteristics, then they will perform well. Person-environment fit theory includes classrooms: if students perceive that the characteristics of their classroom fit them well, then they do well in school (Eccles et al., 1993). Therefore, teachers ideally find ways to fit their classroom environments and instruction to their students' characteristics, such as students' ELL status. The match between classroom and student characteristics specifically for Latino ELLs is key for two reasons: being an ELL has implications both for students' academic outcomes (Hemphill & Vanneman, 2011) as well as how their teachers treat them (DaSilva Iddings & Katz, 2007; Yoon, 2008). Consequently, the unique needs of Latino ELLs present both challenges and opportunities for their teachers. In the next sections, I review literature on how teachers can offer emotional and instructional support in classrooms with ELLs.

Emotionally Supportive Classrooms with ELLs

One challenge of instructing a classroom with many ELLs is creating a classroom environment that offers emotional support to *all* students. Organized, supportive classrooms are generally beneficial. Fourth and fifth graders in classrooms with strong classroom management systems display better academic gains relative to peers in less organized classrooms (Freiberg, Huzinec, & Templeton, 2009). Relatedly, fourth and fifth grade students who experience warm,

sensitive teachers are more engaged during instruction and experience greater academic achievement (Hughes, 2011; Martin & Rimm-Kaufman, 2015).

ELLs seem to be particularly sensitive to well-organized, supportive classroom environments, as they face the enormous challenge of simultaneously learning English and content. ELLs can be isolated, experience stigmatization, or be susceptible to growing anti-immigration sentiment, which can disrupt their ability to learn (Pappamihiel, 2001; Valdés, 2001). As a result, researchers posit the importance of cultivating highly caring, well-managed classrooms, in which Latino ELLs feel safe and supported as they embark on the task of learning English and academic content (Gillanders, 2007; Lucas et al., 2008). Some research indicates that when classrooms are not supportive of ELLs, then those classrooms constrain students' opportunities to learn and participate in classroom life (DaSilva Iddings & Katz, 2007; Yoon, 2008). However, one important link has not yet been made: what do supportive classrooms entail with regard to *high-achieving,* upper elementary classrooms with ELL students? Recent research has often focused on the practices of unsupportive teachers, without reference to academic gains. Answering this question will provide a strengths-based perspective by elucidating what *effective* teachers in classrooms with ELLs do to support to their students*,* as opposed to focusing on the practices of ineffective or unsupportive teachers. Additionally, previous research on how to emotionally support ELLs has focused on young children (e.g., Gillanders, 2007). This dissertation will expand the literature by focusing on fourth and fifth grade classrooms.

High-Quality Instruction in Classrooms with ELLs

In addition to cultivating emotionally supportive classrooms, a second challenge for teachers of Latino ELLs is helping ELLs master content as they simultaneously learn to communicate in English. A variety of practices appear to be important for ELLs' English

proficiency and academic development, including explicitly teaching and modeling content-relevant vocabulary and speech patterns (Carlo et al., 2004; Khisty & Chval, 2002) and enhancing language by using gestures, visuals, or other relevant representations (Shein, 2012). The formation of rich language environment in which all students, including ELLs, have the opportunity to respond to challenging ideas is also key (Castro, Páez, Dickinson, & Frede, 2011; McNeil, 2012). Research indicates that teachers can scaffold ELLs' responses using a variety of language-based maneuvers, such as repeating responses for clarity and confirmation; extending upon the academic content in the response; or reformulating the response using precise academic language (McNeil, 2012; Moschkovich 1999, 2007). The frequency and degree to which teachers incorporate these practices may vary depending on content area—for example, teachers may elaborate students' responses more often during mathematics instruction, when students are encouraged to justify their answers using full mathematical explanations (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). Moreover, ELLs' English proficiency and content acquisition is thought to develop best within appropriately demanding instructional activities, so that students have the opportunity to grapple with academic content (Echevarria et al., 2006). Challenging academic tasks provide students with opportunities to read, write, listen, and speak about what they are learning, which may benefit ELLs' developing English proficiency alongside their content understanding.

Recently, research that links aspects of high-quality instructional environments—such as encouraging ELLs' oral language—back to ELL students' outcomes has primarily focused on early childhood through third grade classrooms (e.g. Castro, Espinosa, & Paéz, 2011; Castro, 2014). With regard to upper elementary classrooms, several qualitative case studies richly describe how teachers of ELLs use strategies, such as revoicing (e.g., Hansen-Thomas, 2009;

Moschkovich, 1999, 2007; White, 2003). However, more research is needed to understand whether these practices are specifically found in *high-achieving* upper elementary classrooms with Latino ELLs. Recent research on instruction in upper elementary classrooms with varying levels of English proficiency has primarily used qualitative studies of teachers who are viewed as master teachers by school personnel or have prior relationships with the researchers, *without* referencing whether students of those teachers made high academic gains. This dissertation will also address this gap, by comparing instructional practices during mathematics instruction in fourth and fifth grade classrooms with varying levels of English proficiency and academic gains.

Summary

In the following sections, I review each of the three manuscripts within this dissertation.

Paper 1. *Supportive Classrooms for Latino English Language Learners: Grit, ELL Status, and the Classroom Context.* The first paper uses person-environment fit theory to understand how Latino student perceptions of classroom characteristics (care and control) interact with students' ELL status and perceived grit. The purpose of this study is to use quantitative data to examine the types of classroom characteristics that interact supportively with Latino students' intrapersonal characteristics and consequently, their academic achievement. I used a sample of fourth and fifth grade Latino students from the Measures of Effective Teaching Dataset (n = 3,272). Multiple regression analyses with students nested in classrooms revealed that when Latino ELLs perceived that their teachers were highly caring or had cultivated well-managed classrooms, then their grit was more strongly associated with their ELA achievement compared to non-ELL students. In other words, in classrooms high in care or high in control, Latino ELLs appeared to be better at leveraging their grit in relation to their ELA achievement.

Paper 2. *How Do Effective Teachers Uniquely Show Support in ELL Classrooms?* In order to expand upon the care findings from the previous paper, the second paper uses qualitative data to unpack what care or *teacher supportiveness* looks like during English Language Arts lessons (ELA) in high-achieving, majority-Latino classrooms with high numbers of ELLs. I used a multiple, comparative case study analysis to describe how teachers in ELL, high-gains classrooms expressed supportiveness compared to teachers in no-ELL, high-gains classrooms and ELL, low-gains classrooms. Three types of supportiveness emerged: relevance (the teacher's ability to describe content as important for students); relationship (the teacher's efforts to connect with her students); and praise of students' work or effort. Teacher expressions of supportiveness differed across the three types of classrooms. Namely, teachers in ELL, high-achieving classrooms used all three types of supportiveness, whereas teachers in no-ELL, high-achieving or ELL, low-achieving classrooms did not.

Paper 3. *How Do Effective Mathematics Teachers of Fourth and Fifth Grade ELLs Demonstrate Instructional Competence and Emotional Support?* The third chapter also used qualitative methods, with a focus on mathematics instruction. The first chapter of this dissertation revealed that when Latino ELL students perceived that their teachers were highly caring and created well-managed classrooms, the relationship between their grit and ELA achievement was strong; however, the same association was not found for mathematics outcomes. The focus of the third study was to consider the reason behind this discrepancy. To do so, I examined (1) teachers' separate use of supportiveness and instruction and (2) how, if at all, teachers integrated these two classroom dimensions during mathematics instruction. I used a multiple and comparative case study approach to describe how teachers in ELL, high-gains classrooms expressed supportiveness and used various instructional practices compared to

teachers in no-ELL, high-gains classrooms and ELL, low-gains classrooms during mathematics instruction. The ELL, high-gains teachers used gestures and representations accurately and purposefully; offered praise; elaborated student responses; checked all students' understanding; and while doing so, provided emotional and instructional support. These practices and displays of supportiveness were less common amongst the remaining teachers in the sample.

Significance

ELLs, many of them Latinos students, are the fastest growing student population in the United States (National Clearinghouse for English Language Acquisition, 2010). Consequently, the importance of determining research-based strategies for supporting this student group cannot be overstated. This dissertation includes multiple innovative aspects. I use a person-environment fit framework and mixed methods approach in order to develop a detailed understanding of supportive classroom environments Latino ELLs. I also focus my research on ELLs in upper elementary school, a relatively understudied period of development for ELLs. In the final two papers, I qualitatively compare multiple majority-Latino upper elementary classrooms with varying levels of English proficiency and academic gains. This comparison presents a unique opportunity, in which I can gain an understanding of practices used specifically by effective teachers with many ELL students.

The primary contribution of this dissertation is identifying and describing characteristics of instructionally and emotionally supportive fourth and fifth grade classrooms for Latino ELLs. Teaching ELLs is a challenging endeavor, which teachers may not feel prepared to undertake (Russakoff, 2011). By examining the types of classroom characteristics that support Latino ELLs, as well as what those characteristics look like in practice, I hope to inform empirical understanding and theory how teachers can support their ELL students emotionally and

instructionally, across both ELA and mathematics content. Consequently, this dissertation has the potential to provide ideas that could be included and tested as part of professional development or pre-service training for upper elementary teachers of ELLs.

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Supportive Classrooms for Latino English Language Learners:

Grit, ELL Status, and the Classroom Context

Abstract

Students' academic achievement is the result of the interplay between person-level and contextual factors (Greene, 2014; Hunt, 1975). Students perform better when classroom characteristics support their characteristics. The authors examined whether student perceptions of two classroom characteristics (care and control) fit with two Latino student characteristics (ELL status and grit) in relation to their academic achievement. Using a sample of fourth and fifth grade Latino students from the Measures of Effective Teaching dataset (n = 3,272), the authors conducted a series of nested regression models with two and three-way interactions between student characteristics and student perceptions of classroom characteristics. Findings revealed that grit is strongly associated with Latino ELLs' ELA achievement in relation to their English Language Arts achievement when students perceived that teachers used high levels of care and control, but not in classrooms with low or mid-levels of care and control. We conclude with implications for practitioners.

Keywords: Measures of Effective Teaching dataset, grit, Latino students, English Language Learners, upper elementary, academic achievement

Supportive Classrooms for Latino English Language Learners:

Grit, ELL Status, and the Classroom Context

Schools are increasingly considering the importance of explicitly teaching and measuring aspects of students' character, in their aim to promote achievement overall and reduce achievement gaps (Cohen, 2015; Strauss, 2015; Zernike, 2016). One popular characteristic is grit, which is defined as passion and persistence in the pursuit of long-term goals (Duckworth & Quinn, 2009). Grit is controversial: many advocates argue that grit places undue burden on individuals to rise above their circumstances (e.g., Osgood, 2012) while others emphasize the role grit plays in success and achievement (e.g., Duckworth, Peterson, Matthews, & Kelly, 2007). Regardless of one's stance, grit has permeated schools. For example, the 2017 National Assessment of Education Progress will include data collection on students' self-reported grit levels, although grit research is in nascent stages (Strauss, 2015).

At the same time that schools are increasingly attending to characteristics such as grit, schools are also facing shifts in student populations. Currently, the US student population is undergoing rapid linguistic, ethnic, and cultural changes. In particular, the Latino student population is growing and concurrently the number of Latino English language learners (ELLs) is expanding (Kena et al., 2016). In this period of student demographic changes and educational reform, it is critical to investigate how the classroom context supports Latino students' intrapersonal characteristics with regard to their academic achievement.

In this study, we employed person-environment fit theory to examine this interplay in relation to the academic achievement of Latino fourth and fifth graders. We used a sample of Latino upper elementary students in order to take a strengths-based, within-group approach and avoid deficit-oriented comparisons with other student groups (Chase-Lansdale, Valdovinos

D'Angelo, & Palacios, 2007; García Coll & Szalacha, 2004). We examined student perceptions of two classroom characteristics that may reflect supportive environments for Latino students: teacher warmth and sensitivity (*care*) and teacher classroom management (*control*). Given the importance of person-environment fit, we investigated whether warm, well-managed classrooms fit well with two Latino student characteristics: grit and ELL status.

Person-Environment Fit Theory

A key idea of person-environment fit theory is that the interplay between environmental characteristics and personal traits produces behaviors (Hunt, 1975). An individual's success within an environment depends on the *goodness of fit* between the individual and the environment: when environmental characteristics and personal traits match well, then the individual's outcomes will be optimal (Greene, 2014). As Eccles and colleagues (1993) noted, the concept of "good fit" extends to classrooms: if students perceive that classroom characteristics fit with their characteristics, then they perform well. We focus specifically on student perceptions of classroom characteristics: classroom management and teacher warmth. It may be that teachers who foster supportive environments for Latino ELLs are also creating environments that allow students to use their character resources, such as their grit, to thrive academically. In the following section, we review literature on teacher warmth and classroom management, attending to why these classroom characteristics may be meaningful for Latino students generally and Latino ELLs specifically.

Classroom Characteristics

Both teacher warmth and classroom management are generally beneficial in upper elementary classrooms. Each is associated with positive student outcomes, including achievement. Having a positive relationship with a warm, caring teacher is associated with

higher levels of student engagement and achievement in upper elementary school (Klem & Connell, 2004; Rimm-Kaufman, Baroody, Larsen, Curby, & Abry, 2015; Wu, Hughes, & Kwok, 2010). Similarly, fourth and fifth grade teachers who implement strong classroom management routines may witness student gains such as improved reading and mathematics abilities (Freiberg, Huzinec, & Templeton, 2009). For the purposes of this study, we refer to teacher warmth as "care" and the quality of classroom management as "control" (Ferguson, 2012). Hence, a "highly-controlled" classroom signals a well-managed and organized classroom.

These classroom characteristics are important across all students. However, the *impact* of these characteristics on students may vary depending on students' ethnic, cultural, and linguistic backgrounds. Many educators and researchers advocate for teachers to look to students' home cultures when planning how to cultivate supportive classroom contexts for students from diverse backgrounds (DaSilva Iddings & Katz, 2007; Gay, 2002; Ladson-Billings, 1995). Although our focus is on Latino students' perceptions of classroom characteristics, we briefly examine research on parenting trends in Latino families in order to identify aspects of home environments that may be salient for Latino students' classrooms. We note that it is *not* appropriate to approach this literature as definitively universal practices across Latino families. Latino families represent a range of national and ethnic backgrounds and there will be considerable variability in their parenting practices. Our discussion of these practices should be read as general, empirically supported parenting trends within the Latino community.

Cultural alignment of classroom characteristics. In general, empirical literature on behavioral expectations and discipline in Latino homes emphasizes the implementation of high and clear expectations, as well as the importance of consistent discipline within Latino families (Cardona, Nicholson, & Fox, 2000; Calzdada & Eyberg, 2002; Dixon, Graber, & Brooks-Gunn,

2008; Domenech Rodriguez, Donovick, & Crowley, 2009). For example, Puerto Rican and Dominican mothers have reported high levels of consistency in following through with discipline and low levels of ignoring misbehaviors; simultaneously, they reported low levels of harsh, punitive, or inconsistent disciplinary actions (Calzdada & Eyberg, 2002). As previously noted, these practices are also beneficial in fourth and fifth-grade classrooms (Freiberg et al., 2009; Rimm-Kaufman et al., 2015). Fourth and fifth grade Latino students may therefore benefit from well-organized classrooms with clear behavioral expectations and consistent follow-through. Indeed, research suggests that using practices such as clear and consistent expectations aligned with Latino students' homes has helped teachers establish smoothly functioning classrooms (Brown, 2004).

Similarly, research on Latino children's home environments indicates that warmth and nurturance are common parenting practices within Latino family culture (Calzdada & Eyberg, 2002; De Von Figueroa-Moseley, Ramey Keltner, & Lanzi, 2006; Domenech Rodriguez et al, 2009). De Von Figueroa-Mosely and colleagues (2006) found evidence of high overall levels of nurturance in Latino families, even with variation among cultural subgroups. Demonstrating warmth also is important for students' engagement and achievement within upper elementary contexts (Klem & Connell, 2004; Wu et al., 2010; Rimm-Kaufman et al., 2015). Given the prominence of parental warmth in Latino families, the practice of teacher warmth may be a key support for fourth and fifth grade Latino students. This possibility is further supported by research: for example, Crosnoe and colleagues found that for middle school Latina girls, bonding with their teachers was associated with higher achievement, when compared to students from other cultural and ethnic groups (2004).

Student perceptions of care and control. Classroom characteristics are only as pertinent as Latino students perceive them to be, particularly if minoritized populations perceive warmth and classroom management practices differently than teachers or researchers. Research involving student perceptions of classroom characteristics has focused on student perceptions of care. Generally, positive student perceptions of teacher care are associated with positive student outcomes. For example, upper elementary students who reported caring relationships with teachers also reported higher levels of engagement, school belonging, academic competence, and academic achievement (Hughes, 2011; Klem & Connell, 2004; Rimm-Kaufman et al., 2015). With regard to care and control, ninth graders who reported higher levels of teacher care and control also reported higher levels of school engagement, as well as less misbehavior and more school satisfaction (Nie & Lau, 2009).

Little research has examined whether Latino students differ from students of other backgrounds in their perceptions of teacher care and control. Garza (2009) suggests that Latino high-school students vary from White students in how they perceived teacher care, preferring teachers to show care by explicitly scaffolding their learning instead of using broadly caring actions, such as greeting students. Given the paucity of research on Latino student perceptions of classroom characteristics, a conservative approach requires measuring teacher care and control using student report. Without student report, it is impossible to know if teachers are using care and control in meaningful ways that respond to the needs of Latino students.

Understanding student perspectives on classroom characteristics that are thought to be culturally relevant may be important for ELL students (DaSilva Iddings & Katz, 2007; de Jong & Harper, 2005). Teachers who do not integrate elements of students' home culture with their classrooms constrain opportunities for ELLs to participate and can lead to ELLs feeling

powerless in their classrooms (DaSilva Iddings & Katz, 2007; Yoon, 2008). Using Latino ELLs'

home environments as templates for constructing a classroom environment may help Latino

ELLs feel included and empowered. For example, Lucas and colleagues (2008) posit a

framework to help teachers successfully support their ELL students. As part of that framework,

they suggested that when ELLs perceive their teachers have cultivated highly caring, safe

classrooms then ELLs will feel less anxiety or stigma due to their ELL status. Thus, it is possible

that Latino ELL students may benefit even more than Latino non-ELL students when they

perceive that their teachers are creating warm and well-managed classrooms.

Student perceptions of their classroom are important. However, these perceptions do not

take into consideration other intrapersonal characteristics that may also relate to student

achievement. As indicated earlier, one such characteristic is grit, which has garnered attention as

schools increasingly focus on character education (Strauss, 2015; Tough, 2011).

Grit

Grit is defined as passion and persistence in the pursuit of long-term goals (Duckworth &

Quinn, 2009). A gritty individual identifies a goal and works hard toward that goal over an

extended period of time, despite setbacks. Grit is conceptually related to other processes, such as

self-control or motivation, although it stands alone as a construct (Duckworth & Gross, 2014;

Myers, Wang, Black, Bugescu, & Hoeft, 2016). Grit is similar to self-control, in that both grit

and self-control involve denying impulses to accomplish a goal of "greater enduring value"

(Duckworth & Gross, 2014, p. 321). However, grit differs from self-control in that it focuses on

a longer-term goal than self-control, despite possible setbacks and failures. In fourth grade, for

example, this is the difference between nine-year-olds successfully reading complex chapter

book of their choosing over the course of a month (grit) versus taking time to sit quietly and read

for twenty minutes (self-control). The former is a long-term goal requiring extended effort and motivation; the latter is a short-term effort requiring in-the-moment impulse control. Similarly, grit and motivation are correlated but distinct constructs (Myers, et al., 2016). With regard to Latino students, evidence suggests that grit is positively and moderately correlated with academic motivation for Mexican American adolescent students (Piña-Watson, López, Ojeda, & Rodriguez, 2015).

Grit is important for students' academic achievement. College undergraduates with higher grit also had higher GPAs after controlling for SAT scores (Duckworth et al., 2007). Grit was also associated with higher GPAs for West Point Cadets, along scores assessing candidates' overall potential (Duckworth et al., 2007). The authors of the present study have found evidence that grit is positively associated with fourth and fifth graders' ELA and mathematics standardized test outcomes. Although the research on the relation between grit and achievement in the late elementary period is limited, a theme emerges from the existing literature about the importance of grit for academic achievement from late middle-childhood through adolescence. The present study is among the first to link grit to upper elementary academic outcomes.

The study of grit has been controversial. Some fear that a focus on grit--particularly in schools-- leads to a "pull yourself up by your bootstraps" mentality, which ignores key structural problems, such as poverty. Angela Duckworth, the foremost researcher on grit, has disavowed the practice of grading grit in schools (2016), as doing so focuses only on students' character while ignoring the context in which these evaluations are made. As posited in our theoretical framework, successful learning results from a well-matched interplay between student and classroom characteristics (Hunt 1975; Lau & Nie, 2008). Given the importance of this interplay, it is necessary to examine grit *within the framework of person-environment fit* for two reasons.

First, grit is gaining rapid attention in districts across the country. Schools are implementing character report cards in which students are graded on their grit and the National Assessment of Education progress will begin grit data collection soon (Straus, 2015; Tough, 2011). Given this reality, researchers have an obligation to investigate how this construct operates in a classroom. Second, grit is thought to be an important trait for individuals in challenging circumstances, including children (Duckworth, Quinn, & Seligmann, 2009; Duckworth, Kirby, Tsukayama, Berstein, & Ericsson, 2011). Thus, grit may be relevant for Latino ELLs who frequently both live in poverty and must achieve English language proficiency, typically in English-only contexts (Fry & Gonzales, 2008; Hemphill & Vanneman, 2011). Understanding how grit operates for Latino students may help researchers and educators support this student group in the future. For example, given the immediate academic and linguistic challenges Latino ELLs can face everyday learning in English-speaking classrooms, perhaps their grit functions best within supportive contexts or conversely, their grit may be hampered by unsupportive contexts.

Person-Environment Fit: Grit, ELL Status, and Classroom Characteristics

How teachers use practices such as care and control may be interconnected with the degree to which students exhibit characteristics similar to grit (i.e., characteristics analogous to passion and persistence). Classroom characteristics overall and student perceptions of classroom characteristics specifically set a context that may allow gritty students to thrive. For example, high levels of classroom organization may help students engage in more independent, on-task behaviors by the conclusion of the academic year (Cameron, Connor, & Morrison, 2003). Students who can manage themselves independently in the short-term may also have higher levels of persistence in the long-term, as grit and self-control are correlated (Duckworth & Gross, 2014). Moreover, a strong, positive relationship between student perceptions of teacher care and

student characteristics similar to grit may lead to better academic outcomes. For instance, student perceptions of strong teacher-student relationships can be indicative of higher levels of student engagement (Klem & Connell, 2004). Higher levels of students' engagement may indicate students' developing passion for the subject and may also lead to improved academic achievement (Wu et al., 2010). It is therefore important to consider students' perceptions of grit in the context of these two classroom characteristics.

Additionally, previous research has indicated the importance of grit or qualities similar to grit for ELL students. Baker (2014) noted the importance of persistence for ELLs to be academically successful. Grit also appears to account for differences in mathematics and ELA achievement between ELLs and non-ELLs (omitted). Perhaps grit becomes most relevant for ELLs when considering that the development of English proficiency is a prolonged process (Thomas & Collier, 2002) and that generally, learning a second language requires persistence and interest through multiple stages of learning (Sparks, Patton, Ganschow, & Humbach, 2009).

While grit may be important for Latino ELL students, it is insufficient to reduce ELLs as being either high or low in grit. Rather, grit should be examined in light of other student and classroom characteristics. Exploring contexts in which grit is beneficial for Latino ELLs may provide insight into useful environmental features for their academic pursuits. Our theoretical framework, which rests on person-environment fit, indicates that Latino student characteristics (ELL status and grit) will interact with student perceptions of the classroom environment (such how teachers use care and control) to produce outcomes (academic achievement).

The Present Study

This work investigates the interplay between grit, ELL status, and student perceptions of care and control. We considered each of the following pairings: (1) care or control and grit; (2)

ELL status and grit; and (3) ELL status and care or control. We also quantitatively tested the hypothesis that person-environment fit is critical for Latino students by examining the three-way interaction between Latino students' ELL status, their grit, and care or control. Simultaneously examining grit and ELL status in relation to each of these classroom characteristics is the most comprehensive manner of investigating how intrapersonal and classroom characteristics interact for Latino students in classrooms. We used a fourth and fifth grade sample for two reasons. First, although grit is discussed, measured, or taught in schools, there are few studies linking grit to academic outcomes, including the academic outcomes of upper elementary students. Second, current research attention focuses predominantly on early childhood and lower elementary ELLs, with less attention on upper elementary ELLs (e.g., Castro, 2014). The present study addresses both gaps. Our research questions are as follows:

Q1. Is the interplay between (1) student grit and care or control, (2) student grit and ELL status, and (3) ELL status and care or control important with regard to ELA and mathematics outcomes?

Q2. Is the interplay between ELL status, grit, and care or control important with regard to ELA and mathematics outcomes?

Method

Participants

We used the publicly available Measures of Effective Teaching (MET) dataset for our analyses. To access these data, we agreed to data policies in place to protect the identities of districts and their members. We provide all the information we can while upholding these agreements. More information on this dataset can be found in MET-released reports (e.g., Kane & Staiger, 2012).

This study focuses on Latino students (n = 3,272). Table 1 provides descriptive statistics of our sample. The sample includes fourth and fifth-grade students from Year 2 (2010-2011) of MET data collection. A total of 434 fourth and fifth grade classrooms are represented. On average, each classroom had about 7.4 ELLs (SD = 5.32) and approximately 11.7 Latino students (SD = 6.75). Of the 434 classrooms, 390 had more than one Latino student and 266 had more than one ELL student. Students were 7 to 12 years old, with an average age of 9.24 years. Approximately 44% of students in our sample were classified as ELLs (n = 1,433), 61% received free or reduced/price lunch (n = 2,008), and 50% were male (n = 1,648). Data from Year 2 were used because this was the only year in which data were collected on student intrapersonal characteristics, including grit. Students in our sample come from Memphis City Schools, Denver Public Schools, New York City Public Schools, Hillsborough County Public Schools, and Charlotte-Mecklenburg Schools.

Measures and Procedures

ELL status. The ELL status variable was provided by the district from the child's school record and reflects the whether the student received school-based language services. This is a dummy variable, with "1" indicating that the district was providing ELL services to the student.

Grit. Eight items measuring elementary students' grit were included in the Student Perceptions Survey offered in the second year of MET data collection (Duckworth & Quinn, 2009). Students responded on a 1-5 Likert scale, with 1 = "Not like me at all" and 5 = "Very much like me". Items 1-4 were reverse coded. Examples of items include: "I have been obsessed with a certain idea or project for a short time but later lost interest"; "It's hard for me to finish projects that take a long time to complete"; "I finish whatever I begin." A complete list of items can be found in Appendix A. These items were taken from the Short Grit Scale and item

language was simplified for fourth and fifth-grade students ($a_{overall}$ = .67, a_{ELL} = .62, $a_{non-ELL}$ = .69 in the present study). While these reliabilities are low, we note that low reliabilities can occur in self-report data with young children (Mellor, 2004). Since English proficiency might have interfered with ELLs' ability to report grit, we tested measurement invariance for ELLs and non-ELLs. We confirmed scalar invariance for ELLs and non-ELLs ($\Delta\chi^2$ = 5.55; Δdf = 8). Scalar invariance indicates that, although ELL responses were measured with greater error, responses can be interpreted similarly across ELLs and non-ELLs (Steimetz et al., 2009; Joop, Lugtig, & Hox, 2012). We calculated a standardized grit composite of the responses averaged across all eight items. Finally, owing the presence of outliers, we winsorized the standardized perceived grit variable at the 1st percentile, in order to ensure normality.

Student perceptions of classroom characteristics. The three classroom characteristics were also included in the Student Perceptions Survey, using items from the Tripod Survey (Ferguson, 2008). Teacher warmth and supportiveness was measured using the "Care" construct, whereas classroom management was measured using "Control". Examples of items include "If I am sad or angry, my teacher helps me feel better" (*care*; 7 items, $a_{overall}$=.83, a_{ELL} = .81, $a_{non-ELL}$=.84 in the present study) or "Everybody knows what they should be doing and learning in this class" (*control;* 4 items, $a_{overall}$=.61, a_{ELL} = .55, $a_{non-ELL}$=.66). Students responded using a 1 to 5 Likert scale, with options ranging from 1 = "No, never" all to 5 ="Yes, always". A complete list of items can be found in Appendix B. An advantage of using student-report data to measure classroom characteristics is the opportunity for "information richness": participants in a specific context possess the deepest understanding of their experiences within that context (Paulhus & Vazire, 2007). It was therefore critical to gather specifically Latino students' impressions of these classroom characteristics, rather than relying on observers who may not

have the same cultural perspectives as Latino students in these classrooms. We again calculated standardized composites of the averaged items for each practice. Descriptive statistics revealed that 1,096 Latino students in the sample perceived teachers as having care scores at least one standard deviation above the mean, whereas 898 Latino students perceived that their teachers had control scores at least one standard deviation above the mean.

Academic achievement. Academic achievement (both prior achievement and current achievement) was measured using state standardized test outcomes for both mathematics and English/Language Arts (ELA). Prior achievement was assessed in the spring of 2010 and current achievement was assessed in the spring of 2011. Raw state standardized assessment scores were not provided in the MET datasets, as test scores could identify districts. Instead, rank-based z-scores (Van der Waerden scores) were provided which standardize scores by state and by grade, allowing us to include all districts in our analyses despite the fact that each district offered its own assessments (Conover, 1999; Kane & Staiger, 2012).

Covariates. Districts were included as fixed effects (1 = the student belonged to that school district), with one district excluded as a reference group. As we cannot identify districts, we are not permitted to report district coefficients. We do discuss how districts were included in our analyses below. Other student-level covariates were free and reduced-price lunch status, age, and gender. All of these student-level variables were obtained from local district administrative data (Kane & Staiger, 2012). Free and reduced-price lunch (FRPL) status was included as a proxy for socio-economic status and was dummy coded as "1" if the student received those services. We also included a dummy variable for gender, in which "1" indicates that the student is male. Student age was the only continuous student-level control variable, measured in years (M = 9.02, SD = .70).

Finally, we also included average scores from the Classroom Assessment Scoring System (CLASS) as covariates (Pianta, La Paro, & Hamre, 2008). The CLASS is an observational measure of three empirically validated domains of instructional practices: Emotional Support (α = .80), Classroom Organization (α = .78), and Instructional Support (α = .83). Each domain is comprised of three to four dimensions, which include items rated by an observer on a 1-7 Likert Scale (Kane & Staiger, 2012).

Analytic Plan

Preliminary analyses were conducted in Stata v. 14 (StataCorp, 2015) and SPSS 20.0, including checks for missingness, skewness, kurtosis, multicollinearity, correlations (Table 2) and multivariate or univariate outliers. As previously mentioned, the grit variable was winsorized at the 1st percentile to correct for outliers and ensure normality. For all of the research questions, a series of regression models were run using Mplus software (Muthen & Muthen, 2011). All variables were entered at the student level; thus these are not multilevel models. However, we recognized that the error terms of students within the same class are likely not independent of one another. We accounted for the nested structure of our data (students nested in classrooms) by using TYPE=COMPLEX, a function which uses a sandwich estimator to compute robust standard errors (Muthen & Muthen, 2007). We note that all continuous variables in these analyses have been standardized, so coefficients can be read as effect sizes.

We ran analyses separately for ELA and mathematics outcomes, each model controlling for ELL status, district, age, gender, free and reduced price lunch, and prior achievement. As one of the districts did not provide FRPL data, FRPL status was included as an auxiliary variable to correct for systematic missingness in all models. For each outcome, we ran multiple models to

answer our first research question (are there two-way interactions between (1) student grit and care or control, (2) student grit and ELL status, and (3) student grit and care or control?).

For each question, we ran separate models for care and control. We made this choice for two reasons. First, we wanted to understand the separate importance of these variables. Care and control are distinct underlying processes, which would lead to different points of intervention and development for teachers. While some empirical literature that would suggest the importance of including these variables in the same model (e.g., Ware, 2006), we could not find theoretical or empirical evidence to support this choice for Latino students. Second, three-way interaction models by their nature are already fairly full models (inclusion of partial main effects, covariates, two-way interactions, and three-way interactions). We were concerned that the including three-way interactions for both care and control in the same model would lead to an overly fitted model.

Grit and care/control. We first examined the interplay between grit and student perceptions of care or control. We included in each model either care or control, grit, and all student-level covariates. We also included an interaction term for either student-perceived care or control and grit. For example, the "care" model included care as the focal classroom characteristic, grit, all student-level covariates and an interaction term for care*grit. The same model was run for control. We alternated mathematics and ELA scores as outcomes.

ELL status and care/control. To examine the interaction between ELL status and student-perceived care or control, we ran an additional series of regression models. We included in each model either perceived care or control, ELL status, grit, and all student-level covariates. We also generated an interaction term for ELL status and care or control. For example, in the "care" model we included care, ELL status, student-level covariates, and a care*ELL status

interaction term. The same process was conducted for control. We alternated mathematics and ELA scores as outcomes.

ELL status and grit. To examine the interaction between ELL status and grit, the model contained ELL status, grit, and the student covariates. We also created an interaction term for ELL status and grit. We alternated mathematics and ELA scores as outcomes.

ELL status, care/control, and grit. For our second research question, which examined the three-way interaction between perceived care or control, ELL status, and grit, we ran separate models for care and control. In order to test a three-way interaction, all possible two-way interaction terms among the three variables must be included. For example, the "care" three-way model included: care, ELL status, grit, FRPL status, age, gender, ELL*grit, ELL*care, care*grit, and care*grit*ELL status. We alternated mathematics and ELA scores as outcomes.

Finally, we checked to see if our findings held when we included observational measures of instructional practices as covariates. Specifically, in the three-way interaction control model, we included Classroom Organization and Instructional Support scores. In the three-way care model, we included Emotional Support and Instructional Support scores. We added these practices as covariates for two reasons. First, if grit is strongly associated with student outcomes, then we hypothesize that adding Instructional Support would not change the significance of either three-way interaction. Second, if Latino student *perceptions* of classroom characteristics are important to take into account, then adding either an observational measure of Emotional Support or Classroom Organization to the model will also not change the significance of either three-way interaction. In other words, the unique interactions across student reports of grit, care, or control will hold after controlling for observational measures of the same classroom processes.

To probe the source of significant three-way interactions, we then conducted an exploratory post-hoc analyses in which we calculated and graphed the simple slopes of the three-way interactions. To graph the simple slopes, we divided our sample into thirds based on how students rated their teachers' use of these various practices. For example, a "high-care" classroom is a teacher rated by Latino students as at least one standard deviation above the mean, whereas a "mid-care" classroom was rated around the mean, and a "low-care" classroom was rated at least one standard deviation below the mean. Within each of these thirds, we then graphed the relationship between students' perceived grit and achievement. For all of these post-hoc analyses, we applied a Bonferroni correction ($\alpha/3$) in order to account for multiple tests. Only slopes with p-values below the $\alpha = .01$ level were considered significant.

Missing data. As we assume that data are missing at random conditional on our covariates, full information maximum likelihood (FIML) was used to account for missing data. FIML is an estimation procedure which uses all available data to estimate parameters, increasing available statistical power (Enders & Bandalos, 2001; McArdle et al., 2004). Approximately 20% of data were missing across the Student Perceptions Survey items (i.e., items pertaining to student-reported grit, care, and control). Students missing grit, care, and control data had lower math and ELA test scores, indicating that missing data within these variables are not missing at random. Researchers suggest that even if data are not missing at random, FIML still can produce valid estimates (Collins, Schaffer, & Kam, 2001; Schaffer & Graham, 2002).

Results

A few results require mentioning before discussing results specific to research questions. Across all research questions, students' perceived grit was related to both their mathematics and ELA achievement $(b_{math} = .06$ and $b_{ELA} = .10)$; all associations were positive but modest in size.

Because measures of grit and test scores are standardized, these values can be read as effect sizes. Similarly, ELL status had an effect size of -.10 for Latino students' ELA achievement.

Two-Way Interactions

None of the two-way interactions between student perceptions of care or control and grit proved to be significant in the models for research question one with regard to either ELA or mathematics outcomes. Similarly, there were no significant two-way interactions between student perceptions of care or control and ELL status or between ELL status and grit for either ELA or mathematics achievement.

Three-way Interactions

Care. The three-way interaction between care*ELL status*grit was modestly related to students' ELA achievement ($b = .06$, $SE = .03$, $p = .03$), but not to students' mathematics achievement. Calculating and graphing the simple slopes revealed that when Latino students perceived their teachers as "high-care", the relation between grit and ELA achievement was twice as strong for ELLs as compared to non-ELLs ($b_{ELLs} = .16$, $SE_{ELLs} = .05$, $p < .01$; $b_{non\text{-}ELLs} = .08$, $SE_{non\text{-}ELLs} = .04$, $p < .05$; see Figure 1).

These findings are notable in comparison to ELLs' ELA performance in mid-care and low-care classrooms. In classrooms that students perceived as mid-care, the relation between grit and ELA achievement was comparable for ELLs and non-ELLs ($b_{ELLs} = .11$, $SE_{ELLs} = .04$, $p < .01$; $b_{non\text{-}ELLs} = .09$, $SE_{non\text{-}ELLs} = .03$, $p < .001$). And in classrooms that were perceived as low-care, the relation between grit and ELA achievement was stronger for non-ELLs than for ELLs ($b_{ELLs} = .06$, $SE_{ELLs} = .04$, $p = .26$; $b_{non\text{-}ELLs} = .10$, $SE_{non\text{-}ELLs} = .04$, $p<.01$).

Control. The three-way interaction between control*ELL status*grit was modestly related to students' ELA achievement ($b = .07$, $SE = .03$, $p = .01$). Closer inspection of the

simple slopes revealed that in high-control classrooms, the relation between grit and ELA achievement was stronger for ELLs compared to non-ELLs (b_{ELLs} = .17, SE_{ELLs} = .05, p<.01; $b_{non-ELLs}$ = .06, $SE_{non-ELLs}$ = .03 p = .10; see Figure 2).

In contrast, in mid-control classrooms the relation between grit and ELA achievement was comparable for ELLs and non-ELLs (b_{ELLs} = .13, SE_{ELLs} = .04, p < .001; $b_{non-ELLs}$ = .09, $SE_{non-ELLs}$ = .03 p ≤ .001). Moreover, in low-control classrooms the relation between grit and ELA achievement was stronger for non-ELLs than for ELLs (b_{ELLs} = .09, SE_{ELLs} = .06, p = .15; $b_{non-ELLs}$ = .12, $SE_{non-ELLs}$ = .04 p = .01). The three-way interaction also appeared to be modestly related to ELLs' mathematics achievement (b =.05, SE = .03, p < .05); however, probing simple slopes did not reveal significance once the Bonferroni correction was applied. Consequently, we do not consider the three-way interaction between control, grit, and ELL status in relation to math achievement to be significant.

Model comparisons. Both significant three-way interaction models accounted for a fairly high percentage of variance (R^2=.61 for care model and R^2=.61 for control model). However, the majority of variance is accounted for by students' prior achievement. We entered terms into the model in a stepwise fashion, beginning with a baseline model containing students' prior achievement and school districts as fixed effect (R^2=.58). We gradually added terms over a series of models. Adding in ELL status in the second model accounted for an additional 1% of variance (R^2=.59). Adding grit in the third model accounted for another 1% of variance (R^2=.60). Adding either care or control in model 4 accounted for no additional variance; moreover, gradually adding two-way interactions (grit*ELL followed by ELL*care/control, followed by grit*control/care) and three-way interactions (grit*ELL*care/control) did not account for additional variance. Adding Instructional Support and Emotional Support as teaching practice

covariates to the care model as well as adding Instructional Support and Classroom Organization to the control model added another 1% of variance (R^2=.61). We discuss our findings below.

<div align="center">**Discussion**</div>

In the present study, we use a person-environment framework to examine how two student characteristics (ELL status and grit) interact with student perceptions of two classroom characteristics (care and control) that shape the classroom environment of Latino students. A series of nested regression models examining the two-way interactions between student characteristics and classroom characteristics did not reveal significant results. Additionally, three-way interactions related to mathematics achievement were not significant. However, two three-way interactions proved to be significant with regard to students' ELA achievement: (1) Grit x ELL x Care and (2) Grit x ELL x Control.

Our findings indicate that in classrooms that Latino students perceived as highly caring or highly controlled, the relation between ELLs' grit and ELA achievement was nearly twice as strong as the relation between non-ELLs' grit and ELA achievement. We note that these effect sizes are small and future work should replicate our analyses. We also caution that the lower levels of reliability, particularly for control, indicate that our results should be interpreted carefully. Still, these findings add preliminary, quantitative evidence to the argument regarding the importance of aligning students' home and classroom contexts (e.g., Benson, Leffert, Scales, & Blyth, 2012; Gay, 2002). They also provide preliminary evidence regarding the importance of considering how students' grit interacts with other intrapersonal and classroom characteristics. Moreover, grit was consistently and positively related to Latino students' math and ELA achievement. This finding indicates that grit does have predictive validity for Latino fourth and fifth graders' standardized test scores.

Student Characteristics and Classroom Characteristics: Two-Way Interactions

The consistent pattern of null two-way interactions speaks to the intricacy of successful Person-environment fit. When we examined only ELL status and student perceptions of care or control as an interaction, we did not take into account the importance of passion and persistence for ELLs' academic achievement (e.g., Baker, 2014). Similarly, when we investigated the interaction solely between grit and student perceptions of care or control, we ignored the importance of ELL status as a key characteristic of the Latino student population (e.g., Fry & Gonzalez, 2008). Finally, when we examined the interaction between ELLs and grit, we placed the onus of "being gritty" on students and ignored how students' perceptions of classroom characteristics may interact with their grit. In order to observe all important aspects of a student's classroom experience, we had to investigate three-way interactions that considered both student and classroom characteristics.

Person-Environment Fit: Care, Control, ELL Status, and Grit

We concentrate our discussion on our findings related to high-care and high-control classrooms in order to maintain a strengths-based perspective on Latino ELLs. However, it is worth noting that in classrooms perceived as low-care or low-control, ELLs performed at non-significantly lower rates than their non-ELL counterparts as students' grit increased. The contrast in findings from high-care and high-control classrooms compared to low-care and low-control classrooms underscores the importance of high levels of care and control for Latino ELLs.

We found that in high-care classrooms, the relation between grit and ELA achievement was stronger for ELLs as compared to non-ELLs. Similarly, in classrooms perceived as highly-controlled, the relation between grit and ELA achievement was stronger for ELLs than for non-ELLs. In general, grittier students may have better academic outcomes (Duckworth et al., 2007).

However, Latino ELLs may face multiple challenges, including learning a second language, poverty, parents who have not completed high school, or belonging to a minority group in school, all of which may tax their grit (Fry & Gonzales, 2008; Russakoff, 2011). Thus, a highly caring or well-organized classroom may provide a context that bolsters students' assets—their grit—and by extension, their ELA achievement. A highly-caring teacher may recognize and remind her ELL students of their intrapersonal strengths, including their grittiness, especially prior to ELA assessments. Similarly, a teacher with a well-controlled classroom may provide students with the time and space they need to learn ELA content deeply, creating a context in which gritty ELLs can leverage their grit and thrive.

Why are these interactions important for ELA outcomes but not mathematics? This discrepancy may be due to the content of the test. An ELA standardized test is a more explicit test of English language comprehension than a mathematics standardized test and can be more challenging for ELLs than non-ELLs (Abedi, 2002). ELLs' performance on both mathematics and ELA assessments tends to decrease as the linguistic complexity of test items increases (Abedi, 2004; Martiniello, 2008). Relatedly, in past years Latino ELLs have performed lower in ELA assessments than mathematics assessments and the achievement gap between Latino ELLs and Latino non-ELLs has often been larger in ELA than in mathematics assessments (Hemphill & Vanneman, 2011; Chudowsky & Chudowsky, 2010). It is possible that ELA tests require more grit for ELLs to complete. Thus, a highly caring or well-managed classroom may provide a key supportive context during challenging ELA instruction and assessments, so that Latino ELLs can draw on their assets, such as grit, and perform well.

Implications for Educators

Two implications for practice stem from these findings. The first relates to classroom environments. Many researchers and educators have advocated for teachers to draw on students' cultures to address the needs of an increasingly diverse student population (Gay, 2002, 2013; Ladson-Billings, 1995). Doing so goes beyond learning about common foods in various cultures or counting in students' native languages. These kinds of cultural exercises can serve as one starting point for incorporating a variety of cultural viewpoints in the classroom. However, they are not sufficient on their own. Teachers in ethnically and linguistically diverse classrooms may find other, more meaningful ways to embed students' home cultures in their classrooms. As previously discussed, high levels of parental care and control are often found in Latino homes (e.g., Calzdada & Eyberg, 2002). Consequently, when Latino students perceive that their teachers are creating highly caring and controlled classrooms, they may perceive cultural alignment between their homes and classrooms. Teachers can accomplish this aim by engaging with students and their families to understand how to cultivate a classroom environment that is both safe and supportive for their Latino and Latino ELL students (e.g., Ladson-Billings, 1995). As indicated by our findings, this alignment between home environment and the classroom can support students' academic achievement.

The second implication relates to how grit is used in schools. Our findings provide preliminary evidence about the importance of considering *the contexts* in which students are enacting their grit. It is critical that educators, researchers, and policymakers alike shift from a reductionistic perspective of students' grit, with which we view students as either gritty or not gritty, to considering whether classroom contexts support all students' grit. This is particularly true for students who face substantial amounts of challenge in their daily lives and consequently may have overly-taxed grit. If grit is to be used in schools, then educators and policymakers must

find sensitive methods of supporting and evaluating students' grittiness. Researchers also have an obligation to examine grit not only with regard to student outcomes, but also in terms of students' contexts.

Limitations and Future Directions

Many of our limitations stem from tradeoffs inherent to the use of secondary data. The MET dataset provided a large sample of Latino students with many useful variables. However, as we did not guide the data collection process, some of our focal variables lack nuance. In particular, the ELL variable does not provide additional valuable information, such as students' specific English proficiency levels. Future research must examine the relation between ELL status, grit, and classroom characteristics with a more nuanced lens on students' English language proficiency. For example, researchers could use assessments such as the WIDA (formerly known as the World-Class Instructional Design and Assessment) to measure ELLs' proficiency and determine if the interplay between grit and classroom characteristics changes when students are more or less proficient in English. Additionally, Latino ELLs' perceptions of classroom characteristics may vary depending on contextual factors, such as the level of diversity in their surrounding communities or statewide educational policies. Future analyses could take these factors into account by using within-state or within-district samples.

With regard to cultural validity, the construct of grit may seem more suitable for students from an individualistic culture and less relevant for Latino students. Given that grit does have cultural importance within American classrooms and that teachers currently are expected to cultivate students' grittiness (Schechtman et al., 2013; Tough, 2011), further research is necessary to understand the cultural validity of this construct. Additionally, although researchers of grit have indicated that grit is distinct from similar psychological constructs, such as self-

regulation (Duckworth & Gross, 2014), more research is needed to understand the degree to which these constructs differ for upper elementary students.

Conclusion

Within a single classroom, a variety of student and classroom characteristics come together to affect learning. We have considered two important student characteristics as well as two classroom characteristics and examined their relation to Latino students' achievement. Our findings reveal classroom characteristics –high levels of care and control—that support grittier Latino ELLs' ELA achievement. These findings provide two types of preliminary evidence. First, students' grit should be considered, evaluated, and supported in context. Moreover, teachers of linguistically and culturally diverse classrooms must tailor classrooms to fit students' characteristics, so that all students perceive that their classroom is supportive.

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Table 1.

Sample Descriptive Statistics

Variable	N	Mean (SE)/ Percentage
Outcomes		
ELA		-.09 (.89)
Math		-.05 (.90)
Key Independent Variables		
ELL	1,433	44%
Grit		3.75 (.63)
Care		4.27 (.69)
Control		3.55 (.70)
Covariates		
Free/Reduced Lunch	2,008	61%
Male	1,648	50%
Age		9.02 (.70)
Prior Math		-.05 (.90)
Prior ELA		-.11 (.90)
Classroom Organization		5.36 (32)
Emotional Support		3.45 (.26)
Instructional Support		3.66 (.35)
Total N	3,272	

Note. Means and standard deviations are provided for age, grit, care, control, ELA, and math, which are continuous variables. Age ranged from 6.96 to 12.48; unstandardized grit ranged from 1.13 to 5; and unstandardized control and care from 1-5.

Table 2.

Correlations Between Continuous Variables

	Age	Grit	Care	Control	ELA10	ELA11	Math10	Math11	ES	IS
Age										
Grit	-.06*									
Care	-.09**	.31**								
Control	-.06*	.29**	.44**							
ELA '10	-.17**	.28**	.01	.05						
ELA '11	-.20**	.33**	.04	.07	.76**					
Math '10	-.15**	.28**	.01	.08	.68**	.64**				
Math '11	-.16**	.29**	.06*	.10**	.61**	.68**	.79**			
ES	.06**	.00	.06*	.02	.00	.00	-.01	.01		
IS	.04	.03	.07**	.08**	.03	.06**	-.03	.08**	.76**	
CM	-.04	.03	.18**	.18**	.09**	.06**	.08**	.14**	.44**	.54**

Note. ** p<.01, and * p<.05. ES is Emotional Support; IS is Instructional Support; and CM is Classroom Management.

Table 3.

Two-Way and Three-Way Interactions Examining Grit, Classroom Characteristics, and ELL Status for ELA Outcomes

	Two-Way A	Two-Way B	Two-Way C	Three-Way
Care				
ELL	-.09(.03)***	-.10(.03)	-.10(.03)	-.10(.03)**
Grit	.09(.01)***	.10(.01)***	.10(.01)***	.09(.02)***
Care	-	.002(.01)	.005(.02)	.01(.01)
Grit x ELL (A)	.02(.03)	-	-	.02(.03)
Grit x Care (B)	-	.01(.01)	-	-.01(.02)
ELL x Care (C)	-	.-	-.02(.03)	.00(.03)
GritxELLxCare	-	-	-	.06(.03)*
Emotional Sup.	-	-	-	-.18(.08)*
Instructional Sup.	-	-	-	.18(.06)**
R^2	.60	.60	.60	.61
Control				
ELL	-.09(.03)***	-.10(.03)***	-.10(.03)***	-.10(.03)***
Grit	.09(.01)***	.11(.01)***	.11(.01)***	.09(.02)***
Control	-	-.02(.01)	-.001(.01)	.00(.02)
Grit x ELL (A)	.02(.03)	-	-	.04(.03)
Grit x Cont (B)	-	-.004(.01)	-	-.03(.02)*
ELLx Cont (C)	-	-	-.04(.03)	-.04(.03)
GritxELLxCont	-	-	-	.07(.03)**
Classroom Org.	-	-	-	.14(.06)*
Instructional Sup.	-	-	-	.02(.05)
Covariates				
Age	-.05(.02)**	-.05(.02)**	-.05(.02)**	-.06(.02)**
Prior ELA	.68(.02)***	.68(.02)***	.68(.02)***	.68(.02)***
Male	-.03(.02)	-.03(.02)	-.03(.02)	-.03(.02)
R^2	.60	.60	.60	.61

Note. "A" refers to the Grit x ELL status interaction; "B" refers to the Grit x teaching practice interaction; "C" refers to the ELL x teaching practice interaction. *** $p<.001$, ** $p<.01$, and * $p<.05$. We note that we ran two separate models, one with care and one with control, and covariates were the same across both models. All continuous measures are standardized and can be read as effect sizes.

Figure 1. Simple slopes for the three-way interaction between ELL status, perceived grit, and perceived care with ELA as the outcome. A. Students in classrooms with low-care (care is one SD below the mean and lower). B. Students in classrooms with mid-care (care is between one SD below and one SD above the mean). C. Students in classrooms with high-care (care is one SD above the mean).
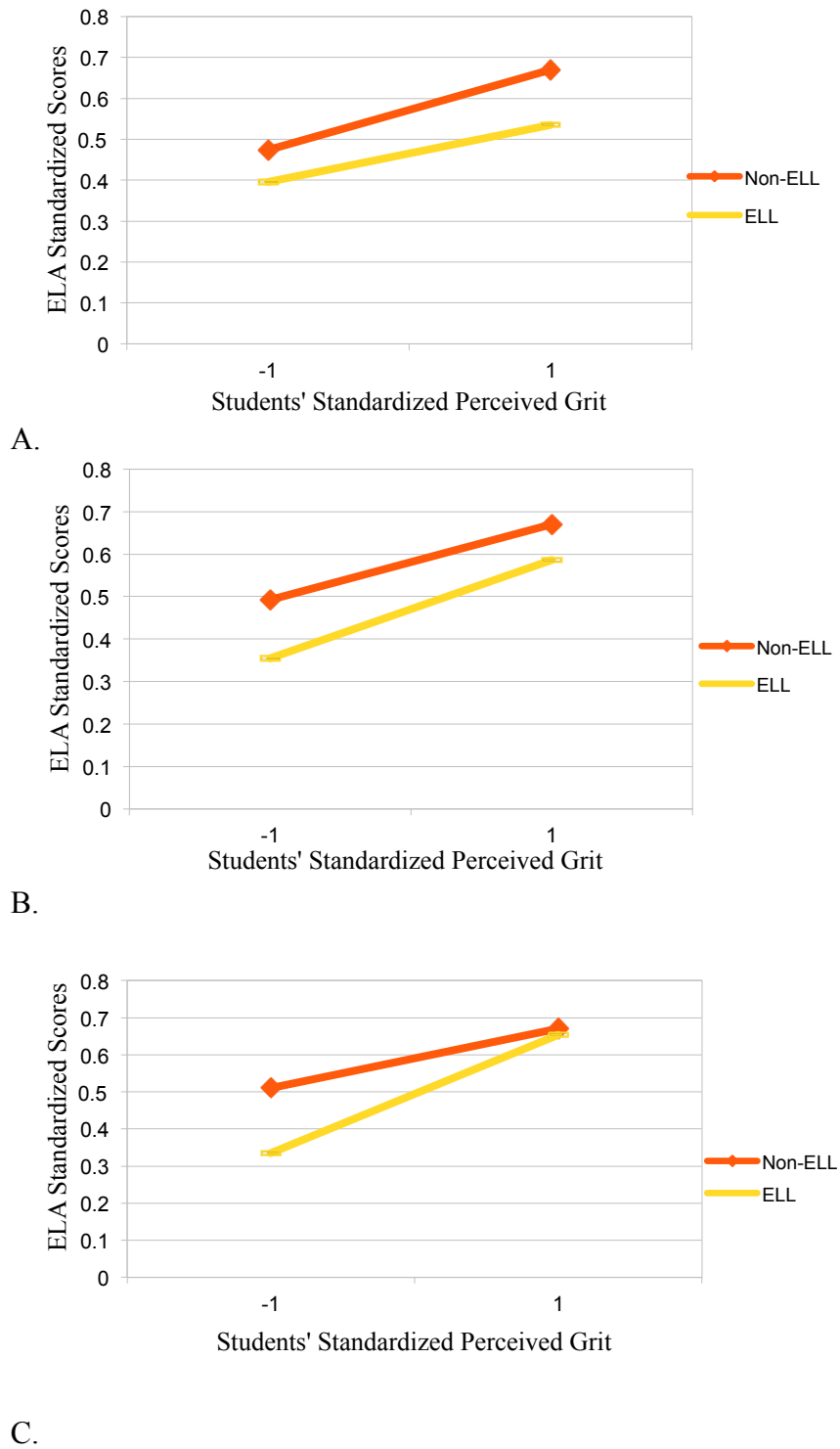
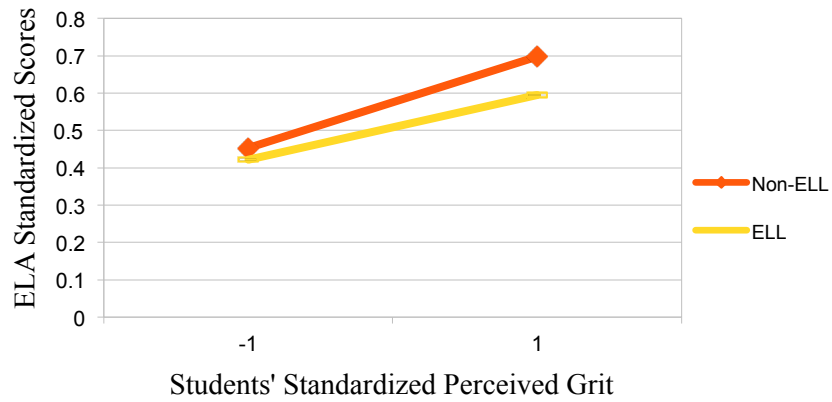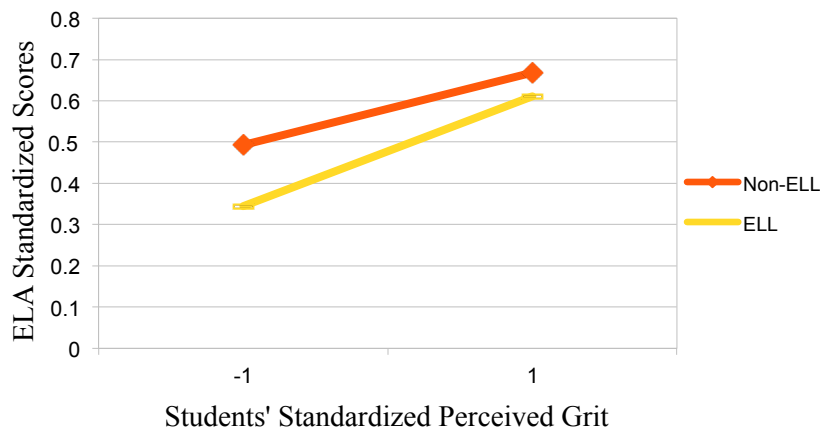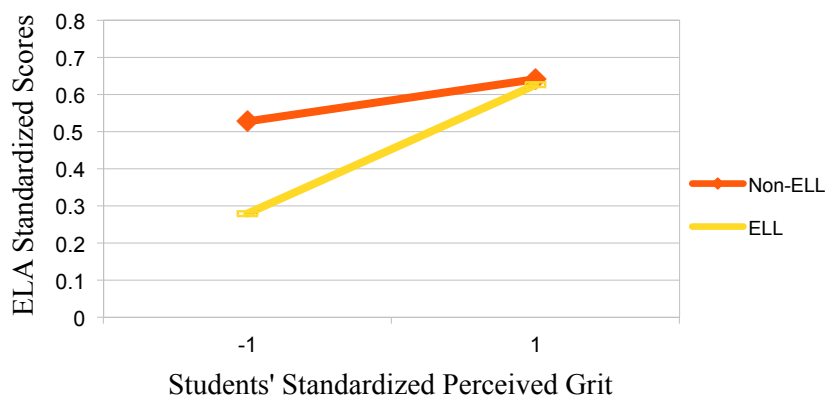*Figure 2.* Simple slopes for the three-way interaction between ELL status, perceived grit, and perceived control A. Students in classrooms with low-control (control is one SD below the mean and lower). B. Students in classrooms with mid-control (control is between one SD below and one SD above the mean). C. Students in classrooms with high-control (control is one SD above the mean).

Appendix A.

The Grit Short Scale included the eight items listed below. The response options ranged from 1-"Not like me at all" to 5-"Very much like me."

1. I often set a goal but later choose to pursue a different one.

2. Sometimes, when I'm working, I get distracted by a new goal or project.

3. I have been obsessed with a certain idea or project for a short time but later lost interest.

4. It's hard for me to finish projects that take a long time to complete.

5. I finish whatever I begin.

6. If something is hard to do and I begin to fail at it, I keep trying anyways.

7. I am a hard worker.

8. I try to do a good job on everything I do.

Appendix B.

The Tripod Survey included the following constructs listed below and their corresponding items.

Response options ranged from 1-*No, never* to 5-*Yes, always*.

Care (7 Items)

1. My teacher in this class makes me feel that she/he really cares about me.

2. The teacher in this class encourages me to do my best.

3. My teacher gives us time to explain our ideas.

4. My teacher seems to know if something is bothering me.

5. If I am sad or angry, my teacher helps me feel better.

6. My teacher is nice to me when I ask questions.

7. I like the way my teacher treats me when I need help.

Control (4 Items)

1. Our class stays busy and does not waste time.

2. Students behave so badly in this class it slows down our learning.

3. Everybody knows what they should be doing and learning in this class.

4. My classmates behave the way my teacher wants them to.

How Do Effective Upper Elementary Teachers of English Language Learners Show Support?

Abstract

This study addresses the question: how do effective teachers show support within upper elementary classrooms with varying levels of English language proficiency? We employed a multiple and comparative case study approach to answer this question, using videotaped English Language Arts (ELA) lessons from the Measures of Effective Teaching dataset. We compared how teachers demonstrate supportiveness in three types of fourth and fifth grade classrooms: (1) high-gains, with 5 ELLs; (2) high-gains, with 0 ELLs; and (3) low-gains, with 5 ELLs. We observed that only ELL, high-gains teachers showed supportiveness in the following distinct ways: through contingent and effusive praise, by describing the relevance of content, and by advancing relationships with students. We discussed why these demonstrations of supportiveness may be important, particularly for Latino ELLs.

How Do Effective Upper Elementary Teachers of ELLs Show Support?

There is a consensus that how teachers interact with their students matters. Teacher-student interactions have been operationalized in a variety of ways—for instance, emotional support, care, learner-centered classrooms, teacher-student relationship quality—each emphasizing a slightly different aspect of the student-teacher relationship (Hughes, Luo, Kwok, & Lloyd, 2008; McCombs, 2003; Nodding, 1999; Pianta et al, 2008). For this study, these related constructs are referred to globally as "teacher supportiveness". Regardless of the specific construct, quality interactions between teachers and students are associated with positive student outcomes, including academic achievement (Cornelius-White, 2007; Hughes, Wu, Kwok, Villarreal, & Johnson, 2012; Roorda, Koomen, Spilt, & Oort, 2011). What is less clear is how these interactions are represented in increasingly diverse classrooms, particularly in upper elementary school classrooms.

For the present study, the authors adopt an inductive approach in order to understand the nature of supportive teacher-student interactions for a specific student group, Latino English Language Learners (ELLs). Latino ELLs comprise a rapidly growing portion of the student population; for example, 2009 U.S. Census data indicated that 37% of Latino fourth graders were classified as ELLs (Hemphill & Vanneman, 2011; Kena et al., 2016). Teachers often feel unprepared to support this student group (Rusakoff, 2011). Various practitioner articles (Howard, 2003; Lucas, Villegas, & Freedson-Gonzalez, 2008) and case studies (Da Silva Iddings & Katz, 2007; Katz, 1999) suggest that Latino ELLs particularly require warm and supportive teacher-student interactions. What prior research has not ascertained is the ways in which teachers working with diverse populations can foster supportive teacher-student interactions —in other words, research is needed to elucidate *how* teachers of ELLs engage in practices that support all

students in their classrooms. Moreover, research on the importance of supportive classrooms for ELLs has primarily focused on early childhood (e.g., Castro, 2014; Gillanders, 2007). Other developmental periods have not received as much attention, including upper elementary.

To address this question, we compared classrooms with differing numbers of Latino ELLs and varying levels of academic success to examine specifically how teachers interact with their students in *ELL, high-gains* classrooms. Previous case studies have relied upon prior relationships with teachers (e.g., Khisty & Chval, 2002) or the availability of teachers of ELLs (e.g., Yoon, 2008). These case studies have identified helpful practices and attitudes for instructing ELLs primarily based on evidence drawn from teachers who are often described as "master teachers", without explicit consideration for academic gains made in those classrooms. However, ELLs regularly experience teachers with limited knowledge on how to help ELLs make academic gains (Buysse, Castro, West, & Skinner, 2005; Rusakoff, 2011; Zeichner, 2003). We therefore take a different approach: rather than analyze the classroom practices of master teachers, we select classrooms based on the number of ELLs and average academic growth to elucidate how teachers in classrooms with ELLs promote positive teacher-student interactions. In doing so, we isolate types of supportive teacher-student interactions that are *unique* to ELL, high-gains classrooms. These unique interactions may inform theory and shape efforts to improve how teachers support ELLs.

Person-Environment Fit

This study draws from person-environment fit theory, which states that in general, an individual's behaviors are a product of how well the individual's intrapersonal characteristics match with the characteristics of the surrounding environment (Hunt, 1975; Greene, 2014). In schools, a student's behaviors and outcomes are linked to how well the student fits within the

classroom (Eccles, 1993). Theoretically and ideally, teachers adapt the classroom environment to meet the students' needs as much as possible (Noddings, 1999). One way through which teachers can achieve this aim is by engaging in supportive interactions with all students. The academic demands of the classroom, in the absence of teacher support, may promote student frustration and students' perceptions of helplessness (Garcia-Reid, Peterson, & Reid, 2015; Sakiz, Pape, & Hoy, 2012). In particular, upper elementary students appear to need the support of their teachers in order to engage in learning (Klem & Connell, 2004; Rimm-Kaufman, Baroody, Larsen, Curby, & Abry, 2015). When teachers offer support, the classroom ceases to be purely demanding and instead becomes an environment in which students are empowered to learn.

Teacher support may be crucial for Latino ELL students for two reasons: first, Latino ELLs experience dual academic demands as they simultaneously learn academic content and develop their English proficiency, often in classrooms in which teachers do not speak their home language (Buysse at al., 2005). Second, Latino ELLs may experience stigma, isolation, anxiety, and anti-immigration sentiment within their classrooms (Lucas, Villegas, & Freedson-Gonzalez, 2008; Pappamihiel, 2001; Yoon, 2008). Teacher supportiveness may buffer ELL students against the difficulty of these academic and social challenges (Gillanders, 2007; Lopez, 2012).

Teacher Supportiveness

Teacher supportiveness is important for all students. The idea of teacher supportiveness has been conceptualized in a variety of ways. Pianta and colleagues (2008) describe the importance of *emotional support,* in which teachers emphasize the development of positive classroom climates, show regard for their students' perspectives, and exhibit sensitivity towards students. Noddings (1999), on the other hand, urges the importance of *care,* defined as attending to the specificity of who students are and ensuring that students feel cared for, rather than as a

single, general orientation towards one's class. Finally, others consider *teacher-student relationship quality,* which is characterized by high levels of teacher warmth and support, with low levels of teacher-student conflict (Hughes, Luo, Kwok, & Lloyd, 2008). While these constructs differ slightly, all belong under the umbrella of teacher supportiveness.

Teacher supportiveness in fourth and fifth grade. The importance of teacher supportiveness during early childhood and lower elementary school for a host of behavioral and academic outcomes is well documented (e.g., Burchinal et al., 2008; Buckrop, Roberts, & LoCasale-Crouch, 2016). However, the quality of teacher-student relationships can decline during the upper elementary school years, possibly because class time grows increasingly devoted to instruction and less oriented towards purposefully engendering positive teacher-student interactions (Jerome, Hamre, & Pianta, 2009; McCormick & O'Connor, 2015). Despite the drop in quality, the importance of supportive teacher-student interactions outcomes persists during upper elementary school (McCormick & O'Connor, 2015). For instance, teacher supportiveness continues to be positively associated with academic outcomes in fourth and fifth grade (Baker, 2006).

The present study focuses on fourth and fifth grade classrooms, in part because upper elementary school is a key period of development as children prepare for the transition to middle school (Barber & Olson, 2004). Moreover, the decline of teacher supportiveness despite its continuing importance during fourth and fifth grade leads to the question: how do teachers show supportiveness in fourth and fifth grade classrooms? Answering this question may provide insight into how teachers persist in facilitating supportive student-teacher interactions during the upper elementary years, a question that may be particularly salient for Latino ELLs.

Teacher Supportiveness for Latino ELLs

Teacher support is important for all students but it may be a critical aspect of classroom instruction for Latino ELLs. In general, English language learners face unique academic challenges, as they gain English language proficiency and master academic content simultaneously. Many ELLs engage in this learning process in contexts where teachers do not speak their native language (Buysse et al., 2005). This twofold challenge can create a sense of anxiety, stigma, or a desire to withdraw from learning (Pappamihiel, 2001), which teacher supportiveness may ameliorate. Beyond these challenges, ELLs' lack of English language proficiency can trigger teachers' deficit perspectives, leaving ELLs and their families feeling incompetent and powerless (Da Silva Iddings & Katz, 2007). Growing anti-immigration sentiment can further exacerbate these challenges (Lucas et al., 2008).

Some studies examining teacher interactions with ELL students often describe teachers either effectively ignoring their ELLs or viewing them with deficit perspectives (Da Silva Iddings & Katz, 2007; Orosco & Klinger, 2010; Yoon, 2008). For example, Yoon (2008) described teachers who viewed their ELL students as quiet, shy, or frustrating to teach; some of them believed their ELL students were the sole responsibility of the ESL resource teacher. Similarly, Da Silva Iddings and Katz (2007) discuss discrepancies in the perceptions of teachers of ELLs versus parents of ELL students—parents described their children as hardworking and responsible, whereas teachers saw them as immature and reserved. Others report teachers who believed their ELL students are "not listening" or "not ready to learn" because of their lack of English proficiency (Orosco & Klinger, 2010). These attitudes may undermine teacher's efforts to develop supportive relationships with Latino ELLs, and ultimately limit student learning.

Less is known about teachers who do engage in supportive student-teacher interactions with their students. Many researchers have advocated that culturally and linguistically diverse

students require *culturally responsive* teachers, who as part of their pedagogy develop intentional, supportive relationships with their diverse students (Gay, 2002). However, few studies have examined how culturally responsive teachers develop this aspect of their pedagogy specifically with regards to Latino ELLs. For example, Yoon (2008) described a teacher who considered herself a teacher of all students, including her ELLs, and positioned her ELLs as valued members of the class community. More evidence is needed to uncover the specific pedagogical means through which teachers engage in emotionally supportive teacher-student interactions with their Latino ELL students during instruction.

ELLs in upper elementary school. Teacher supportiveness for ELLs across all grades is important; however, there is reason to consider how teachers support ELLs specifically during fourth and fifth grade. During early childhood and lower elementary school, English language learners are often referred to as "dual language learners" out of recognition that all students are learning how to use language during this stage of development (e.g., Castro, 2014). However, once ELLs reach upper elementary school, students are expected to speak, write, and read English. This shift in expectations may lead to problems for ELLs. For instance, ELLs who have not become proficient in English by first grade may experience achievement disparities in fifth grade math and reading when compared to native English speaking peers (Halle, Hair, Wandner, McNamara, & Chien, 2012). Given the challenges that upper elementary school represents for ELLs, this group may be in need of support from their teachers.

Despite evidence that teacher supportiveness is important for all students, and may be a particularly salient factor for upper elementary Latino ELLs, we have little understanding of what teacher supportiveness looks like for ELLs in fourth and fifth grade classrooms. To develop models of teacher supportiveness that are specific to fourth and fifth grade Latino ELLs and may

foster their achievement gains, it is necessary to compare how teachers engage in supportiveness across classrooms with varying numbers of ELLs and levels of academic gains.

Present Study

The present study addresses the following question: *how,* if at all, do teachers in ELL, high-gains, upper elementary classrooms show support to their students? To answer this question, we compare teachers in ELL, high-gains classrooms with two other types of teachers: (1) teachers in no-ELL, high-gains classrooms and (2) teachers in ELL, low-gains classrooms (Figure 1). We focus teacher-student interactions during English Language Arts (ELA) lessons for two reasons. First, the achievement gap between Latino ELLs v. non-ELLs is consistently largest in ELA assessments, according to National Assessment of Educational Progress data (Hemphill & Vanneman, 2011; Chudowsky & Chudowsky, 2010). Consequently, it is important to consider how teachers provide emotional support ELLs who are not only grappling with the challenging process of learning to read and write, but having to do so in a second language. Second and most importantly, previous quantitative work by the authors demonstrates a relation between high student perceptions of teacher care, Latino ELLs' intrapersonal characteristics, and their ELA achievement (omitted).

Method

Case Selection

The study is a multiple and comparative case study (Yin, 2003). We used extant videotaped lesson data from high-achieving upper elementary school classrooms (n = 24 videotapes of ELA lessons across 6 classrooms, each lesson ranging from approximately 40-60 minutes in length) in a large, urban school district taken from Year 2 of the Measures of Effective Teaching (MET) study, a large-scale study designed to measure effective aspects of

teaching across districts in the U.S. (Kane & Staiger, 2012). These classrooms were purposefully selected using four criteria, described below (see Figure 2 for a visual representation of the case selection process).

First, we narrowed the dataset to fourth and fifth grade classrooms (n = 584), in order to understand how teacher supportiveness is specifically demonstrated during this developmental period. Next, we selected classrooms that were primarily composed of Latino students (at least 60%; n = 73). This criterion allows for a within-group approach to studying classrooms with ELLs (Chase-Lansdale, Valdovinos D'Angelo, & Palacios, 2007; García Coll & Szalacha, 2004). By choosing classrooms primarily composed of Latino students, we can leverage varying levels of English proficiency within those classrooms and select classrooms with different numbers of Latino ELLs. It is important to note that cultural and ethnic heterogeneity exists within Latino students generally; however, the MET data did not provide information about students' cultural, national, or ethnic backgrounds and so we could not include those characteristics in our case selection process.

Next, we further narrowed the search to two types of classrooms: classrooms with no ELLs (n = 5) and classrooms with at least 25% ELLs (n = 48; about 5 ELLs per classroom). We chose 25% ELLs as our criterion as this percentage represents a small yet critical proportion of students with the potential to influence average classroom gains. By comparing classrooms with no ELL students and 25% ELL students, we could examine whether teachers employed different strategies to support their students in the classroom based on the level of English proficiency of their students.

For our fourth criterion, from within this subset of classrooms we chose cases with varying levels of academic success. We selected "high-gains" classrooms, defined as classrooms

that on average grew approximately a quarter of a standard deviation from Year 1 to Year 2 of

the MET study. We also selected "low-gains" classrooms, defined as classrooms that on average

grew approximately .05 standard deviations from Year 1 to Year 2. We used .25 standard

deviations as our criterion for "high-gains" because this amount represented highest growth

achieved by multiple classroom with at least 5 ELLs on the state standardized assessment. We

chose .05 as our criterion for "low-gains" because we wanted to observe teachers who made

minimal progress with their students, but failed to make substantial gains. These low-gains

teachers are likely trying to foster class-wide growth, but may not be engaging in practices that

are effective in helping them do so. We decided to use state standardized tests instead of other

assessments provided in the MET dataset as state standardized tests are the focus of current

educational policy. As a result, standardized tests can greatly shape instruction, both in terms of

what content is taught and how content is taught, and thus can influence how teachers interact

with their students (Au, 2007).

Two classrooms with approximately 25% ELLs met the "high-gains" criterion and so

they were selected as cases. In order to maintain an equal number of cases across classroom

categories, I then chose two classrooms with multiple ELLs and no-gains as well as two

classrooms with no ELLs and high-gains. Consequently, we selected the following categories:

ELL, high-gains classrooms; no-ELL, high-gains classrooms; and ELL, low-gains classrooms.

Using these categories, we compared the types of support used by teachers in ELL, high-gains

classrooms to the strategies used by teachers in (1) no-ELL, high-gains classrooms and (2) ELL,

low-gains classrooms. The first comparison (ELL, high-gains versus no-ELL, high-gains

classrooms) allowed us to isolate differences between effective teachers generally and effective

teachers *with ELL students*. Thus, we observed whether the support strategies used by high-gains

teachers are present across classrooms with differing numbers of ELLs or whether, in fact, there are specific strategies that teachers used to obtain high-gains in classrooms with ELLs. The second comparison (ELL, high-gains versus ELL, low-gains classrooms) allowed us to isolate differences in how teachers with many ELLs versus *effective* teachers with many ELLs interacted with their students. This comparison allowed us to examine whether the support strategies used by teachers were present across classrooms with many ELLs, or whether there are specific support strategies used by teachers of ELLs whose classrooms make high-academic gains. We note that ELLs and non-ELLs alike in the ELL, high-gains classrooms made gains.

We refer to the teachers in the ELL, high-gains classrooms as Teachers A and B. Teachers in the low-ELL, high-gains classrooms are Teachers C and D, and teachers in the ELL, low-gains classrooms are teachers E and F. We designated teachers with letters instead of pseudonyms because we used secondary data for our analysis and have not formed relationships with teachers that would allow us to select appropriate pseudonyms. Students are referred to with the label "S"; multiple students are assigned numbers, such as "S1" and "S2". We are limited in our description of teachers due to our confidentiality agreement with the MET dataset. All teachers are female and mostly belong to the same school district; two teachers come from a separate school district. Table 2 contains classroom quality data and descriptors of teachers' class composition and instructional style.

Data Analysis

Each teacher had four ELA lessons, which we transcribed over a period of repeated viewings. We watched each video three times: the first time, we transcribed the lesson. The second and third times, we took "field notes", in which we noted interactions, gestures, facial expressions, tone of voice, or classroom configurations that were not captured by the

transcription of language (for an example transcript, see Appendix A). We also double-checked the accuracy of the transcription. All teacher and student language captured by the microphone were transcribed verbatim. Non-verbal elements were included as narrative notes.

Once we finished transcribing and taking notes on the lessons, we read all four lessons per teacher and wrote corresponding analytic memos for each lesson (Saldaña, 2016) about our impressions and understanding of the lesson at the end of each lesson transcript. We read through each transcript three times, editing memos as we read to capture our comprehensive reactions. In the final reading, we used the memos to develop emergent descriptive codes for teacher supportiveness (Saldaña, 2016). These emergent codes were either characteristic of individual teachers' efforts to be supportive or were prevalent across teachers. For example, we noted that most teachers tended to use general praise when speaking to students, and so general praise became a descriptive emergent code. Other examples of emergent, descriptive codes included: "uses humor"; "uses specific praise"; "describes a content-to-self connection"; "calls students by nicknames"; "offers encouragement"; "shows enthusiasm"; and "describes a skill-to-self connection."

We then conducted close reads of transcripts, using descriptive emergent codes to assess individual instances of teacher supportiveness as we read. After the first round of coding, we examined patterns of codes per teacher and compiled those patterns to create case descriptions of each teacher (Yin, 2014). Case descriptions were comprised of excerpts from teachers' transcribed lessons, excerpts of analytic memos, patterns of codes across lessons, and overall code frequency counts. Based on teachers' individual case descriptions as well as patterns across case descriptions, we then collapsed codes into broader coding categories: relevance, relationship, and praise. *Relevance* describes instances when the teacher makes an effort to

demonstrate to students how the content or skills is *useful* for students' academic development. *Relationship* is when the teacher makes an effort to connect with students, beyond or through teaching content, such as through humor or asking about students' lives. Finally, *praise* is when the teacher affirms a student's effort or response. Table 1 contains second-round code definitions, the emergent codes from which they evolved, examples of codes, and reasons why those codes were assigned. Additionally, in an effort to "standardize" how often various codes were used, we divided by frequency of each code by each teacher's average lesson length.

The first author then coded all transcripts a second time using these broader codes—relevance, praise, and relationship—to double-check that case descriptions of teachers held. A research assistant with experience working with elementary school students and blind to the various types of teacher categories also double-coded 25% of the videotapes using the second-round codebook (Marshall & Rossman, 2010). We met to discuss our differences in coding. We returned to transcript data and the videotaped lessons themselves to reach agreement regarding our differences. The research assistant also wrote a case description of each teacher's supportiveness based on reading lesson transcripts and watching the ELA videotaped lessons. This way, we could ensure that the overall patterns identified by the first author matched the patterns the research assistant observed in her independent examination of the data (Saldaña, 2016; Yin, 2014). Overall, descriptions were similar. Where discrepancies existed, we went back, re-watched lessons, and re-read transcripts. We discussed until our descriptions converged.

Triangulation. The first author and research assistant then triangulated our descriptions with various quantitative measures from the MET dataset, specifically the Student Perceptions Survey (Ferguson, 2008) and the Classroom Assessment Scoring System (CLASS; Pianta, La Paro, & Hamre, 2008). The Student Perceptions Survey (SPS) is a student-report survey in which

students describe various qualities of their teacher. For the present study, we compared our coding and descriptions of teacher supportiveness to students' report of how caring their teacher was. The CLASS is an observational measure used to rate teachers along three dimensions: Emotional Support, Instructional Support, and Classroom Organization. In particular, we compared our coding and case descriptions against the Emotional Support and Instructional Support dimensions, as these domains focus on distinct aspects of teacher supportiveness. Emotional Support captures the teacher's efforts to establish good rapport with students, whereas the Instructional Support measures in part a teacher's efforts to make instruction authentic and engaging. The purpose of this quantitative triangulation was to discern whether student reports of teacher supportiveness as well as observational measures of supportiveness aligned with our case descriptions.

Case Descriptions and Comparisons

We begin by describing how ELL, high-gains teachers interacted with students. We then compare and contrast their student-teacher interactions with the teachers in ELL, low-gains classrooms and no-ELL, high-gains classrooms. We note that Table 2 contains code frequency counts, SPS survey scores, and CLASS scores, as well as brief descriptions of each teacher's instructional style, all of which are also referenced and described below.

How Do ELL, High-Gains Teachers Support Students?

Both teachers in this category differed in how they demonstrated support. Simultaneously, both distinctively offered support to their respective classes. We first describe each teacher's instructional style generally. We then provide evidence regarding *how* this teacher showed support to her students. Specifically, we describe the types of support (praise, relationship, relevance) that we witnessed in each teacher's classroom.

Teacher A. Teacher A's lessons typically observed a specific sequence: whole group review or introduction of new material, followed by students working independently or in small groups, and then going over their work as a class. Students moved around during the lesson— they might start seated in a circle on the carpet in front of a Smartboard, then move to working in groups at tables around the classroom, and then gather back at the Smartboard to conclude. Teacher A's instruction was tightly aligned with state standards for ELA instruction and clearly test-oriented. After reviewing key concepts such as how to make an inference, students would practice those skills using test-prep passages.

Teacher A ran a tight ship; when our research assistant first watched her lessons, she described her classroom style as "militant". For example, one of the most notable aspects of her classroom was how incredibly quiet it was for an upper elementary classroom. Students transitioned silently in and out of small and whole group formats. Class-wide discussions were organized: students raised their hands to contribute and rarely called out. Although we only heard this teacher set expectations for students' behavior once during all four lessons, we observed that she redirected student behavior 37 times over the course of all lessons.

Praise. Given this description, one might not expect Teacher A to be a supportive teacher. However, another noticeable component of Teacher A's style was her frequent and contingent use of *praise*. Of all teachers observed, Teacher A was the most frequent "praiser", with 127 instances of praise coded across all four lessons (Table 2). In fact, for every instance of redirection she offered at least four praise statements on average across all observed lessons. Teacher A most often used an Initiate-Respond-Evaluate style of whole-class discussion ([IRE]; Cazden, 2001) in which she praised students for their correct answers to a question. Approximately 90% of her coded instances of praise followed an IRE sequence. Additionally,

Teacher A typically offered general praise: she offered only 9 specific praise statements in all, in which she highlighted *what* the student was doing to warrant praise. Her general style of praise was intertwined with her test-oriented instructional style. When students in this class responded correctly, the teacher was quick to praise. For example, in the following excerpt, the teacher was going over a test-prep passage:

Excerpt 1.

1. Teacher A: Ok. What's the answer?

2. Student: H (*giving correct multiple-choice answer*).

3. Teacher A: What is it?

4. Class: H

5. Teacher A: "She hears giggling sounds in the classroom", is that the correct answer?

6. Class: Yes

7. Teacher A: You guys are *smart*. Ok, Number 7. Read the sentence from the story. Her expression was calm and serene. The word "serene" most likely means…?

8. Student: A, "calm".

9. Teacher A: Good.

10. Class: Yesss! (*cheering, some students pump their fists in the air*).

11. Teacher A: I love when you guys go: "yesss"! I just love it!

As students responded correctly to a question, Teacher A praised them for their answer with a variety of phrases: "you guys are *smart*" (line 7) and "good" (line 9). Students in turn were responsive and invested in doing well in this activity: they cheer "yesss!*"* (line 10) after they answered two questions in a row correctly. She in turn shared in their excitement—"I love it

when you guys go: yesss!" (line 11). In this excerpt, the teacher's contingent praise built to a

mutually happy moment, for students and teachers.

This teacher's praise was also *effusive*. In 29% of her praise codes, she described

students' efforts and answers in superlative terms. For example, during another lesson, as they

went over a test prep passage the following exchange occurred:

Excerpt 2.

1. Teacher A: Do not call out guys, I know you're excited, but do not call out. The

author wrote the story to… (*lots of hands go up*). Y'all are reading for

thirty minutes every night and it's paying off, I see that. S?

2. Student: B

3. Teacher A: I think you are a smart boy. Smartest boy in the United States. Let's give

him a round of applause. S, I'm so proud of you, ok? Very proud of you!

In line 1 of this excerpt, Teacher A acknowledged her students' efforts in reading at home, and

then followed up a student's correct response by praising him extravagantly. His answer was

relatively simple, particularly in comparison to her praise. Her words celebrated both the class's

efforts as a whole as well as the correctness of his response. This kind of effusive praise was

typical of this teacher: Teacher A also called her class "fantastic" and their involvement during

lessons "excellent". At various points throughout all lessons she told them to "give themselves a

round of applause" or to clap for their peers. She assured them that they were "ready for that

ELA test"; and communicated how proud she was when she thought that they made an effort. As

evident in line 3 of Excerpt 2, her praise goes beyond perfunctory affirmation of a correct

response. Her praise communicated to students that they not only answered correctly, but that

she appreciated their efforts, and was proud of their work. Thus, while her classroom at first

seems characterized by an authoritarian style (Baumrind, 1971) in its efficiency, the teacher also used supportive language in her classroom, largely through her use of praise.

It is important to emphasize that the high degree of praise evident in Teacher A's classroom appeared tied to her reliance on test-prep. Because much of her class time was spent going over students' answers to test-prep passages, she had space to give high levels of general, even effusive, praise. Creating a warm atmosphere through praise may be important in a classroom with many ELLs who need encouragement as they simultaneously learn English and content. At the same time, it is likely that the high-gains evidenced by Teacher A's students are at least partly due to the fact that she explicitly taught to the test. Moreover, general praise does not elucidate for students precisely what they have done well. Both of these factors must be taken into account when considering why and how Teacher A's class displayed high-gains.

Relationship. To a lesser degree, this teacher also tempered her strict classroom organization through attempts at being *relational* with students. *Relational* moments occurred when a teacher joked around with students, attempted to be humorous, called students by terms of endearment, offered encouragement, or made a comment suggesting that she is familiar with a student's life or cares about a student. However, her efforts are noticeable, particularly because she made more efforts to be relational than any other teacher in our sample (35 efforts coded). For example, Teacher A found opportunities to infuse her lessons with humor. In one lesson, she stood on a chair and imitated a well-known public landmark to make her students laugh. She says: "Look, S can't hold it (*a student is laughing hard).* I'm pretty crazy, huh?". She called her students by terms of endearment such as "baby" or "sweetheart". These light-hearted and comfortable moments between Teacher A and her students may have helped to lighten the stress of learning, particularly in a test-focused classroom. Teacher A also used lessons as a jumping

off point to inquire about students' lives. For example, when reading a book about what courage

is, she asked students if they have also had experiences in their own lives which required

courage. She asked: "Who knows how to ride a bike?" (*Some students raise their hands*). *"But*

you have to have courage to go through with it, am I correct? Who can remember the first time

they rode their bike without training wheels?" Demonstrating interest in students' life

experiences is a key building-block to being an overall supportive teacher.

Perhaps most notable about this teacher is that on average, her students perceived her as

highly caring. In fact, they scored her over two standard deviations above the mean on the Caring

domain of the SPS, the highest of any teacher we observed (Ferguson, 2012). Given that this is a

student-report measure, we infer that her use of general and effusive praise and her efforts to be

relational were well received by her students.

Teacher B. Teacher B used less praise (only 15 instances of praise shown across 4

lessons) than Teacher A, possibly because Teacher B did not engage in IRE sequences as often

as Teacher A did. At times, Teacher B could seem frustrated with her students, raising her voice

when she asked them to sit down or telling them that they were embarrassing themselves on

camera. She was less test-focused than Teacher A—only one out of her four lessons involved

explicit test-prep—which may be one reason she used less praise. In the remaining lessons,

students were reading non-fiction books of their own choosing, writing and revising their

writing, or analyzing how advertisements use facts and opinions to persuade their readers. This

style of instruction is more aligned with high-quality ELA instructional practices (Grossman,

Loeb, Cohen, & Wyckoff, 2013). Her typical lesson format followed that of Teacher A; they

began as a whole group, then separated out into groups or worked independently, and came back

together at the end of the lesson to share their work. During independent or group work, the

teacher often called individual students or groups of students to conference with her.

Relevance. One aspect of her teaching stood out, particularly when compared to the other

teachers. Perhaps because she was less test-focused during her instruction, this teacher made a

greater effort to help her students understand the *relevance* of what they were learning within

their own lives. Teacher B had the highest number of relevance code counts (18) compared to all

other teachers in the sample; as will be noted, most of the teachers we observed made no effort to

convince students of the relevance of their learning. To be clear, her efforts to demonstrate

relevance went beyond acknowledging that students may have previously learned about or

experienced something similar to the content that they are learning. That kind of

acknowledgement would draw on students' prior experiences or background knowledge, but

might not explicitly help students perceive the *usefulness* of instructional content in their lives.

During ELA lessons, this teacher appealed to her students as readers and writers. She tried to

make clear to them that what they were learning in the classroom would make them stronger

readers and writers, rather than assuming that they would passively absorb information. Teacher

B thus built value into what students were learning. For example, in one lesson students were

tasked with creating thesauruses, so that when they revised their writing, they could use more

nuanced, descriptive, or interesting language. The teacher made clear to them that these

thesauruses served a purpose and would be useful as they revised:

Excerpt 3.

1.   Teacher B: "So what I'm going to do is hang these up in a place where you can see

them. The whole point of doing this is that these are for you, so that when

you're writing and you want to write happy instead you can say: "I'm not

going to use the word happy, I'm going to use excited or cheerful." Right?
So every time you're writing or revising, you're thinking of better words
you can look at it and say hey, I'm going to use this instead."

In excerpt 3, Teacher B contextualized the purpose of the lesson—students creating thesauruses—as "for you". Other teachers in our sample regularly stated lesson objectives, perhaps adding that this material would be important in the end of year test. However, only Teacher B purposefully described lessons as meant to support her students' writing development. She added later in the introduction of the same lesson: "Because now that we're getting older and we're becoming stronger writers, we can use better words that are going to be more exciting, right?". Teacher B conveyed to her students that they needed thesauruses because they had *identities as improving writers*. Moreover, the lesson required students to work in teacher-organized small groups, developing thesauruses based on whatever books they were currently reading. Consequently, the lesson also had utility, in that it led to the creation of a developmentally appropriate tool that students could practically use in future as they write and revise. Within Excerpt 3, Teacher B was both explicitly reinforcing her students' identities as writers and giving them tools they could use to maintain and enhance those identities.

Sometimes, however, Teacher B described the relevance of learning by emphasizing their *shared* identities as readers and writers—both hers and her students'. For example, Teacher B described how both she and her students were developing as readers in as she taught students how to take notes on questions that arise as they read non-fiction books:

Excerpt 4

1. Teacher B: I know that when I read non-fiction I'm always wondering. Because a
                 lot of time when I read non-fiction, I'm reading about something I

never knew about, and it gives me lots of facts, it gives me information about the topic and I usually have lots of questions about what I'm reading. Do you guys have questions when you're reading your books?

2. Student: Yes

3. Teacher B: Yeah, I should hope so. Sometimes you don't know what the words mean, sometimes the author tells you what the words mean. Sometimes they don't. So a lot of time when we read non-fiction we should ask questions about what's going on. To make sure we're really involved in the book and we really understand the book. Today we're going to talk about how we ask questions as we read and see if we can find the answers as we're reading. Sometimes you can, sometimes you can't. So I'm going to show you how I would do that in a non-fiction text. How I stop every once in a while, I ask a question, and then I look to see if the question is answered. Don't worry. You'll get a chance to do it in your own book, ok?

In excerpt 4, the teacher described how reading can elicit questions and how important it is to answer those questions in order to comprehend text. She both discussed the importance of asking questions generally (line 3) and described how she personally asks questions about books while reading (line 1). While emphasizing the importance of this skill, Teacher B both assured students that asking questions is an integral part of the reading process *and* that she and her students share identities as continuously improving readers. Teacher B further underscored students' identities as readers by having students read books of their own choosing, and come up with their own perplexing questions, instead of assigning books with comprehension questions. And like the

lesson discussed in excerpt 3, this lesson had utility: students learned how to take notes in order to track and answer their questions, a strategy that they can continue using to improve their comprehension. Unlike excerpt 3, however, this time the relevance described was more personal: both she and her students were engaged together in an ongoing process of improving as readers.

   Relationship and relevance. Teacher B not only articulated the relevance of content for students' lives, but also sometimes simultaneously expressed personal enthusiasm and interest in what her students were learning. Her efforts to convey relevance blended with her efforts to share enthusiasm with students over what they were learning. For example, in the lesson on note-taking described above, Teacher B was asking her students to describe the questions that had come up for them as they were reading. The following exchange occurred as students shared their questions:

Excerpt 5.

   1. Teacher B: What's your question?

   2. Student: Why do bees have two stomachs?

   3. Teacher B: I didn't even know that! Did you guys know that bumblebees have two

              stomachs? Can you tell us why, Mr. Scientist?

   4. Student: Heeey! (*smiling*). Because one is to hold the honey and there is one that

              holds the honey and one that gets the food.

   5. Teacher B: Ok so one is to hold the food they eat and the other is to hold the honey

              they make?

   6. Student: No. One is to bring the food in to make the honey.

   7. Teacher B: Great, wow. We learn a lot from reading, you guys.

Teacher B was the only teacher to express this kind of interest in the content that students were reading. Her tone and words in line 1 indicated enthusiasm ("I didn't even know that!") and she concluded that "we learn a lot from reading" in line 7. She was not only listening to assess whether students have accurately completed this lesson; she also asked her student what he learned and then expressed interest in his answer. She gently teased her student, calling him "Mr. Scientist" in line 3, which he responded to with a smile. The other ELL, high-gains teacher, Teacher A, established relationships with her students by employing humor, asking about their lives in relation to the content they were reading about, and using terms of endearment. In excerpt 5, Teacher B engaged in similar interactions—joking with a student, asking multiple questions about what he personally learned from reading—with the difference that her interactions are based on *how interesting she perceived content to be.* Her perceived interest in content aligned with her tendency to describe the relevance of content: both types of interactions are based on the inherent value of what students are learning and doing. This kind of language may heighten students' perceptions of how interesting or motivating an activity is; it also may lead to a shared moment between teachers and students, in which the teacher and students find interest in the same content.

Teacher B's efforts to be supportive were perceived by her students. On average, her students scored as the second highest caring teacher among those we observed, with an average caring score over one standard deviation above the mean. We interpret her high score to indicate that her efforts to articulate relevance and build relationship were appreciated by her students.

Summary. Teacher A and Teacher B—both teachers of ELL, high-gains classrooms—differed in how they demonstrated supportiveness to their ELL classrooms. Teacher A was more effusively praise-oriented, whereas Teacher B regularly conveyed the relevance of content to her

students. Both sometimes used relational language when interacting with their students. Their demonstrations of supportiveness often aligned with their preferred methods of instruction: Teacher A focused on test prep, whereas Teacher B had students delving into fiction and non-fiction texts. Despite this difference, both more noticeably demonstrated supportiveness to their students than teachers in no-ELL, high-gains classrooms or teachers in ELL low-gains classrooms, as will be described in the following sections.

How Do No-ELL, High-Gains Teachers Support Students?

In comparison, the two teachers in the high-gains, low-ELL category were less distinctive with regard to how they show support to their students. Notably, neither teacher made an effort to explicate the relevance of the content the students were learning (0 attempts across all four lessons for both teachers; Table 2). Similarly, both teachers made few efforts to be relational with their students (Teacher C had 1 effort; Teacher D had 4 efforts).

Teacher C. Like Teacher A, Teacher C primarily focused on preparing students for the end of year test: all four of her lessons exclusively involved asking students to read and respond to test-prep passages. Teacher C always used a whole-group format while teaching. Students remained seated at their tables throughout all lessons, as Teacher C read test-prep passages aloud to her students and then called on students to answer questions related to those passages. All conversations during these lessons were focused on the test-prep passages being read, as well as strategies for answering questions related to those passages. Teacher C maintained an even, firm, rather business-like tone during lessons.

Praise. For Teacher C, the primary supportive aspect of her teaching was her use of praise. Like Teacher A, 90% of her praises followed an IRE sequence, a feature of her teaching tied to her reliance on test-prep. However, her praise was qualitatively different from Teacher A,

in that it was less effusive (10% of her praise codes contained effusive language). More often, her praises were a confirmation of students' answers, rather than opportunities to commend their effort or describe how proud she was of them, as Teacher A did. For example, the following kinds of interactions characterized this teacher:

Excerpt 6.

1. Teacher C: What is the article mostly about? The New York Yankees are a Dutch team. Raise your hand, discuss it. S?

2. Student: No because it was only a part of it, a little bit.

3. Teacher C: That was just a what?

4. Student: A detail

5. Teacher C: A detail, just mentioned toward the end. S again (*calling on the same student*). Henry Hudson was a failed explorer?

6. Student: He didn't fail, he didn't find the route to the East Indies, but he found one of the most famous places in NY, like M. So he didn't fail.

7. Teacher C: Ok, so do you want to eliminate or consider that?

8. Student: Eliminate

9. Teacher C: Eliminate ok so you don't like A or B. Does everyone agree with that?

10. Class: Yes.

11. Teacher C: Ok. How Henry Hudson discovered Manhattan?

12. Student: Maybe we could keep that because it's the title and the main idea.

13. Teacher C: All right. And thick forests covered Manhattan.

14. Student: That was a fact like only one paragraph, so I would consider C.

15. Teacher C: Ok who thinks she's right? Good, pretty basic. Very nice.

Teacher C expressed affirmation when the student answered correctly. However, the praise was brief and to-the-point. It lacked the enthusiasm displayed by Teacher A. Moreover, in line 15, she described students' answer as "pretty basic", which minimized the student's contributions. Above all, Teacher C's praise is contingent on a correct response, but the praise is perfunctory and utilitarian in nature: it is used to ensure students know their responses were correct, but not to overtly to communicate pride or appreciate the student's efforts.

To be clear, Teacher C was not an unsupportive teacher. Her use of praise indicated that she did engage in supportive teacher-student interactions. However, her supportiveness was limited to general praise: she did not advance relationships with her students or describe the relevance of what they were learning beyond emphasizing the importance of the end-of-year test. Her Student Perceptions Survey caring score reflected her relative supportiveness: on average, her students rated her approximately .4 standard deviations above the mean.

Teacher D. Teacher D often began lessons as a whole group, with students seated on the carpet and clustered around a whiteboard as she introduced the lessons and walked them through examples. Students would then often work in groups on a related activity, with a share-out period at the end of the lesson. Teacher D always began by introducing the objective for that day, such as discerning facts versus opinions or how to make an inference, and then would have students apply those topics in related whole-group or small-group activities, usually focused on reading and responding to a passage the teacher had selected from a basal reader. We noted that she tended to "monologue" or speak for long periods of time, pausing to have her class chorally respond with one-word answers. She had a kind and even tone; she rarely if at all raised her voice and maintained a smiling affect throughout her lessons.

Praise. Teacher D was less praise oriented than teachers A and C, although she did use praise more frequently than Teacher B (24 instances of praise coded for Teacher D). She was also less relational (4 coded instances) than the ELL, high-gains teachers, and like the other no-ELL, high-gains teacher, Teacher D did not engage in explanations of the relevance of what she was teaching to her students across all four lessons. Overall, Teacher D's praise was reminiscent of Teacher C's praise; for example, she affirmed students' answers by providing some praise at the end of the interchange ("excellent", "good job, boys and girls"). She did not use praise to contingently and frequently praise students' correct responses. Her style of affirmation was subtle, particularly in comparison to Teacher A's effusive use of praise.

Missed opportunities for relevance and relationship. To a lesser degree, another noticeable aspect of Teacher D's instruction were her missed opportunities to help students appreciate the relevance of their learning or even connect prior experiences to instructional content. For example, during a lesson on main ideas and supporting details, the students were reading a passage about centipedes and identifying supporting details. A student raised his hand and began to explain that he had seen a centipede in his backyard. The teacher interrupted him quickly saying: "Ok, well, I'd be careful with that. But let's get back to the lesson." She then moved into explaining directions for the next activity. Her redirection is not unkind; she acknowledged that the student might want to be "careful". However, the teacher has missed an opportunity to either (1) engage in a relational moment with her student by connecting what the student has experienced to what the class is reading, as Teacher A did, or (2) to demonstrate how reading can help us better learn about our surrounding environment, as Teacher B did.

Similarly, in another lesson on making inferences, Teacher D gave her students a short biography about a historical figure and told them to use the biography to make inferences. She

introduced the lesson by explaining that when reading, one regularly has to make inferences based on available information in the text and prior knowledge. Students then read the biography independently. However, in upper elementary school, biographies are a compilation of facts from one person's life and tend to be straightforward in their reporting; they do not typically require the reader to make inferences. And indeed, after students read the biography, Teacher D acknowledged that they "really don't need to" make inferences about this text since it already gave "really good details". Teacher D sent mixed messages to her students: she told them inference-making is part of reading, then supplied them with a text that did not require the reader to make inferences. Teacher D contrasts with Teacher B, who regularly articulated the relevance of what students were learning for their development as readers.

Teacher D's students perceived her as supportive- her students on average rated her .8 standard deviations above the mean. She was not perceived to be as supportive as Teachers A and B, who had ratings over two and one standard deviations above the mean, respectively. However, her ratings were twice as high as the other no-ELL, high-gains teacher, Teacher C, who was rated approximately .4 standard deviations above the mean. Although Teacher D was not as perceived to be as supportive as the two ELL, high-gains teachers, it is possible that she may have engaged in unobserved supportive interactions with students outside of her instruction or the videotapes we viewed.

Summary. Overall, both classrooms in this no-ELL, high-gains category can be described as warm, but not distinctively so. These teachers almost entirely relied on praise to convey supportiveness; however, the praise they offered was mostly confirmatory and not as effusive as compared to Teacher A. Moreover, evidence of interactions that strengthen their

relationships with students or that purposefully emphasized the relevance of content for students'

learning was not observed.

How Do ELL, Low-Gains Teachers Support Students?

Like the no-ELL, high-gains teachers, the two ELL, low-gains teachers tended to use

praise as a primary form of supportiveness and rarely if ever conveyed the relevance of what

students were learning. Teacher E rarely engaged in relational moments with her students,

whereas Teacher F occasionally engaged in *insensitive* interactions with her students.

Teacher E. Teacher E had a similar instructional style to Teacher D; she began by

introducing a lesson objective and typically used a basal reader, which she would read aloud to

students or ask students to read in groups. Students were always seated at tables, and throughout

the lesson, the teacher would alternate between instructing students as a whole group and asking

students to work with their table groups. Teacher E maintained a calm and even tone throughout

lessons. She often used praise (41 instances coded) but did not engage students by emphasizing

the relevance of their work (0 codes), nor did she advance relationships (2 codes; Table 2).

Praise. Like the no-ELL, high-gains teachers, there was little distinctive about how

Teacher E praised her students. For example, in the following excerpt, she and her students are

reviewing what an inference is:

Excerpt 7.

1. Teacher E: What is an inference? S?

2. Student: Um, an inference is what you know.

3. Teacher E: Well, that's part of it, what I know.

4. Student: And then you're going to take the book and then you're going to put it

         together.

5. Teacher E: And then I'm going to put it together and what's it called?

6. Student: Then you have some of what happened in the book.

7. Teacher E: Look at the light bulb, that kind of helps you remember, what's that—inference?

8. Student: Um, you have an idea of what it is.

9. Teacher E: Perfect. You take what you know and what you read and you put it together, the light bulb comes on.

This excerpt is characteristic of this teacher: she is pleasant and offers affirmation at the end of the interchange in line 9. However, like Teacher C and D, there is nothing distinctive or unusual about the exchange; for instance, she does not commend students' effort, nor could her praise be described as effusive. Like other observed teachers (e.g. Teacher C), her reliance on basal readers may have at least partly limited her demonstrations of supportiveness to praise. Her students report her caring as about half a standard deviation above the mean, indicating that she was a caring teacher but not unusually so.

Teacher F. Teacher F, in contrast, displayed a mix of supportiveness and lack of sensitivity. Teacher F usually taught whole-group lessons. She used a combination of basal reader lessons as well as more experiential, hands-on lessons, such as showing students "a neighbor's garbage" and asking them to make inferences based on what was contained in the garbage. The latter type of instruction, while likely engaging for students, was not always clearly tied to students' developing literacy skills. Students in her class worked in a variety of arrangements, ranging from whole-group to partner formats. Sometimes students were seated at desks; other times, they gathered on the carpet in front of a whiteboard. Teacher F maintained a calm and even tone.

Praise and relevance. Teacher F most often used praise to convey support (16 instances of praise coded) and rarely described the relevance of what students were learning (only once across all four lessons). She also made some efforts to be relational with her students (4 attempts coded); however, those efforts were sometimes tempered with insensitivity.

Missed relationship. Teacher F made statements that may seem insensitive to her students, particularly her ELL students. For example, in one lesson in which students are reading about green cards, the teacher stated that green cards are necessary in order to keep out "crazy criminals". She then mentioned that there were immigrant students in the class and suggested that those students ask her parents about their own green card application processes. In another lesson, in which students are reading about a little girl whose father is leaving to seek work elsewhere, she tells her students to raise their hands "if your father has left." All of these statements occurred while working with basal reader passages and were possibly intended as efforts to make instruction relevant. However, Teacher F's language described sensitive subjects rather thoughtlessly. Teacher F's students appear to have noted her lack of sensitivity: students rated this teacher as half a standard deviation *below* the mean compared to other teachers.

Summary. Overall, classrooms in the ELL, low-gains category are mostly neutral with regard to teacher supportiveness. These two teachers both used praise, although Teacher E praised more frequently than Teacher F did. Neither teacher often engaged in relational language with heir classrooms, although Teacher F was observed engaging in insensitive talk. In contrast, teachers in the ELL, high-gains classrooms offered more effusive praise, more efforts to build relationships, and more attempts to explicate relevance. The insensitive remarks witnessed in Teacher F's classroom were absent from ELL, high-gains classrooms.

Triangulation with SPS and CLASS Scores

As we have noted, student ratings of teacher caring ranged across our sample, from approximately -.5 standard deviations below the mean to over 2 standard deviations above the mean (Table 2). The two ELL, high-gains teachers were rated as most caring by the students in their classrooms. We also compared our case descriptions against teachers' CLASS scores. We first compared case descriptions to against Emotional Support scores, which partly measures both teachers' use of praise and teachers' efforts to build relationships with students. The average Emotional Support score for fourth and fifth-grade classrooms within the larger MET study was 4.57 (SD = .37). For our selected cases, scores ranged from 4.39-5.25, indicating that our observed classrooms ranged from slightly below average to high on Emotional Support.

Given the importance of relevance for one of our teachers, we also checked Instructional Support scores for each teacher, as this CLASS domain partly captures how teachers express the relevance of their content. Within the larger MET fourth and fifth grade sample, the average Instructional Support score was 3.68 (SD = .40). For our selected cases, Instructional Support scores ranged from 3.04-4.33. Content Understanding, a dimension of Instructional Support partly aligns with relevance, had an average score of 4.16 (SD = .43) across fourth and fifth grade MET classrooms. For our selected cases, average Content Understanding scores ranged from 3.5 to 4.81. Thus, our selected cases ranged from low to high with regard to both Instructional Support and Content Understanding.

Student reports of teacher caring and observational measures of teacher emotional supportiveness did not align. Most noticeably, the teacher with the highest student-reported care score had the lowest Emotional Support and Instructional Support scores (Teacher A, a ELL, high-gains teacher). Similarly, the teacher with the second highest student-reported care score had the second lowest Emotional Support score (Teacher B, also a ELL, high-gains teacher). The

teacher with the highest Emotional and Instructional Support scores was rated as relatively average in caring by her students (Teacher E, a ELL, low-gains teacher).

The student-reported SPS scores supported our coding and interpretations: ELL, high-gains teachers were viewed as the most sensitive and supportive by their students, when compared to teachers in the other categories. The observational measures, however, are not aligned with our case descriptions and comparisons. We discuss these findings below.

Discussion

Within upper elementary classrooms, we compared how ELL, high-gains teachers showed support to their students compared to teachers in no-ELL, high-gains classrooms and teachers in ELL, low-gains classrooms. We find that ELL, high-gains teachers were doing more to show supportiveness, whether by being effusive and frequent in their praise, explaining the relevance of content for students' lives, or making efforts to form relationships with their students. In contrast, the remaining teachers primarily engaged in affirmative praise to show supportiveness. One ELL, low-gains teacher sometimes interacted insensitively with her class. This contrast suggests that in general, ELL, high-gains teachers used a variety of supportive teacher-student interactions.

These three forms of supportiveness may be particularly useful for Latino ELLs in upper elementary school. In general, the quality of teacher supportiveness in upper elementary school can decline (Jerome et al, 2009). With regard to ELLs specifically, upper elementary ELLs are no longer viewed as "dual language learners" and are expected to be proficient in English. Students who do not become proficient English speakers during lower elementary school can experience academic difficulties in upper elementary school (Halle et al., 2012). Upper

elementary ELLs are in need of teacher supportiveness to help them face these challenges. We consider why these types of supportiveness may useful, particularly for Latino ELLs.

Praise

The role of praise in classrooms has been a research topic for decades. A review of praise literature shows that, when delivered contingently and in response to students' appropriate behaviors, praise can increase desirable behaviors (Partin et al., 2009). As Brophy (1981) notes, in for order praise to be effective, it must be contingent, specific, and credible. That is, praise must be delivered immediately in response to a student's desirable behavior; specific regarding *what* about the student's behavior is desirable; and believable by the student. With regard to our teachers, one ELL, high-gains teacher regularly used praise contingent on students' correct answers. Her praise was often effusive, which students could have interpreted as exaggerated and thus unbelievable. However, her students rated her as very highly caring, which may indicate that her praise was credible. Her praise lacked specificity, as the majority of her praise was general and embedded within IRE sequences. The lack of specificity is likely due to her instructional style: when teacher questions are centered around checking students' answers to test-prep questions, then students' answers may not lend themselves to specific praise. Other qualitative work (Garza, 2009) suggests that Latino high-school students preferred their teachers to show support by providing targeted academic help and affective academic support, over having a general, caring disposition. Given this preference, it may be that students would have viewed Teacher A as even more supportive if she praised them with greater specificity, so that students understood *why* their answers were correct. Alternatively, although general praise does not encourage effort, this type of praise may create a "feel-good" moment for students which strengthens the students' relationship with the teacher.

Praise is not often described as a specific strategy for showing support to Latino ELLs. This is possibly because teacher praise is often viewed as a behaviorist teaching strategy and is commonly used within a special-education framework to remediate students with special needs (e.g., Sutherland, Weby, & Yoder, 2002). Being an ELL is *not* equivalent to being a special-needs student; in fact, ELLs are overrepresented in special education (Sullivan, 2011; De Venazuela, Copreland, Qi, & Park, 2006). However, ELLs are contending with two sizeable, simultaneous challenges: learning English and learning content simultaneously. Praise is an easy-to-implement strategy that lets all students, including ELLs, know their efforts are seen and appreciated (Partin et al., 2009). Simultaneously, frequent use of general praise may be symptomatic of test-oriented instruction and fail to benefit ELLs' long term development as readers and writers. Future work should consider the role of praise in supporting ELLs' academic outcomes, both short and long term.

Relationship

Beyond praise, there is an emotional aspect to being an ELL. Lower levels of English proficiency can be stressful for ELL students (Dawson & Williams, 2008) and can be related to students' poor internalizing and externalizing behaviors (Niehaus & Adelson, 2013). Teachers A and B also demonstrated a willingness to establish relationships with her students, through a variety of means such as attempts at humor, asking about students' lives, and showing their enthusiasm about instructional content. The importance of being relational in a classroom with many ELLs cannot be overstated. For example, Walker and colleagues found that 70% of teachers surveyed actively did not want ELLs in their classrooms (2004). Even when teachers are willing to support ELL students, larger systemic issues such as a lack of personnel or poorly aligned resources can make teaching ELLs a challenge (Batt, 2008). ELLs are consequently at

risk of feeling unwanted or burdensome in their schools. It is therefore critical that teachers in classrooms with many Latino ELLs make efforts to forge relationships with their students. We note that teachers' efforts to form relationships with students came from ordinary moments, such as asking about a student's weekend or calling a student "sweetie." As Yu and colleagues (2016) note, these simple, everyday interactions can build to the formation of meaningful relationships; a hopeful message for teachers eager to connect with their students.

Relevance

The other ELL, high-gains teacher, Teacher B, showed supportiveness by explaining the relevance of content for students. Multiple theories and educational approaches acknowledge the importance of making learning relevant. For example, constructivist pedagogy generally encourages teachers to help their students perceive meaning in the phenomena they are learning (Richardson, 2003). Similarly, other theories of motivation cite relevance as key for eliciting student engagement and willingness to learn (Ames, 1992). Empirical evidence supports these theories: it is important to clarify the relevance of expected behaviors so that students will engage accordingly (Skinner & Belmont, 1993). Upper elementary students report that when teachers convey the relevance of what they are learning, they have more positive feelings, fewer negative feelings, and are engaged in school (Assor, Kaplan, & Roth, 2002).

Only one teacher—a ELL, high-gains teacher—made an obvious effort to describe the relevance of what students were learning. Making learning relevant for ELL students may be particularly critical. Research on best practices for instructing ELLs often focuses on developing ELLs' oral English proficiency, with less of a focus on learning academic content (e.g., Slavin, Madden, Calderon, Chamberlain, & Hennessy, 2011; Janzen, 2008). Similarly, in schools, teachers may try to "protect" their ELL students by placing them in courses with limited

academic demands, in which learning English is the primary aim for ELL students (Kanno &

Kangas, 2014). ELLs consequently may receive the message that their main academic task is to

learn academic English. Having a teacher who focuses on why *content*, and not just learning

English, is important may therefore be a key and novel show of support for Latino ELLs. It is

important to note that in the present study, the teacher who articulated relevance the most

frequently also had her students engage in quality literacy activities and rarely used test prep.

The likelihood of explaining relevance is tied with the depth and authenticity of instruction.

Additionally, this teacher varied in how she described relevance: sometimes she emphasized the

general importance of content and other times she described how content was important for her

and her students. Future research should continue exploring the role of relevance; in particular,

researchers should consider whether or how ELLs perceive and value the two types of relevance.

Triangulating with Quantitative Measures

An interesting aspect of our study is the degree to which student-report measures and

observational measures align with our findings. The two teachers with the highest student-

reported Care scores were the teachers in ELL, high-gains upper elementary classrooms. We

observed these same teachers distinctively showing support, through frequent praise, efforts to

build relationships, and discussion of content relevance. Thus, students' report of teacher caring

aligned with our qualitative observations of teacher supportiveness. However, observational

measures of teacher supportiveness and instruction did not align with our case descriptions or

students' reporting.

There are multiple possibilities behind this discrepancy, including issues of

generalizability and rater effects (see Mashburn, 2017). Given the focus of the present study on

majority-Latino classrooms with ELLs, we highlight one key possibility: the need for

observational measures that align with culturally and linguistically diverse students' expectations for supportive teachers. An important example is teachers' descriptions of relevance. In the present study, we triangulated relevance code patterns and frequencies with observational scores of Instructional Support generally and Content Understanding specifically, because scores capture whether or not the teacher made a connection to prior learning or the outside world. However, these two constructs—relevance versus connections to prior learning—although related, are not synonymous. In the present study, relevance implied more than real-life or prior learning connections. Rather, relevance was an explicit statement regarding how instruction would benefit students as emerging readers and writers, which may help students perceive themselves as readers and writers. This type of nuance could be captured in culturally and linguistically specific observational measures of classroom quality. As another example, we also observed high-gains teachers of ELLs using effusive, general praise. Using specific, effort-focused praise instead of general, person-focused praise is typically recommended for teachers as a means of strengthening students' motivation (e.g., Mueller & Dweck, 1998). However, general effusive praise may still help Latino ELLs feel valued by their teachers, and thus may strengthen their relationships with teachers. Consequently, this practice may be worth including in observational measures developed for diverse classrooms.

Given the current importance of observational measures for understanding the effectiveness of classrooms, it is critical to explore whether current measures include key processes that support diverse student groups, such as Latino ELLs. A benefit and trade-off of the present study is the small number of classrooms we observed, which allowed us to make specific and nuanced observations about the ways in which teachers demonstrated support to their students. These types of interactions can then be tested in larger samples, to determine

whether these interactions are broadly beneficial. Additionally, future work could include semi-structured interviews with upper elementary Latino ELLs, to determine whether that the types of interactions we observed in the present study map onto their ideas of teacher supportiveness.

Limitations

A primary limitation of this work is the nature of our data. We used videotaped lesson data, which allowed us to capture and continuously review how teachers interacted with their classes. However, we could not interview teachers or students, particularly Latino ELLs, to understand their perspectives on teacher supportiveness. We also were able to observe four ELA lessons per teacher; observing more lessons would have provided additional data. Future work should address these gaps.

Moreover, we attempted to select teachers from a single district, to ensure that the teachers we observed faced similar expectations and pressures. However, we had to select two teachers who fit our criteria from another district. Teachers in this second district may have experienced different expectations, which may have lead them to adapt their instruction and interactions with students accordingly. To some degree, this limitation is also a strength: similar patterns of practices across districts reinforce our findings. However, future work could take district context into consideration by examining similar questions using a within-district approach. Relatedly, students in different districts took different standardized tests, which could ultimately impact whether a teacher is represented as high or low-gains within our data. However, since the standardized test scores were equated using Van der Waerden scores during the primary analysis of the MET dataset, we are less concerned that this discrepancy impacts our case selection (Conover, 1999; Kane & Staiger, 2012).

Implications

The results of this comparative case study are important for classrooms with ELLs in a period of changing national educational standards (Valdés, Kibler, & Walqui, 2014). These shifts in standards are challenging for teachers and students alike to enact and learn, particularly in classrooms with varying levels of English proficiency. However, when teachers show support by using a variety of strategies—praise, relationship, relevance, amongst other possibilities—they may create contexts in which these standards can be achieved. For instance, if teachers work to understand and showcase the relevance of content, they may both deepen their own understanding of how to teach new content *and* heighten students' motivation to tackle challenging content. However, teachers cannot shoulder this responsibility alone. Education leaders can create opportunities for professional development that allow teachers to fully support all students. Specifically, creators of professional development could include the themes of praise, relevance, and relationship in modules aimed at developing teachers' abilities to emotionally support fourth and fifth grade ELL students.

We note that our findings may only be generalizable to other majority-Latino classrooms with some ELLs. However, the ELL student population is unevenly distributed throughout this country and schools with fewer ELLs tend to also have fewer resources for supporting this student group (e.g., Consentino de Cohen, Deterding, & Clewell, 2005). Consequently, our findings may help teachers in classrooms with some ELLs provide their students with the emotional support required to thrive as a linguistic minority.

Conclusion

All of the teachers we observed displayed supportiveness in some way. Only one teacher engaged in interactions that could be perceived by students as negative or insensitive. That said, only *high-gains* teachers with many ELLs in their classrooms displayed several distinctive types

of supportiveness, through praise, efforts at forming relationships, and articulating relevance. This contrast suggests that ELL, high-gains teachers are adept employing a variety of support strategies. Although we cannot infer causality from the present analysis, our findings suggest teacher use of praise, relationship building, and relevance may be useful strategies to support achievement gains in classrooms with varying level of English proficiency. It is increasingly important that teachers of ELLs reflect on the nature of their interactions, and strive to facilitate interactions that support all students.

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Table 1.

Code Definitions and Examples

	Definition	Descriptive Sub-Codes	Example	Why Coded
Relevance	A statement about why or how content is important for the student as a reader or writer.	• Text to self connection. • Content to self connection.	"So I'm wondering, when you guys write, do you feel like you use the same words over and over again?"	The teacher is describing thesauruses in terms of students' identities as writers.
Relationship	A teacher's efforts to connect with her students, either beyond or through content.	• Humor. • Encouragement. • Asking about students' lives. • Demonstrating knowledge about students' lives. • Terms of endearment.	"S is smiling because he has a new baby brother!"	The teacher demonstrates a connection to her student by knowing about events in his life.
Praise	Affirmation of a student's response or effort.	• General praise • Specific praise	"Give yourselves a round of applause"	The teacher is celebrating the class's effort.

Table 2.

Code Counts, SPS Care Scores, and CLASS Scores

Teacher ID	A		B		C		D		E		F	
Relevance	3	0.06	18	0.36	0	0.00	0	0.00	1	0.02	0	0.00
Relationship	35	0.76	12	0.24	1	0.02	4	0.10	2	0.05	4	0.12
Praise	127	2.75	15	0.30	88	2.05	24	0.62	41	0.97	16	0.47
SPS Care	2.23		1.14		0.43		0.84		0.56		-0.5	
CLASS-ES	4.39		4.61		4.73		4.84		5.25		N/A	
CLASS-IS	3.04		4.11		4.09		4.13		4.33		N/A	
CLASS-CU	3.5		4.5		4.34		4.28		4.81		N/A	
# ELLs	5		5		0		0		5		5	
# Gains	High		High		High		High		Low		Low	
Focus of Instruction	Test Prep		Authentic Literacy		Test Prep		Basal Reader		Basal Reader		Basal Reader	
Class Arrangements	Whole and small groups		Whole and small groups		Whole group		Whole and small groups		Whole and small groups		Whole group	
Average Lesson Length	46.25 min		50.50 min		43 min		38.5 min		42.25 min		34.25 min	
Range of Lesson Lengths	36-54 min		43-60 min		46-50 min		36-43 min		34-48 min		30-40 min	

Note. For each teacher, the left-hand column contains the total number of codes per type of supportiveness shown. In the right-hand column are the number of codes per average lesson length.
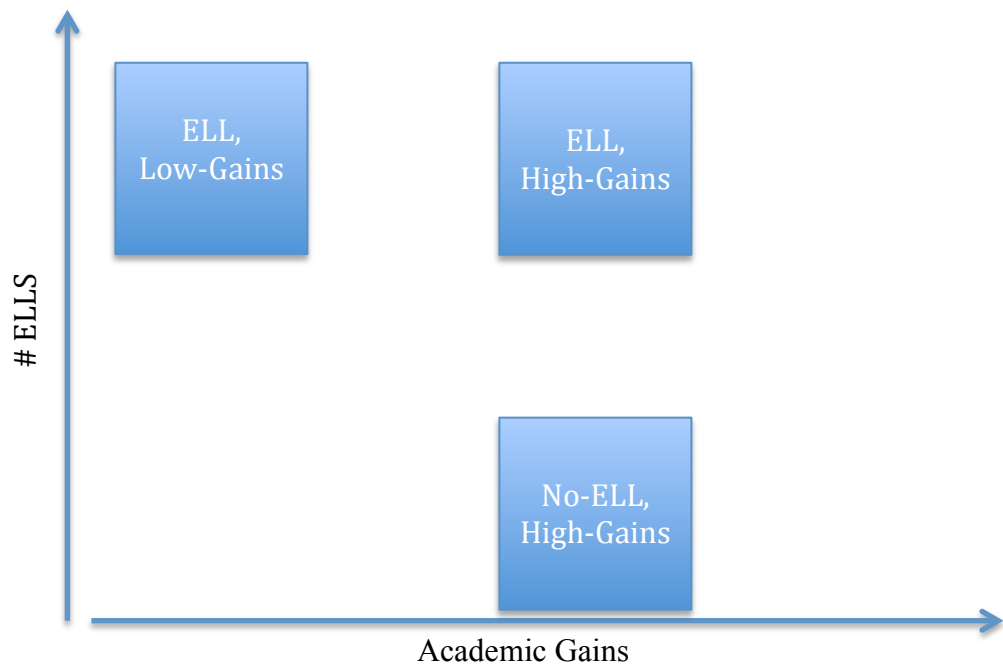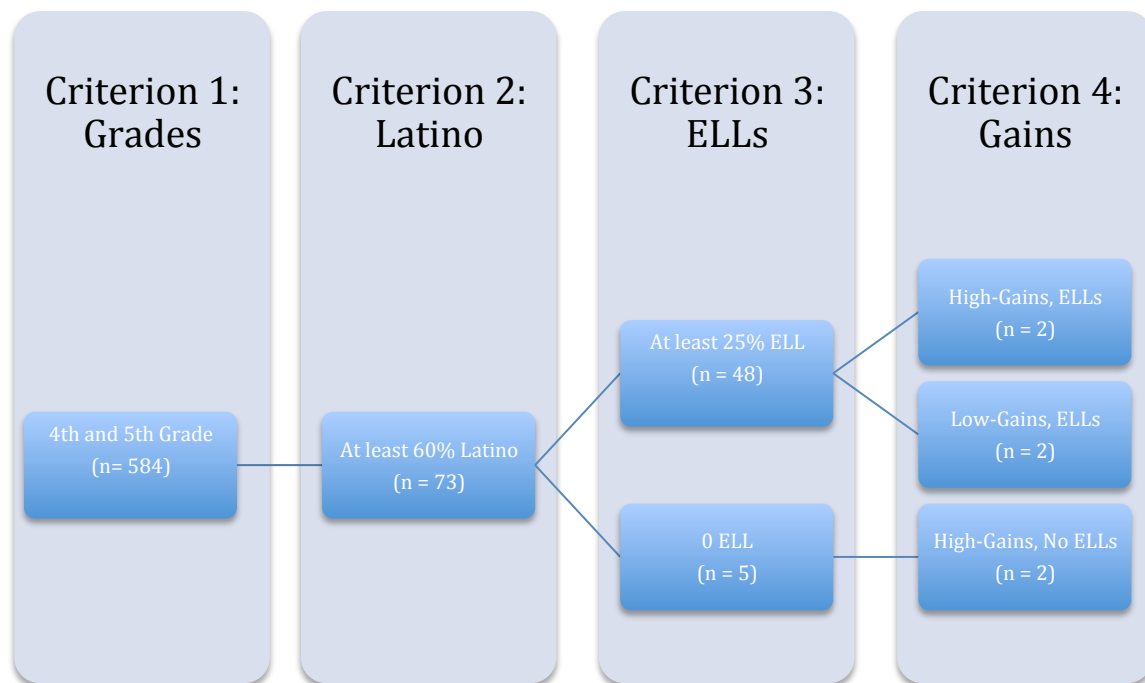
Figure 1. Types of cases selected.

Figure 2. Case selection process. "N" refers to the number of classrooms.

Appendix A.

The following provides an expanded example of transcribed language from teachers with accompanying field-notes. Specifically, this excerpt was coded as an example of general and effusive praise. Bolded print represents our additional notes. All language was transcribed verbatim; non-verbal elements such as student or teacher gestures; tone of voice; classroom configurations; or student work were added as narrative notes.

T then starts reading the next passage from the test-prep book, about fish that produce electricity. She reads through the first questions and the possible A,B,C, and D options. Students immediately start raising their hands and shouting various answers-- "B! A! B!"-- as soon as she stops reading.

1. **Teacher A:**   *Do not call out guys, I know you're excited, but do not call out.*

   *(**Repeating the question**) The author wrote the story to… (**lots of hands go up**). Y'all are*

   reading for thirty minutes every night and it's paying off, I see that. S?

2. **Student**:   *B*

3. **Teacher A:**   *I think you are a smart boy. Smartest boy in the United States. Let's give*

   *him a round of applause. (**Students immediately start clapping for their***

   ***peer**). S, I'm so proud of you, ok? Very proud of you!*

Below is an example of an analytic memo written at the end of a different transcript. The memo includes both the reader's observations, references to the lesson, and quotes from the lesson. This memo focuses on the no-ELL, high-gains teacher who asked her students to make inferences about a biography, an example discussed during the results section.

The passage students were asked to read was very explicitly—it didn't really require a lot of inferencing, since it was detailed, factual biography. The teacher says at one point "we were discussing—and we really don't need to in this story. It gave us really good details but there's a few details that we were trying to infer and we weren't 100% sure." Then the inferences they draw about this individual's biography—who is a nurse—are all on the same vein of "she likes helping people, she cares about people". In the teacher's efforts to focus intently on inferencing and the main idea, I'm not sure that the true purpose behind drawing inferences (i.e., good reading comprehension) is realized in this lesson. That said, she has a warm and even tone. She doesn't take a lot of time to express warmth specifically through words or actions, though—it's mostly the absence of a negative climate coupled with an even tone.

How Do Effective Mathematics Teachers of Fourth and Fifth Grade ELLs Demonstrate

Instructional Competence and Emotional Support?

UNDER REVIEW—PLEASE DO NOT CITE WITHOUT PERMISSION

Abstract

This study explores factors that differentiate the quality of mathematics instruction in high-achieving, majority-Latino fourth and fifth grade classrooms with many English language learners. Using secondary data from the Measures of Effective Teaching dataset, I conducted a multiple and comparative case study analysis describing how teachers in ELL, high-gains classrooms expressed supportiveness and use various instructional practices compared to teachers in no-ELL, high-gains classrooms and ELL, low-gains classrooms during mathematics instruction. The ELL, high-gains teachers used gestures, visuals, and physical representations accurately and purposefully; offered praise; elaborated student responses; checked all students' understanding; and provided emotional and instructional support while doing so. These practices and displays of supportiveness were less common amongst the remaining teachers. One ELL, no-gains teacher was highly similar to the ELL, high-gains teachers, with the primary exception that her use of physical representations did not connect back to lesson objectives. I conclude with implications for measuring instructional quality in classrooms with ELLs as well as ideas for professional development.

Keywords: Latino students, upper elementary, mathematics instruction, English Language Learners, Measures of Effective Teaching dataset

How Do Effective Mathematics Teachers of Fourth and Fifth Grade ELLs Demonstrate

Instructional Competence and Emotional Support?

Teachers of English language learners (ELLs) contend with unique, challenging

demands. Essentially, teachers support ELLs in learning academic content as ELLs develop their

English language proficiency (Echevarria, Powers, & Short, 2006). The content focus of the

present study is fourth and fifth grade mathematics instruction. Currently, the Common Core

State Standards for Mathematics encourage teachers to balance procedural fluency with

conceptual understanding; to center instruction around challenging, open-ended tasks; and to

include more discussion, in which students explain and justify their answers ([CCSSM]; National

Governors Association Center for Best Practices Council of Chief State School Officers, 2010).

These standards reflect a growing realization that today's students must be competent in

mathematics in order to be competitive in the workforce and contribute to society. As laudable as

these goals are, they pose a considerable instructional challenge for ELLs and their teachers.

Moreover, quality mathematics instruction does not occur in a vacuum. If ELLs are to surmount

the challenges of acquiring a new language while gaining expertise in mathematical content, they

must be part of a supportive classroom environment. Both theory and evidence suggest that

teachers who create emotionally supportive-classroom environments, in which all students feel

accepted and safe to learn, promote ELLs' successful development (Banse & Palacios, under

review; Banse, Martin, & Palacios, under review; Gillanders, 2007; Lucas, Villegas, & Freedson-

Gonzalez, 2008). In other words, teachers require a comprehensive understanding of the

emotional and instructional supports that may help ELLs succeed in learning mathematics.

Consequently, the overarching purpose of this exploratory study is to uncover how

effective teachers of ELLs differ from other teachers during mathematics instruction. The study

has two aims. First, I ascertain to what degree, if at all, effective teachers of ELLs demonstrate emotional support and use quality mathematics instructional practices, respectively. Given that both instruction and supportiveness are critical for student learning, it is important to understand the complexity of how teachers cultivate each dimension within real-world contexts (aim 1).

Second, I investigate whether and how teachers are situating their demonstrations of support *within* instructional practices**.** For example, perhaps all teachers regularly offer praise, but only effective teachers of ELLs offer praise within the context of cognitively demanding mathematical tasks. Therefore**,** it is necessary to examine the nexus of these two classroom dimensions (aim 2). Understanding how teachers of ELLs integrate instructional practices and supportiveness is critical, as learning in English-speaking classrooms can contribute to both instructional and emotional difficulties for ELLs (Pappamihiel, 2001; Yoon, 2008). Examining how teachers purposefully combine both emotional and instructional support may provide nuanced insight into what successful mathematics instruction for Latino ELLs entails.

In this study, I compare the mathematics instruction of high-gains teachers in fourth and fifth grade classrooms with ELLs to (1) no-gains teachers of ELLs *and* (2) high-gains teachers in classrooms with no ELLs, to gain a detailed understanding of whether teachers use instructional practices and show supportiveness differently across these three types of classrooms (Figure 1). I focus on fourth and fifth grade classrooms that are primarily comprised of Latino students, in order to maintain a within-group approach to my qualitative case descriptions and comparisons (Chase-Lansdale, Valdovinos D'Angelo, & Palacios, 2007; García Coll & Szalacha, 2004).

Conceptual Framework

Supportive classrooms and high quality instruction are important for all students' learning (Cornelius-White, 2007; Hamre & Pianta, 2005). Teacher supportiveness can alleviate

the demanding nature of learning and support students' engagement (Garcia-Reid, Peterson, &

Reid, 2015; Rimm-Kaufman, Baroody, Larsen, Curby, & Abry, 2015; Sakiz, Pape, & Hoy, 2012)

whereas high quality instruction promotes students' deep content learning (Cramer, Post, &

delMas, 2002; Taylor, Pearson, Peterson, & Rodriguez, 2003). Both of these classroom

dimensions are important in their own right and should be examined independently, to determine

whether or not teachers are attending to students' emotional and instructional needs. However,

the nexus of both teacher supportiveness and high quality instruction must also be

considered. Research and theory indicate that both dimensions are present in classrooms deemed

"high-quality" (Allen et al., 2013; Hamre & Pianta, 2005; Pianta & Hamre, 2009). Consequently,

both teacher supportiveness and high quality instructional practices likely interact with,

reinforce, and complement one another.

Examining teacher supportiveness and high-quality instruction, both separately and

together, must be considered with regard to classrooms with varying levels of English

proficiency. Research on classrooms with ELLs has primarily focused on either instruction (e.g.,

Khisty & Chval, 2002) or teacher supportiveness (e.g., Yoon, 2008). Few studies have

simultaneously considered both classroom dimensions with regard to Latino ELLs' outcomes

(e.g., Downer et al., 2012). However, no studies as of yet have described how effective teachers

of ELLs separately cultivate and possibly integrate supportiveness and high-quality instruction.

Such a description is critical, as the emotional and instructional needs of Latino ELLs are

amplified compared to their English-speaking peers. All students must learn content and may

experience emotional difficulties. Latino ELLs simultaneously learn content and develop their

English skills, while possibly experiencing emotional difficulties, such as increased internalizing

behaviors compared to English-speaking peers (Niehaus & Adelson, 2013). In the following

sections, I review the importance of supportive classrooms for Latino ELLs. I then discuss

instructional practices that are considered central during mathematics instruction for ELLs.

Supportive Classrooms and Upper Elementary ELLs

ELL students in general face a variety of possible stressors: lower levels of English

proficiency in English-speaking environments; the twofold task of learning English and content

simultaneously; the risk of stigmatization and xenophobia stemming from their ELL status; or

teachers who are underprepared to support them, and may not even want ELLs in their

classrooms (Lucas et al., 2008; Pappamihiel, 2001; Russakoff, 2011; Walker, Shafer, & Iiams,

2004; Zeichner, 2003). Teachers may hold deficit-oriented perspectives towards their ELL

students, which can inhibit their ability to facilitate supportive student-teacher interactions (Da

Silva Iddings & Katz, 2007; Orosco & Klinger, 2010; Yoon, 2008). For example, teachers may

view their ELL students as quiet, immature, frustrating to teach, or poor listeners.

The stress and anxiety of being an ELL student may intensify as students move from

lower to upper elementary school. Teacher supportiveness can decline during upper-elementary

school (Jerome, Hamre, & Pianta, 2009; McCormick & O'Connor, 2015). This decline happens

around the time that ELLs transition from being "dual language learners" into "English language

learners". In early childhood, all students are language learners; students who are learning

English in addition to their native language are considered "dual language learners" (e.g., Castro,

2014). By upper elementary school, students not yet proficient in English are considered

"English language learners", who often must adapt to English-speaking contexts.

The presence of a warm, sensitive, and supportive teacher may alleviate some of the

emotional problems and school-based challenges that upper elementary ELLs can face. Prior

work indicates that when fourth and fifth grade Latino ELLs perceive that their teachers have

cultivated highly caring classrooms, there is a stronger association between their grit and ELA achievement (Banse & Palacios, under review). Qualitative examination of upper elementary classrooms with varying levels of English proficiency and academic gains revealed that effective teachers with many ELLs used praise, built relationships, and articulated the relevance of learning when teaching ELA lessons. In comparison, less effective teachers with many ELLs and effective teachers with no ELLs primarily relied on general praise (Banse, Martin, & Palacios, under review). Praise can serve as an efficient method of affirming students' efforts and the accuracy of their work (Partin et al., 2009), whereas advancing relationships may relieve some of the stress of being an ELL student and help the teacher avoid enacting a deficit-oriented perspective towards ELLs (Yoon, 2008). Moreover, articulating the relevance of what students are learning may contribute to students' positive views of school and improve their level of engagement (Assor, Kaplan, & Roth, 2002), which may be particularly important for Latino ELLs, who can receive messages in school that they are only there to learn English and that high-quality instructional content is not for them (Kanno & Kangas, 2014).

These patterns of supportiveness emerged in our qualitative examination of classrooms with varying numbers of ELLs and academic gains during ELA instruction (Banse et al., under review). In the present study, I examine the degree to which they occur in similar types of upper elementary classrooms during mathematics instruction.

Mathematics Instruction and Upper Elementary ELLs

Although mathematics is often considered a universal language, this perception is inaccurate. Mathematics is in fact "a language on top of a language"; that is, mathematics has a language all its own, beyond whatever the language of instruction is (Gutiérrez, 2002, p. 1073). For example, in fourth and fifth grade students are asked to apply and extend their understanding

of quantity by working with concepts, skills, and procedures related to operations with fractions, a subject full of complex ideas and nuanced terminology (CCSSM, 2010). The current push for upper elementary mathematics instruction to be discourse driven provides yet another layer of linguistic complication for ELLs, as this expectation places greater emphasis on students' use of mathematical language and communication during instruction (Moschkovich, 1999). Moreover, upper elementary teachers do not always change their practices to accommodate the linguistic needs of their ELL students (Valle, Diaz, Waxman, & Padrón, 2013). Given the challenges that learning mathematics can present for fourth and fifth grade ELLs, they are in need of targeted instructional support from their teachers.

A variety of mathematics instructional practices are theorized to be important for upper elementary students' learning. For example, the CCSSM (2010) states that all students should persevere in problem-solving, attend to precision, and reason abstractly and quantitatively, amongst other requirements. However, the focus of the present study is on practices that specifically and theoretically support both ELLs' content understanding *and* English language proficiency. Namely, I consider the importance of the following practices, described in greater detail below: instructional language; visual representations, concrete representations, and gestures; and cognitively demanding mathematical tasks.

Instructional language. A key component of all content instruction in classrooms with ELLs is a teacher's use of instructional language. Moreover, current recommendations for mathematics instruction include regularly using whole or small group discussion formats, so that students can practice explaining and justifying their mathematical understanding (CCSSM, 2010). This recommendation may seem daunting for teachers of ELLs. However, various studies indicate that teachers can include ELLs in discussion through the practice of revoicing: repeating

and elaborating upon student responses (Moschkovich, 1999, 2007). Teachers who revoice encourage their ELL students to participate in class-wide or small-group discussions by asking them to explain their reasoning, and then use revoicing as a means of confirming, clarifying, and extending upon their response (McNeil, 2012). Theoretically, this practice both encourages ELL students' talk and teachers' modeling of mathematical explanations.

A second practice which emerges from the literature as important for ELLs' language and content understanding is explicitly defining and modeling mathematical vocabulary (Banse, Palacios, Merritt, & Rimm-Kaufman, 2016; Khisty & Chval, 2002; Merritt, Palacios, Banse, Leis, & Rimm-Kaufman, 2016). Explicitly defining and using mathematical vocabulary, possibly as part of language objectives for that day's lesson, may improve both ELLs' content understanding and academic English proficiency (Echevarria et al., 2006). This practice is a two-way process: both teachers and students are encouraged to consistently use and model mathematical vocabulary, so that students begin to regularly use mathematical vocabulary when explaining their reasoning (Khisty & Chval, 2002).

Visuals, concrete representations, and gestures. Supplementing instructional language with mathematical visuals, representations, and gestures can also be key within classrooms with varying levels of English proficiency. Teachers of all students are encouraged to use visual representations, concrete representations, and gestures—for example, manipulatives like base-10 blocks—as means of demonstrating mathematical concepts and encouraging students to enact their mathematical understanding (Bruner, 1964). Curricula that incorporate these tools enhance fourth and fifth graders' learning of mathematics (Cramer et al., 2002). Using concrete or visual representations also provides a means of further reinforcing and clarifying instructional content for ELL students (Echevarria et al., 2006). Gestures can similarly help both teachers and ELL

students describe mathematical ideas to one another (Shein, 2012). These tools are not "extra-linguistic"; that is, they are not separate from language. They are embedded within language and consequently are not a "crutch", but a legitimate method of communicating understanding (Moschkovich, 1999). Use of gestures and representations may therefore be a critical factor in how effective upper elementary mathematics teachers of ELLs differ from other teachers.

Challenging tasks. Challenging, open-ended tasks are activities that encourage students to actively test and use their mathematical understanding. A true mathematical task has a high level of cognitive demand, with multiple possible strategies for solving the task (Stein, Grover, & Henningsen, 1996; Stein, Smith, Engle, & Hughes, 2008). While teachers can scaffold challenging tasks for their students, the task must maintain a high level of cognitive demand in order to further students' mathematical understanding (Stein et al., 1996). Cognitively demanding tasks are key for all students, including ELLs. First, mathematical tasks require students to grapple with challenging ideas and push students' understanding of mathematical content. Teachers of ELLs sometimes prioritize ELLs' English learning over their content learning; providing ELLs with challenging mathematical tasks helps ensure that ELLs' mathematics content learning is supported and furthered (Kanno & Kangas, 2014). Second, challenging mathematical tasks open up opportunities for class-wide discourse and peer interaction, providing ELLs with opportunities to develop their English proficiency through discussion of their mathematical understanding (Echevarria et al., 2006; Gersten & Baker, 2000; Stein et al., 2008).

Present Study

There is evidence that mathematics instructional quality and supportive classroom environments are both critical for helping Latino ELLs contend with the unique instructional,

linguistic, and emotional challenges they face in classrooms (Banse et al., 2016; Banse & Palacios, under review; Gillanders, 2007; Khisty & Chval, 2002; Merritt et al., 2016; Moschkovich, 2007). However, there is limited work examining both the mathematics instructional quality and level of emotional supportiveness in upper elementary classrooms with ELLs. Given the specific needs of ELLs, understanding how upper elementary teachers cultivate both instructional and emotional quality is vital for ensuring that needs of ELL students are met.

To this end, I conducted a multiple, comparative case study approach, observing six classrooms, two within each of the following categories: (1) ELL, high-gains; (2) ELL, no-gains; and (3) no-ELL, high-gains. I addressed the following questions:

(1) How do teachers in classrooms with varying levels of English proficiency and academic gains show supportiveness and use high-quality mathematics instructional practices, respectively?

(2) How do teachers in classrooms with varying levels of English proficiency and academic gains *integrate* supportiveness and high-quality mathematics instructional practices?

I hypothesized that high-gains teachers in classrooms with ELLs will show supportiveness and implement mathematics practices in many of the ways described above. I also hypothesized that the ELL, high-gains teachers would integrate displays of instructional and emotional support in order to accommodate the needs of their ELL students.

Method

Case Selection

I conducted a multiple and comparative case study with purposeful case selection. My aim in selecting cases was to identify three types of classrooms: classrooms with ELLs that had made high-gains; classrooms with ELLs that had made low-gains; and classrooms with no ELLs

that made high-gains. The purpose of observing these three types of classrooms was to compare across classroom categories and identify the instructional and socio-emotional factors unique to teachers in high-gains classrooms with multiple ELLs.

Four criteria defined the case selection process. First, I narrowed the dataset to include only fourth and fifth grade classrooms (n = 584; Figure 2). I then further reduced the dataset to only include classrooms primarily comprised of Latino students (at least 60%; n = 73). This restriction allowed me to (1) maintain a within-group approach during analysis (Chase-Lansdale, Valdovinos D'Angelo, & Palacios, 2007; García Coll & Szalacha, 2004) and (2) capitalize on the varying levels of English language proficiency within classrooms.

Next, I narrowed the dataset to majority-Latino classrooms either with no ELLs (n = 5) and at least 25% ELLs (n = 48). I chose 25% ELLs as a criterion because this percentage equates to approximately 5 ELLs per classroom; while not the majority, 5 ELLs constitute a sizeable portion of the classroom with the potential to influence average classroom gains. From this subset of classrooms, I chose classrooms with varying levels of academic gains: both "high-gains" and "no-gains" (Table 1). Students in "high-gains" classrooms averaged at least .20 standard deviations worth of growth on the end of year mathematics test. I chose to use state standardized tests instead of other assessments provided in the MET dataset as state standardized tests are the focus of current educational policy and consequently can greatly influence instruction, both in terms of what content is taught and how content is taught (Au, 2007). "High-gains" were defined as such because this was the highest amount of growth shared by multiple teachers in majority-Latino classrooms. Students in "no-gains" classrooms averaged less than .05 standard deviations above the mean math test score for the full fourth and fifth grade MET sample. In high-gains classrooms with ELLs, both ELLs and non-ELLs made gains.

Two classrooms with 25% ELLs met "high-gains" criteria and so they were selected as cases (*ELL, high-gains classrooms*). In order to maintain an equal number of cases per classroom category, I then chose two classrooms with multiple ELLs and no-gains (*ELL, no-gains classrooms)* as well as two classrooms with no ELLs and high-gains (*No-ELL, high-gains classrooms)*. I use videotaped mathematics lessons from the Measures of Effective Teaching study ([MET]; Kane & Staiger, 2012). Each teacher observed had four mathematics lessons, ranging from 30 to 60 minutes in length.

Data Analysis

For data analysis, I used an iterative deductive and inductive approach to address the two research questions of interest. First, with the help of a research assistant I transcribed each lesson per teacher over a period of three viewings. We viewed each lesson multiple times, both to check the accuracy of our transcriptions and to capture non-verbal lesson elements, such teachers' use of gestures, teacher and students' movement around the classroom, or various representations the teacher used (for an example of a transcript and "field notes", please see Appendix A). All verbal language captured by the microphone was transcribed verbatim. Important non-verbal elements, such as teacher gestures, tone of voice, student work, or classroom configurations, were included as narrative notes.

Once we transcribed all lessons, I read each lesson multiple times (at least three reads per lesson). As I read, I captured my comprehensive impressions of the lesson using analytic memos (Saldaña, 2016). With each successive read, I edited my analytic memos to reflect my developing understanding of each teacher's instructional style and demonstrations of support. One purpose of these memos was to identify emergent codes that were consistent either across a teacher, a category of teachers, or all six teachers. During my second read-through of lesson

transcripts, I noted that multiple teachers had systems in place for checking students

understanding. Consequently, an additional emergent code was added to the overall coding

scheme: checking for understanding. Other deductive codes were included in the coding scheme,

including codes from a previous study of how teachers demonstrate supportiveness during ELA

instruction: relevance, relationship and praise (Banse et al., under review). Various mathematics

practices theorized to support ELLs' mathematics understanding and developing English

language proficiency were also included as deductive instructional codes. Table 1 contains

definitions and examples of all codes and Figure 3 provides a visual display of initial codes.

Once the codebook was finalized, I coded all lessons. I first coded all lessons using only

the supportiveness codes. The graduate research assistant, who has experience working with

upper elementary students, double-coded 100% of all transcripts using the same coding scheme

(Marshall & Rossman, 2010). I double-checked the reliability of our supportiveness coding by

comparing how frequently we assigned various codes within lessons and also examining the

degree to which we assigned the same code to a given instance within a lesson. We also met to

discuss our overall perceptions of how the various teachers demonstrated supportiveness to their

students. Both our coding and perceptions aligned in the first round of coding; for example, on

average all of our supportiveness codes overlapped by 86%.

The research assistant and I then conducted the same process for our instructional codes.

Overall, our instructional coding revealed similar within-teacher and across-teacher patterns

related to teachers' use of instructional practices such as tasks, visuals, gestures, representations,

revoicing, and vocabulary. For example, both of our coding results revealed that all ELL teachers

used gestures, visuals, and representations consistently and frequently across all four lessons; at

least four times as often as the no-ELL teachers did. Additionally, both of us coded teachers as

modeling and teaching vocabulary inconsistently across all four lessons; for example, we both

noted that teachers at least doubled their usual amount of vocabulary instruction when teaching a

geometry lesson. A key difference in our initial instructional coding was our interpretations of

when teachers elaborated student responses. We met to discuss our interpretations and refined

our coding criteria to resolve differences; specifically, elaborations had be *more* than the addition

of a single new word or phrase, such as extending a student's response of "two" into "two

inches". We then independently re-coded the data in light of our conversation. Ultimately, on

average all of our instructional codes overlapped by 85%. Table 2 contains all coding patterns

and frequencies.

Additionally, we calculated each teacher's average lesson length and for each teacher, we

divided the total number of counts for a given code by the average lesson length (e.g., 100 total

counts of vocabulary/30 minutes on average per lesson). The resulting numbers yield a sense of

how the time teachers on average devoted to math lessons relates to how often they used various

coded practices, and thus provides a more "standardized" code count. We chose to divide by the

average lesson length rather than the total length of lessons because a code per minute rate may

provide a false indicator of instructional quality. For example, Teacher A and Teacher B may

teach and model vocabulary at a rate of two vocabulary words per minute, but if Teacher A's

math lessons are twice as long than Teacher B's, than their students are experiencing different

kinds of mathematics instruction. We also provide average lesson length and a range of lesson

lengths per teacher (Table 2).

All analytic memos, coding patterns and frequencies, and lesson excerpts then served as a

basis for both case descriptions and case comparisons (Saldaña, 2016**).** Two case descriptions

were written per teacher: one for instruction and one for supportiveness. The research assistant

also wrote her own case descriptions, capturing both teachers' supportiveness and instruction, while blinded both to the number of ELLs and the level of gains within each classroom. We met again to discuss our interpretations of each teacher's overall instructional style and displays of supportiveness. Our case descriptions aligned; for example, we noted similar differences in the quality with which teachers used concrete representations.

To answer question one, I compared teachers' separate use of supportiveness and instructional practices across the three types of classrooms: (1) ELL, high-gains; (2) no-ELL, high-gains; and (3) ELL, no-gains (Yin, 2014). To answer question two, I examined how predominant types of teacher supportiveness occurred in conjunction with instructional practices. Specifically, I went back through the transcripts and noted patterns of supportiveness that occurred alongside specific instructional practices. I discuss my findings below.

Triangulation

Finally, I triangulated my qualitative case descriptions and comparisons using various quantitative indicators of classroom quality. I used both the Classroom Assessment Scoring System (CLASS) and the Student Perceptions Survey ([SPS] Pianta, La Paro & Hamre, 2008; Ferguson, 2008). The CLASS is an observational measure with two domains that correspond to the questions posed in the present study: Instructional Support and Emotional Support. Instructional Support is comprised of various dimensions, including how well content is delivered, the quality of feedback students receive, the analytic depth of instructional activities, and the quality of instructional dialogue. Emotional Support also measures a variety of dimensions, including whether the classroom climate is positive or negative, teacher sensitivity, and teacher regard for student perspectives. Independent MET observers who had been certified on the CLASS protocol viewed two fifteen-minute segments per mathematics lesson. Teachers

received dimension-level scores ranging from 1-7 for each segment. MET observers then averaged segment scores to create a lesson score. Each teacher's mathematics instruction was videotaped and scored using the CLASS protocol four times per year. To create a single teacher score, MET observers averaged the four lesson observation scores. It is important to note that the same videotaped lessons used in the present qualitative analysis were also used by CLASS observers to score lessons. The SPS is a student report measure through which students assess various aspects of their teachers' instructional style. At a single point in the school year, students reported on various teacher characteristics, including degree to which teachers show warmth and support to their students (*Care*). Teachers' SPS scores were created by averaging student ratings for each teacher.

In the present study, I used teachers' SPS Care and CLASS scores as points of triangulation. I compared how well qualitative case descriptions of teachers' supportiveness and mathematics instruction aligned with these three quantitative scores of classroom quality. I refer to teachers in the ELL, high-gains category as Teachers A and B. No-ELL, high-gains teachers are Teachers C and D. ELL, no-gains teachers are teachers E and F. I chose to label teachers rather than assign pseudonyms because I use secondary data and consequently have not formed relationships with teachers that would allow me to select appropriate pseudonyms. I denote that a student is speaking by using the letter "S".

Findings

I first describe how teachers employed various instructional practices, followed by their demonstrations of supportiveness. Some of these characteristics, such as teachers' use of vocabulary, were similar across classroom categories. Other characteristics, such as teachers' use of gestures and representations, varied across the three types of classrooms. Coding patterns and

frequencies can be found in Table 2. Information on classroom characteristics such as the average length of lessons, range of lesson lengths, number of ELLs, and the nature of classroom gains can also be found in Table 2. Quantitative scores of classroom quality can be found in Table 3. Figure 4 provides a visual summary of practices observed in the present study.

Mathematical Tasks

None of the six teachers asked students to grapple with true mathematical tasks, in which students could use multiple strategies to reach a solution. As will be discussed, one teacher provided students with potential tasks but reduced their cognitive demand. Others provided procedural worksheets, hands-on practice with skills like measuring, or classifying activities (e.g., comparing and contrasting shapes). For example, one teacher taught her students how to plot coordinates and noted that coordinates are useful for reading maps. However, instead of then using or creating maps, students were given a worksheet with instructions to plot the coordinates of different shapes. Noting the lack of tasks is key for understanding the depth of instruction across the observed lessons. Although teachers demonstrated other instructional strengths discussed below, to varying degrees all teachers delivered procedural instruction. Teachers' CLASS scores support this interpretation. In particular, their "Analysis and Reasoning" scores ranged from 3 to 3.75; although these scores were slightly higher than the full upper elementary MET teacher sample, these scores are still low relative to the maximum possible score of 7. "Analysis and Reasoning" is a dimension of Instructional Support, measuring the degree to which students are asked to problem-solve using conceptual understanding (Pianta et al., 2008). These relatively low scores indicate that across classrooms, students were not provided with opportunities to grapple with demanding problems.

Vocabulary

Coding patterns revealed that teachers' direct instruction and modeling of mathematical vocabulary was inconsistent across lessons and tied to content. For example, both a ELL, high-gains teacher and a ELL, no-gains teacher taught or modeled some vocabulary in three out of four lessons (each of them taught or modeled vocabulary 0 to 4 times per lesson; Table 2). However, in their lessons on geometry both of them at least doubled their use of vocabulary; for example, a ELL, high-gains teacher provided a definition for the term polygon as "shapes that don't have curves, they must have straight lines". Geometry has several foundational vocabulary words; in order to classify quadrilaterals a student must know the term quadrilateral. The inconsistency of vocabulary use across lessons for all teachers indicates that vocabulary instruction and modeling did not differentiate their instructional styles. This finding is consistent with the literature; for example, Ernest-Slavit and Mason (2011) found that only 10% of teacher language across five upper elementary teachers could be considered "academic language", including content-specific vocabulary. The observed pattern of vocabulary use in the present study suggests that teachers used mathematical vocabulary when it was essential for content.

Gestures, Visuals, and Concrete Representations

Many of the observed teachers used gestures, visual representations, and concrete representations. However, the quality and purpose behind how these tools were used varied across the three types of classrooms.

ELL, high-gains teachers. Both ELL, high-gains teachers regularly used gestures, visual representations, and concrete representations to underscore their instruction (Table 2). In other words, they frequently supplemented their spoken or written language with pictures, manipulatives, tools, and gestures, to clarify and deepen a mathematical idea. For example, Teacher A was working through a problem (53x7) with her class using partial-products:

Excerpt 1

1.   Teacher A: What's the second part we're doing with our partial products algorithm, S?

2.   S: 7x5

3.   Teacher A: Ok, now, is it 7x5?

4.   S: Times 50.

5.   Teacher A: Times *50 (said with emphasis)*. That part is really, really important. So remember this—we're not doing 7 groups of 5, because if we did that, we'd just have 35, wouldn't we? We're doing 7 groups of 50. (*Teacher A holds up five "longs", or base-10 blocks representing one tenth)*. So if I have my tens cubes, these longs, and I have five of them, so I have five of those (*the teacher places groups of five longs on the projector as she counts out seven groups of five longs)*, that's one group, if I get five more that's another group, five more, another group *(she counts out 7 groups of five longs on the projector)*.

In excerpt 1, Teacher A could have briefly emphasized that "7x5" is really "7x50" and then finished solving the problem. Instead, she used base-10 blocks to physically remind students of what the "5" in the tens place represents and what the two factors within the "second part" of the partial-products algorithm should be. Her use of base-10 blocks has two implications. First, using manipulatives allowed her class to visualize the concept that underlies the partial-products algorithm: 53 can be decomposed into 50+3 and the multiplication problem can be solved as (50x7)+(3x7). Additionally, the base-10 blocks served as a reminder to be precise about place value when using partial-products; otherwise, students would arrive at the wrong answer. Using visuals to deepen students' understanding of procedures is useful for all students' learning. This

practice may have an added benefit for ELLs: using visual representations to reinforce mathematical ideas can also reduce the language demands of a lesson (Echevarria et al., 2006).

No-ELL, high-gains teachers. Both Teachers C and D also exhibited a procedural teaching style, in which mathematical concepts were distilled into distinct steps that students should follow for a given problem context or key word. However, neither teacher enhanced their instruction through consistent or accurate use of gestures, visuals, or concrete representations. Teacher C never used visual or concrete representations and occasionally used gestures such as pointing to keywords (7 gestures coded across all four lessons). Teacher D used concrete or visual representations with greater frequency, but was often inaccurate in her use of these tools. For instance, in one lesson on comparing decimals, she asking a student to identify the hundredths place value in a chart, using base-10 blocks. She said the following to the class:

Excerpt 3

1.   Teacher D: What spot is it in? *(She does not wait for students to respond.)* Zero point zero one, it would be one. Right? Because when we put in, let's say zero point one in our chart, it would be in our tenths column but it is worth what? Oneths. Ok, so this is on oneths or one cube (*holding up a hundredths cube)*, so I'm going to write here, I mean not one oneths. One cube, which equals zero point one. Does everybody understand?

In excerpt 3, Teacher D used the phrases "zero point zero one", "zero point ", "oneths", and "one cube" but did not use the correct place value name, "one hundredth". Her explanation reveals that she is unsure of how to explain the concept of place value. As a result, her use of base-10 blocks—calling the hundredths cube "oneths"— further confused her explanation of different place values, instead of ensuring precision and accuracy. Teachers' ability to use manipulatives

to scaffold students' learning is tied to teachers' understanding of content; without thorough understanding, manipulatives likely will not clarify students' learning. Her use of gestures and representations thus directly contrasted with how Teachers A and B used these tools.

ELL, no-gains teachers. Like the ELL, high-gains teachers, both Teachers E and F frequently relied upon visuals, representations, gestures, and tools to supplement and reinforce students' understanding. The quality and purpose behind their use of representations differed from the ELL, high-gains teachers and even from one another. Teacher E often used tools such as visual representations to introduce a lesson, but also discounted representations as unimportant or confusing. In a lesson on comparing mixed numbers, she began by drawing a number line, identifying where on the number line various mixed numbers would fall. However, after going through this exercise, she said to her students:

Excerpt 4

1.   Teacher E: "All right, there's an easier way to figure this out. Besides drawing a number line for everything. Can you draw a number line? Yes. You can count up, make it look like a ruler because rulers have those little ticks. That's fine. *(She lowers her voice and whispers the next words).* But if you can remember this trick it's a lot easier."

She then proceeded to teach her students the algorithm for turning a mixed number into an improper fraction. As she taught the algorithm, she told students that that this method was "just a pattern or a trick you're going to have to learn, there's really no way other than to memorize it." Teacher E conveyed to her students that visual representations are confusing and procedures are illogical yet preferable because they are simpler to understand. Distilling mathematical concepts into straightforward steps may seem like a comprehensible method of teaching mathematics.

However, by downplaying the usefulness of representations, Teacher E limited the problem-solving strategies her students could have at their disposal. This decision might have particularly impacted her ELL students, who sometimes rely on visual representations to scaffold their understanding of mathematical ideas and language.

Teacher E's use of visuals and representations was dissimilar to Teacher F's use. Teacher F oriented her lessons around the use of visuals and manipulatives; in fact, in all four lessons her students used manipulatives to develop mathematical understanding. This description may seem like an indicator of conceptual teaching; however, Teacher E regularly reduced the cognitive demand of the task. For example, in one lesson she gave her students 20 tiles and asked them to find different combinations of factors that produce 20, an activity which could constitute a mathematical task. She then directed her students "first, let's use 20 and 1", limiting students' ability to consider different combinations. Using manipulatives may have helped students visualize the underlying concept. However, the teacher-directed nature of this activity reduced students' independent thinking and consequently, the cognitive demand of the task.

Additionally, Teacher F did not connect students' use of manipulatives back to procedures. In a separate lesson, students were using base-10 blocks to solve multiplication problems using partial-products. Teacher F checked in with a student to see if he understood:

Excerpt 5

1.   Teacher F: "So, this is the product of what?" (*The teacher is standing next to the student's desk. The student has four rods and 24 cubes in a rectangle forming an array for 4x16).*

2.   S: 4x16?

3.   Teacher F: Awesome job, you got it! I thought I was going to stump you with that question. Now, the only thing I don't see, I see where you labeled the break-apart 4x10 and 4x6, which is ok but sometimes we like to make rectangles, like here- 4,10,6 *(Teacher point to the sides of the array that represent 4,10, and 6)*. Like we did yesterday so you know where the problems come from. You know where the 4x10 came from, you know where the 4x6 came from.

In excerpt 5, Teacher F ensured that the student had not lost sight of the broader multiplication problem: 4x16. She asked him to label the "where the problems came from"—the 4,10, and 6— so that he kept track of the problems within the broader problem. However, she did not explain— or ask the student to explain—*why* labeling the individual sides of the rectangle are important, as opposed to labeling the "break-apart". More broadly, at no point in the excerpt or lesson did she ask the student or class to transfer their understanding of partial products by solving similar multiplication problems *without* arrays, to be certain that they truly did know "where the 4x10 came from". These two oversights are key: a student's ability to model a problem under teacher guidance using manipulatives does not translate to independently solving without concrete tools. With regard to ELLs, if manipulative use is not purposefully connected back to mathematical procedures, then these tools may be less likely to scaffold ELLs' language and content understanding. Teacher E often did not connect representations back to key procedures or mathematical ideas; in fact, 37% of her gestures or representations included a clear connection. In comparison, 85% and 93% of Teacher A and B's use of gestures and representations, respectively, connected clearly back to procedures.

Repetition and Elaboration

Coding patterns and case descriptions revealed that teacher repetition of student responses was a fairly regular occurrence across all six classrooms. However, teachers varied more with regard to how often they elaborated upon student responses.

ELL, high-gains teachers. Beyond their use of visuals, gestures, and concrete representations, both ELL, high-gains teachers regularly repeated and elaborated upon their students' answers (Table 2). Repeating and elaborating student responses serves a few purposes: first, they indicate that teachers were asking students to respond to questions with some frequency. Additionally, teacher elaboration of student responses indicates that teachers were building upon students' responses, providing the class with opportunities to hear mathematical ideas refined, extended, and reinforced. For instance, in a lesson on finding the perimeter of rectangles and squares, Teacher A has the following interchange with a student:

Excerpt 6

1.   Teacher A: So from here to here, what can we say about those lines? (*the class is looking at a rectangle)*

2.   S: They are not parallel? (*questioning tone)*

3.   Teacher A: They are not parallel?

4.   S: They are parallel.

5.   Teacher A: They *are* parallel. So the blue line going this way (*pointing to the lines on a rectangle displayed on the Smartboard as she speaks)* is also parallel to the line going across the same way. Because they're going on forever in their own direction. And this is important, it doesn't matter if I measure here or here or here (*pointing at various places on a pair of parallel lines)* they are not going to cross.

In excerpt 3, Teacher A both repeated the student's response "they are parallel" and then used the student's response as a launching point into a key mathematical idea about parallel lines: "they are not going to cross". She used both language and gestures to affirm and extend one student's contribution, in order to reinforce the understanding of the whole class. Teacher B engaged in similar interchanges with her students. Consistent teacher elaboration provides ELLs with opportunities to hear ideas fully articulated, which may support both their content understanding as well as their own ability to explain their understanding (McNeil, 2012).

No-ELL, high-gains teachers. Both teachers repeated student responses regularly; in fact, Teacher C had a very high number of repetitions, indicating that she was regularly inviting students to respond to questions (109 repetitions). However, both teachers had the lowest number of elaborations as compared to the other four teachers (6 and 7 elaborations for Teachers C and D, respectively).

ELL, no-gains teachers. Notably, both no-gains, ELL teachers repeated and elaborated with some frequency on students' responses, although Teacher F used elaboration more often than Teacher E (15 and 31 elaborations for Teachers E and F, respectively). The fairly regular use of elaboration across all four ELL teachers indicates that this practice may be a common feature of classrooms with varying levels of English proficiency.

Checking Understanding

One consistent instructional practice emerged from reading transcripts and watching videotaped lessons: checking for understanding. This practice was used to varying degrees across ELL, high-gains; no-ELL, high-gains; and ELL, no-gains teachers.

ELL, high-gains teachers. An important component of both ELL, high-gains classrooms were the implementation of classroom systems in place to check students' understanding. A key

characteristic of these systems was that they ensured that teachers were regularly assessing the needs of *all* students. For instance, Teacher A provided all of her students with whiteboards. During whole-group instruction, her students continuously worked alongside her when learning new content and held their work up on their whiteboards for her to check. She also dedicated a portion of each lesson to circulating amongst her students' desks as they independently practiced new content and checked in with each of them at their tables. She provided her students with "Active Expressions", a technology that allows students to respond to multiple-choice questions. She used this technology to conduct formative assessments.

Teacher B had similar systems in place. She had rotating small groups that she would call to work with her during the independent practice portion of her lessons. She sometimes invited students over to work with her on an ad hoc basis if they were having difficulty understanding new content. Like Teacher A, once her small groups concluded or if students were working in centers, she circulated amongst students to ask questions that probed their understanding. For example, in a lesson on measurement, she had students work at various centers measuring length, volume, and mass. Teacher B stopped at the liquid volume center and asked a small group of students to describe how full a cup was ("1/2"). She also asked them to estimate in milliliters how full the cup was ("62.5 milliliters") and explain how they arrived at that answer ("You have to divide it by two since it's only half full"). She conducted similar interchanges with all other centers, which allowed her to formatively assess her students' level of understanding. She also used direct instruction methods when checking understanding; for example, when working with a group on place value Teacher B asked students to echo her as she named various place values.

Overall, checking all students' understanding was a defining characteristic of both ELL, high-gains teachers' instruction. This practice might be useful in classrooms with varying levels

of English proficiency and therefore nuanced instructional needs, as it allows teachers to engage in individualized interactions and target students' specific instructional needs.

No-ELL, high-gains teachers. Both no-ELL, high-gains teachers tended to use whole-group instruction, with few opportunities to thoroughly ensure all students understood the material. Both teachers would sometimes circulate amongst their students, but their check-ins were perfunctory. Teacher C would encourage students to independently practice problems, but did not check in with them individually during that practice, instead offering guidance to the class as a whole. For example, during the lesson on least common multiples, she asked students to solve a fraction addition problem. As they solved she commented: "How are we doing? I see a list, very nice. Good. How are we doing over here? Good. Catching on? S, that's too squished." A few minutes later, students were asked to volunteer to come to the board and solve problems. This system did not ensure *all* students' understanding is checked, as was the case with Teachers A and B. Teacher D's check-in style mimicked that of Teacher C: she would occasionally circulate but did not engage in thorough interactions with students.

ELL, no-gains teachers. Teacher E favored whole group instruction and did not have an apparent system in place for checking all students' understanding. In fact, her instruction primarily consisted of going over homework problems or providing the class with worked examples; she was never observed giving students time for independent practice. She sometimes asked students to give her a "thumbs down" if they did not understand the material, but never asked students what confused them. Conversely, Teacher F regularly circulated as her students worked with manipulatives either independently or in table groups. As a result, she was able to check the understanding of all her students and provide them with individualized support and feedback. For example, she typically approached each table group as she circulated asking:

"What are we doing over here?". She would then probe students' answers; for example, when a student responded that he was making an array using 5 rows and 13 columns, she responded: "Can you tell me why you chose five rows?". These interactions may have helped Teacher F accommodate students' various instructional needs, such as their level of English proficiency.

Relationship

Teachers' efforts to build relationships with their students were coded when the teacher attempted to connect with her students, either beyond or through content. As will be discussed, few teachers made these efforts.

ELL, high-gains teachers. Teacher A made some efforts to advance the relationships between herself and her students (16 instances coded; Table 2). For instance, she enthusiastically greeted a student who had been absent the previous day at the start of one of her lessons, noting the student's excitement to be back and mentioning that the student had been missed. However, attempting to build relationships between students and teachers was not a shared feature of Teacher A and Teacher B's instruction. In fact, Teacher B sometimes seemed tense or frustrated with her students. For example, in a lesson on measurement that involved pouring water into containers, Teacher B raised her voice at students she felt were being messy, a behavior that could have potentially hurt her relationships with students. I consider these behaviors in greater detail in the discussion section.

No-ELL, high-gains teachers. Both teachers made few efforts to connect with their students through interactions such as humor, encouragement, or asking about students' personal lives. Both Teacher C and Teacher D's classrooms could be described as emotionally neutral, neither harsh nor overtly supportive. Teacher C occasionally made ominous references to the end of year test. For example, in one lesson a student was solving a problem with the numeral 2 in

multiple place values. Teacher C commented: "Do you know why they do this? To confuse you. All those 2's." She suggested that test developers intentionally crafted problems that lead to students' mistakes, which might diminish other positive aspects of her classroom environment.

ELL, no-gains teachers. Like Teachers C and D, Teacher E made little effort to form relationships with her students. Teacher F, however, made some efforts to advance relationships with students (11 efforts coded). For example, during one lesson Teacher F sent a student up to the board to solve a problem. When the student took extra time to carefully organize and include every step of her problem-solving process, Teacher F remarks: "Oh, I picked the detail girl to come up and solve the problem. She's careful with her details." Teacher F thus displayed an awareness of her student's intrapersonal strength, indicating that she was attempting to know her students well and form relationships with them.

Relevance

None of the six teachers regularly made an explicit connection between the content students were learning and *why* that content was important. Interestingly, most teachers covered a lesson on decimals and each of those teachers referenced how knowing how to add and subtract decimals is useful for handling money. Otherwise, no connections were made. The lack of relevance is also considered in greater detail in the discussion section.

Praise

All six teachers, to varying degrees, predominantly used praise to convey warmth to their students. Their praise was usually general and did not highlight what students did well (Table 2). For example, in the following excerpt Teacher A praised students for modeling .7 correctly on their whiteboards:

Excerpt 4

1.　　　　　　T: Model 7/10. Hide, show. (*Students hold up their answers on their personal*

whiteboards that they have in their laps). You should have 7 lines there, good job.

 Praise was the predominant type of support shown across all four lessons for all six teachers.

However, the *context* in which the ELL, high-gains teachers offered praise differed in

comparison to many of the remaining teachers. Specifically, these teachers often praised their

students while checking their understanding. Additionally, isolated instances of warmth emerged

as teachers flexibly provided their students with emotional support.

Checking Understanding: Integrating Emotional and Instructional Support

The second aim of the present study was to examine how teachers integrated emotional

and instructional support across these three types of classrooms. Teachers who checked students'

understanding also integrated displays of emotional support during these interactions. Overall,

these teachers both offered praise and flexibly provided students with specific emotional

supports, so that students' instructional needs could be met as the teacher checked understanding.

ELL, high-gains teachers. The ELL, high-gains teachers regularly used praise in the

context of checking for students understanding: approximately 38% of Teacher B's praise

occurred while checking students' understanding whereas 45% of Teacher A's praise occurred in

the same context. Moreover, other isolated instances of teacher warmth and supportiveness

emerged when teachers checked students' understanding. These isolated instances of warmth did

not occur across lessons and consequently were not added to the codebook as an emergent code.

Rather, these instances occurred within individual lessons as the teachers checked students'

understanding and flexibly provided students with the emotional support while doing so. For

instance, during a lesson on adding fractions, Teacher A used her "check for understanding"

period to interact one-one-one with a student who had trouble paying attention during the whole-

group portion of the lesson. Specifically, Teacher A had redirected the student multiple times to

pay attention during the whole-group portion of the lesson, asking him to listen as she went over

several worked examples. During the check for understanding, she immediately visited his table.

In the following excerpt, she checked the student's understanding by asking the student to walk

her through the steps of finding common denominators. At the start of the interchange, the

student had provided an incorrect answer and was unsure of how to proceed:

Excerpt 5

1.   Teacher A: Ok, I'm going to ask you to look again. Whatever you do to the

        denominator, you do to the numerator. Look down here. I multiplied 3x10 to

        make 30, so now we're going to do? (*Her tone is firm but still calm and even as*

        she asks him to look again. She does not sound irritable. She is pointing to the

        problem on the student's paper).

2.   S: *(long pause)* 3x7

3.   Teacher A: 3x7. Exactly! And we are going to get?

4.   S: 21.

5.   Teacher A: 21, thank you! All right now, got it?

In excerpt 5, Teacher A exhibited both firmness and patience as she asked a recalcitrant student

to demonstrate his understanding of the lesson. Instead of becoming frustrated, the teacher

walked the student through the first part of the problem again and asked him to provide the next

step. Thus, Teacher A provided her student with the specific emotional support he needed to

benefit from the lesson as she individually checked his understanding.

Teacher B similarly showed supportiveness while checking her students' understanding.

In a lesson on length, she realized that her students were having trouble measuring inches and

centimeters to the nearest fraction, such as one half or one quarter. After practicing this skill as a class, students were supposed to pair up and measure various objects in the classroom with a ruler. However, since some were having trouble, she asked those who felt confused to stay on the rug with her and continue practicing with her guidance. She asked her students: "Who's staying on the rug? Who's staying here? Ok, good! Be honest with yourself. If you didn't get this right then you need help, right?" Students may be embarrassed to stay behind and ask a teacher for help. Teacher B tried to normalize the process of seeking help ("if you didn't get this then you need help, right?") and praised those who stayed with her. She thus provided an emotionally supportive context in which instructional help could be targeted to students who needed it. As will be discussed below, this practice may be particularly encouraging for her ELL students.

No-ELL, high-gains teachers. As observed, neither no-ELL, high-gains teacher regularly or deeply checked for students' understanding. The lack of mechanisms for doing so meant that Teachers C and D did *not* create contexts in which they flexibly demonstrated emotional support while responding to students' instructional needs.

ELL, no-gains teachers. Teacher E also did not check students' understanding and therefore like Teachers C and D did not clearly integrate instructional and emotional support. However, like both ELL, high-gains teachers, Teacher F's regular use of checking on understanding both provided a context for praise (40% of her praise occurred while checking students' understanding) as well as an opportunity to flexibly respond to students' emotional needs while providing instructional support. For example, as one student struggled to explain her reasoning as she was working through a problem, Teacher F said mildly: "I'd like you to put your pencil down. You're like me, we're better doing one thing at a time." She provided gentle, specific guidance to a student on how to focus so that the student could describe a mathematical

idea. The nexus of supportiveness and instruction present in the ELL, high-gains teachers'
classrooms was therefore also present in one ELL, no-gains teacher's classroom.

Triangulation With Quantitative Measures

Table 3 provides quantitative scores of classroom quality. Within the fourth and fifth-
grade teacher sample (n = 434), average ratings across teachers were 4.48 (SD = .39) on
Emotional Support and 3.63 (SD = .45) on Instructional Support. In the present study, Emotional
Support scores for the six observed teachers ranged from 4.28 to 5.41 or from below average to
high. With regard to Instructional Support, teachers in the present study ranged from 3.84 to
4.31, indicating that CLASS observers viewed all six teachers as better than average
mathematics teachers. It is interesting to note that a ELL, no-gains teacher (Teacher F) received
the highest Instructional Support Score. SPS Care scores are presented as z-scores and can be
read as standard deviations. Students mostly viewed their teachers as highly warm and caring.
Four of the six teachers, including both ELL, high-gains teachers, received Care scores
approximately one standard deviation above the mean. The remaining two teachers received
average Care scores from their students. I consider these findings below.

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Discussion

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I examined how ELL, high-gains teachers showed support and employed various
instructional practices while teaching mathematics in comparison to (1) no-ELL, high-gains
teachers and (2) ELL, no-gains teachers. I found that ELL, high-gains teachers used gestures and
representations consistently and accurately; offered praise; elaborated student responses; checked
all students' understanding; and within those checks, praised students and responded flexibly to
students' emotional needs. A ELL, no-gains teacher also employed some of these practices.

The purpose of this multiple and comparative case study was twofold: first, to examine separately the degree to which teachers cultivated emotionally supportive and instructionally sound classrooms. Second, I examined how, if at all, teachers integrated emotional and instructional elements of their classroom environment, to create globally supportive classrooms during mathematics instruction. Overall, many of the practices that differentiated ELL, high-gains classrooms from the other classrooms were instructional in nature. However, there was evidence that both ELL, high-gains teachers and one ELL, low-gains teacher regularly checked all students' understanding, and while doing so integrated both emotional and instructional support. I discuss why these practices are important, particularly for ELLs.

Gestures, Visuals, and Representations

Using gestures, visuals, and concrete representations well can serve a twofold purpose in classrooms with many ELLs. First, using representations such as manipulatives can support the development of all fourth and fifth grade students' mathematics understanding (Cramer et al., 2002). The ELL, high-gains teachers were observed emphasizing mathematical procedures over concepts; however, they would clarify and add precision to students' understanding of those procedures by using gestures or representations such as base-10 blocks. Procedural and conceptual mathematical understanding develop iteratively and consequently, students require a balance of procedural and conceptual emphasis (Rittle-Johnson, Siegler, & Alibali, 2001). While the instruction observed in both ELL, high-gains teachers' classrooms favored procedural instruction, it may be that use of gestures and representations strengthened and deepened students' overall understanding. With regard to ELLs, the teachers' consistent, accurate, and purposeful use of gestures and representations may have reduced the language demands of

mathematics instruction while supporting ELLs' content understanding (Echevarria et al., 2006; Shein, 2012).

It is important to note that Teacher F, a ELL, no-gains teacher, was highly similar to both ELL, high-gains teachers in many respects. She used praise, elaborated, checked all students' understanding, and provided both emotional and instructional support while doing so. Teacher F also used gestures and representations and provided her students with opportunities to work with manipulatives. The key difference between the ELL, high-gains teachers and Teacher F was that Teacher F both proceduralized students' use of manipulatives and did not connect concepts represented by manipulatives back to procedures. Manipulatives are useful tools for learning but they are not a "silver bullet". If teachers do not carefully articulate how manipulative use is related to the lesson objective, then students may fail to grasp both the purpose of the manipulatives and the lesson. (Puchner, Taylor, O'Donnell, & Fick, 2008). Moreover, manipulatives are tools for learning but not the end goal of the lesson; eventually, students should bridge from using enactive tools to mathematical symbols (Bruner, 1964).

Explicitly connecting the use of manipulatives back to procedures may be critical for ELLs. Manipulatives can serve a twofold purpose in helping ELLs comprehend language and learn mathematics. However, if the reason behind using manipulatives is unclear, then these tools may lose their value as scaffolds for ELLs. Future research may consider when and how teachers' use of tools such as manipulatives helps or hinders ELLs' mathematics learning.

Elaboration

Teachers' use of elaboration differed across classrooms, more so than teachers' use of repetition. Both ELL, high-gains teachers (Teachers A and B) and to some degree, both ELL, low-gains teachers (Teachers E and F) regularly elaborated upon student responses. Teachers

who elaborate student responses both extend students' ideas and model mathematical thinking, a practice that may be important for helping ELLs learn how to articulate their mathematical understanding. This finding is consistent with other studies which have noted that elaboration is often used by teachers of ELLs (Banse et al., 2016; McNeil, 2012; Merritt et al., 2016). Exposing ELL students to oral language through practices such as elaboration is recommended in preschool contexts (Castro, Páez, Dickinson, & Frede, 2011). Future research should examine whether this practice is also linked to ELLs' language and content outcomes in upper elementary school. In particular, given that this practice was shared across ELL classrooms, both with high-gains and no-gains, research should consider how elaboration could either elucidate or obfuscate the teacher's meaning (e.g., Ernest-Slavit & Mason, 2011). The ELL, high-gains teachers may be better "elaborators" than their colleagues and provide elaborations that clarify and further ELLs' understanding of both content and English. Conversely, ELL, low-gains teachers may use language that is less accessible for ELLs.

Relevance, Relationship, and Praise

All teachers, to varying degrees, used praise to indicate to students that their efforts were appreciated or their answers were correct. Praise can be a useful tool for helping students know that they are successfully learning new material, particularly if the praise is specific (Partin et al., 2009). Teachers mostly offered general praise, rarely acknowledging the specific process through which students arrived at a correct answer. Specific praise or feedback can help students appreciate the importance of effort over natural ability (Dweck, 2007) and is therefore recommended to teachers over general praise. However, general praise may also create a "feel-good" moment for students, which may not directly benefit their content learning, but may strengthen their relationships with their teachers.

All six teachers rarely articulated the relevance of students' learning mathematics and only two teachers made clear efforts to advance relationships with students. The lack of relevance and relationship is worth noting, particularly since these two forms of supportiveness were present in ELL, high-gains classrooms during ELA instruction (Banse et al., under review). There are a few possible reasons for these findings. First, mathematical standards have long advocated for teachers to connect mathematics instruction back to everyday life and explain why learning mathematics is important (National Council for Teachers of Mathematics, 2000; CCSSM, 2010). However, teachers may find it challenging to forge those connections in their own lives; indeed, even mathematics education researchers have noted how difficult it is to teach mathematics in a way that helps students perceive its relevance (Civil, 2002). It is interesting that almost all teachers were able to connect adding and subtracting decimals to handling money; beyond that everyday transaction, no other connections were made. Failing to make these connections, however, may lead students to believe that mathematics is an abstract and or irrelevant content area. The lack of relevance signals a need for upper elementary curricula or projects that help students perceive the usefulness of mathematics. Moreover, perhaps students must deeply learn new concepts before they can then apply those concepts in everyday situations. For example, a teacher can introduce the concept of area by talking about building a new school playground, which might elicit student interest in the subject. However, students must fully understand what area is and how to calculate area before students can use these new ideas to create a playground blueprint.

Additionally, most teachers did not regularly engage in "relational moments" with their students; in fact, one ELL, high-gains teacher, Teacher B, sometimes appeared tense with her students. Teaching mathematics is a demanding and multilayered endeavor, which, amongst

other requirements, necessitates that teachers respond to students' thinking in the moment, anticipate misconceptions, and accurately analyze errors (Ball, Hill, & Bass, 2005; Hill, Ball, & Schilling, 2008). This challenge may be amplified when teachers are accommodating varying levels of English proficiency during mathematics instruction. Teachers may focus their cognitive energy on using various instructional practices well and consequently neglect to connect or even appear tense with students during instruction. However, other practices, such as checking understanding, may convey supportiveness to students and partially ameliorate the negative effects of teacher frustration.

Checking for Understanding: Instructional and Emotional Supportiveness

The ELL, high-gains teachers also had clear systems in place for checking *all* students' mathematical understanding. Mechanisms for checking understanding included systems such as personal whiteboards for students or rotating small groups, as well as a consistent willingness to walk around and check in with all students. In contrast, the no-ELL, high-gains teachers and one ELL, no-gains teacher (Teacher E) did not check in with students. ELLs sometimes report feeling isolated or ignored during classroom instruction (Yoon, 2008); teachers who make a point to check in with all students may not only correct misconceptions, but also help students feel that they are seen and included during mathematics instruction. The consistent practice of checking for students' understanding, in and of itself, may therefore serve a twofold purpose in ELL classrooms: supporting ELLs both instructionally and emotionally. Other research has noted that ELL, high-gains teachers check all students' understanding (Merritt et al., 2016).

Additionally, both ELL, high-gains teachers and one ELL, no-gains teacher (Teacher F) embedded various types of warmth within their checking-for-understanding interactions with students. All three teachers regularly praised students while checking understanding. Outside of

praise, teachers' displays of warmth were linked to students' in-the-moment instructional needs, such as showing patience or encouraging help-seeking. These teachers' willingness to check for understanding—and the types of support they embedded within those checks—revealed an integration of emotional and instructional support that was not present across the remaining teachers. Probing a student's understanding of material may be a vulnerable interaction for a student, particularly if the student is learning to speak English. Including an expression of supportiveness may reduce students' feelings of vulnerability and help students focus on understanding challenging content. This finding provides one example of how teachers can integrate emotional and instructional support within ELL classrooms.

Lesson Length and Code Frequencies

In general, accounting for average lesson length revealed some new information about coding patterns and frequencies. For example, code counts alone indicate that Teacher A repeated student responses with the greatest frequency; however, after dividing by average lesson length, it appears that Teacher C, a no-ELL, high-gains teacher, also devoted considerable time to repeating student responses. However, most coding patterns and frequencies patterns held. For instance, even after accounting for average lesson length, teachers of ELLs used gestures, visuals, and representations with the greatest frequency, even though these teachers' average lesson times varied. There are a few key takeaways from these findings: first, more time did not necessarily indicate better teaching. Teacher B, a ELL, high-gains teacher, taught lessons that on average were eleven minutes shorter than her ELL, high-gains counterpart and still often used quality practices such as elaboration or representations. However, longer lessons may still provide space for better teaching: Teacher A, the other ELL, high-gain teacher, taught the longest lessons and had the highest code counts across many practices.

Triangulation With Quantitative Scores

I triangulated my qualitative case descriptions with both student-report and observational scores of classroom quality. Overall, the ELL, high-gains teachers were highly rated by CLASS observers and their students. Relative to the full sample of fourth and fifth grade teachers in the MET dataset, the ELL, high-gains teachers received above average Emotional Support scores. They were also rated approximately a standard deviation above the mean with regard to Instructional Support and Care. The latter finding is interesting, given that Teacher B was observed exhibiting frustration with her students. However, both teachers offered praise and provided emotional and instructional support as they regularly checked in with their students. Their high Care scores may indicate that these behaviors signaled warmth to their students.

The remaining four teachers—both no-ELL, high-gains and ELL, no-gains—also scored well across all three quantitative measures. All six teachers received above average Instructional Support scores. Their Emotional Support and Care scores indicated that these four teachers were either average or highly supportive teachers. As mentioned previously, both Emotional and Instructional Support Scores were derived from the same videotaped math lessons used in the present qualitative analysis. However, qualitative case descriptions indicated nuanced variability in how instructional practices and displays of support were used and integrated across classrooms with varying levels of English proficiency and academic gains. In other words, the case descriptions may have provided greater insight than the quantitative scores of classroom quality into why some teachers of ELLs had high gains.

This discrepancy signals an important point about measuring classroom quality in classrooms with ELLs: the *nuance* with which various practices are implemented and integrated matters. For example, Teacher F received the highest Instructional Support score, although she

was a ELL, *no-gains* teacher. Teacher F may have appeared to be an instructionally strong teacher because she relied on concrete tools to help her students visualize mathematical concepts. However, her students made low gains, possibly because she did not regularly connect tool use back to mathematical procedures, a tendency that may have been hurtful for her ELL students. This is a subtle yet critical distinction that is not captured by current measures of classroom quality. For example, the Instructional Support domain of the CLASS measures whether teachers use multiple modalities—such as such as gestures and representations—as a means of maintaining student engagement, *without* considering how those modalities support ELL students. Adding other indicators, such as whether the teacher's use of multiple modalities is consistent with accurate content teaching, reinforces teacher language, and connects back to the lesson objective might remedy this issue.

These findings suggest trade-offs in using observational measures of classroom quality in diverse classrooms. Certainly, observational measures such as the CLASS are validated on various cultural, ethnic, or linguistic student populations (e.g., Downer et al., 2012). Nevertheless, these measures were not developed with the aim of including specific processes that meet varying needs of diverse populations, such as Latino ELLs. In other words, current observational measures of classroom quality capture important yet general aspects of instruction. However these measures may lack nuanced processes that bolster diverse students' success and may be key for reducing achievement gaps. Future research should create or alter existing measures of classroom quality to include practices that provide instructional and emotional support to students from culturally, linguistically, and ethnically diverse backgrounds. A benefit of the present study is that observing a small number of classrooms can yield nuanced

understanding of how teachers may be using various practices to support diverse students, such as Latino ELLs. These findings can then be tested in larger samples.

Implications

In the current U.S. public education system, many teachers will encounter classrooms that are entirely comprised of ELLs, with tremendous diversity in terms of home languages, proficiency, countries of origin, and cultural backgrounds. In comparison, the classrooms in the present study were less linguistically, ethnically, or culturally diverse. All six classrooms were majority Latino. Four of these classrooms also contained a comparatively small number of Spanish-speaking ELLs. These findings therefore may only generalize to classrooms that are majority-Latino, with some ELLs. However, these findings do have implications for many portions of this country. It is important to note that the ELL student population is unevenly distributed (Boyle, Taylor, Hurlburt, & Soga, 2010; Rusakoff, 2011). Some scholars suggest that one-third of ELL students are in schools with low concentrations of ELLs and that these schools often lack the resources necessary to fully support their ELL students (Consentino de Cohen, Deterding, & Clewell, 2005). In contrast, schools with high ELL populations were more likely to have teachers and school leaders with the training and resources necessary for optimally instructing ELLs (Consentino de Cohen et al., 2005).

Consequently, teachers in classrooms with low concentrations of ELLs may not have the benefit of resources that enable them to use best practices when teaching ELLs. It is important to elucidate the practices of effective teachers in low-concentration ELL classrooms for two purposes. The first purpose is to ultimately test the efficacy of these practices for teaching ELLs. If appropriate, these practices can be disseminated to teachers in classrooms with low concentrations of ELLs so that teachers can differentiate instruction for their ELL students. For

example, the ELL, high-gains teachers in the present study used a variety of specific practices, such as using gestures and representations with quality, purpose, and precision. Testing and sharing these practices with other teachers may enhance both researchers' and teachers' understanding of how to support ELLs.

The second purpose is to identify areas in which teachers in classrooms with low concentrations of ELLs require professional development. For example, none of the teachers in the present study taught in a language other than English. Drawing on students' home languages is recommended as a best practice for supporting ELLs (e.g., Lucas et al., 2008); however, this practice may be more commonly found in schools with high ELL populations and therefore more bilingual staff (Consentino de Cohen et al., 2005). Consequently, perhaps teachers in classrooms with low-concentrations of ELLs more broadly require training to understand how they can incorporate students' home languages into their instruction.

Limitations

A few limitations of the study should be noted. First, students in different districts took different standardized tests which could impact whether a teacher is high or low-gains; however, since the standardized test scores were equated using Van der Waerden scores during the primary analysis of the MET dataset, I am less concerned that this discrepancy impacted case selection (Conover, 1999; Kane & Staiger, 2012). Additionally, more data such as interviews with teachers and students, additional cases, and time in the field would undoubtedly provide a more nuanced understanding of various factors that comprise and differentiate these classrooms. This limitation opens doors for future work, in which teacher and student interviews and more intensive, purposeful data collection can enhance the findings of the present study.

Conclusion

The present study sought to identify how ELL, high-gains classrooms differed from no-ELL, high-gains classrooms and ELL, no-gains classrooms during mathematics instruction. Specifically, I examined how teachers in these classrooms showed support and used mathematics instructional practices, both separately and together. High-gains teachers of classrooms with ELLs used gestures and representations accurately and purposefully; offered praise; elaborated student responses; checked all students' understanding; and provided emotional support while doing so. To varying degrees, these practices and displays of support were less common in the other classrooms, indicating that these practices may characterize effective teachers of ELLs during mathematics instruction. These findings add to the literature on supporting upper elementary ELLs while teaching mathematics and provide ideas that could be used and tested as part of professional development for teachers of ELLs.

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Table 1.

Code definitions and examples

Code Name	Code Definition	Examples	Why Coded
Relevance	A statement about why or how content is important for the student.	T: "You know why adding and subtracting with fractions is important? Money. That's how you know you got correct change."	The teacher is connecting a mathematical idea to its use in the real world, thereby explaining why this lesson is important for students' lives.
Relationship	A teacher's efforts to connect with her students, either beyond or through content.	T: "Oh, I picked the detail girl to come up and show the problem! She's careful with her details."	The teacher is conveying that she knows the student and the student's strengths. The student hasn't done any work as of yet, but the teacher knows she will pay careful attention to her work.
Praise	Affirmation of a student's response or effort.	T: I like how you explained *why* eight is multiple of two.	The teacher highlights what about the student's answer is correct.
Revoicing	Repeating, elaborating upon, or reformulating a student's response.	T: Why is that a line of symmetry? S: It's the same on both. T: It has the same amount of space on both sides, so if I fold this shape in half, the shape folds evenly.	The teacher takes the student's response and extends it, fully articulating and modeling a mathematical idea for the class while doing so.
Vocabulary	The teacher explicitly defines and/or consistently uses mathematical vocabulary.	T: A *line of symmetry* divides a shape into two congruent parts.	The teacher defines a vocabulary word.

Gestures and representations	Using physical gestures, visual representations, or physical representations to communicate.	The teacher folds a square in half along its line of symmetry, to show that the two sides mirror one another.	The teacher demonstrates using gestures and a concrete representation what the concept of symmetry means.
Tasks	Students are given mathematical tasks which could be solved using a variety of approaches. Students must problem-solve using a variety of strategies; the teacher may also connect the task back to life experiences or prior learning.	A teacher asks her fourth-grade class: "3 is a factor of two numbers. What else might be true about these numbers?". A student responds: "They are not prime numbers."	The activity has multiple possible strategies and even solutions: students could list possible common multiples, for example.
Checking for understanding	The teacher has a system(s) in place to ensure *all* students understand the material.	The teacher asks students to use whiteboards on which they solve problems and hold up the answer.	The teacher can look at all whiteboards around the room and quickly assess students' understanding. She can then support students who are still individually struggling.

Table 2.

Code Totals, Frequencies, and Lesson Lengths

Teacher ID	**A**		**B**		**C**		**D**		**E**		**F**	
Repetition	132	2.59	61	1.50	109	2.81	88	2.55	86	2.23	97	2.12
Elaboration	37	0.73	40	0.98	6	0.15	7	0.20	17	0.44	41	0.90
Gestures, Visuals, and Representations	117	2.29	43	1.05	7	0.03	18	0.52	42	1.09	46	1.01
Relationship	16	0.31	1	0.02	3	0.08	1	0.03	4	0.10	11	0.24
General Praise	69	1.35	33	0.81	96	2.48	26	0.75	35	0.90	35	0.77
Specific Praise	4	0.02	1	0.02	7	0.18	1	0.03	11	0.29	8	0.17
Vocabulary Total	14	0.27	15	0.37	19	0.49	1	0.03	16	0.42	13	0.28
Vocabulary Lesson 1	9		3		5		0		8		4	
Vocabulary Lesson 2	1		2		13		0		1		7	
Vocabulary Lesson 3	1		7		0		1		4		2	
Vocabulary Lesson 4	3		3		1		0		3		0	
Type of Gains	High		High		High		High		No		No	
#ELLs	5		5		0		0		5		5	
Average Lesson Length (min)	51.00		40.75		38.75		34.50		38.50		45.75	
Range of Lesson Lengths (min)	48-56		34-45		36-40		33-36		36-50		38-54	

Note. For each teacher, the total number of code counts for each practice are shown in the left-hand column. In the right-hand column are the number of code counts divided by the teacher's average lesson length.

Table 3.

CLASS and SPS Scores

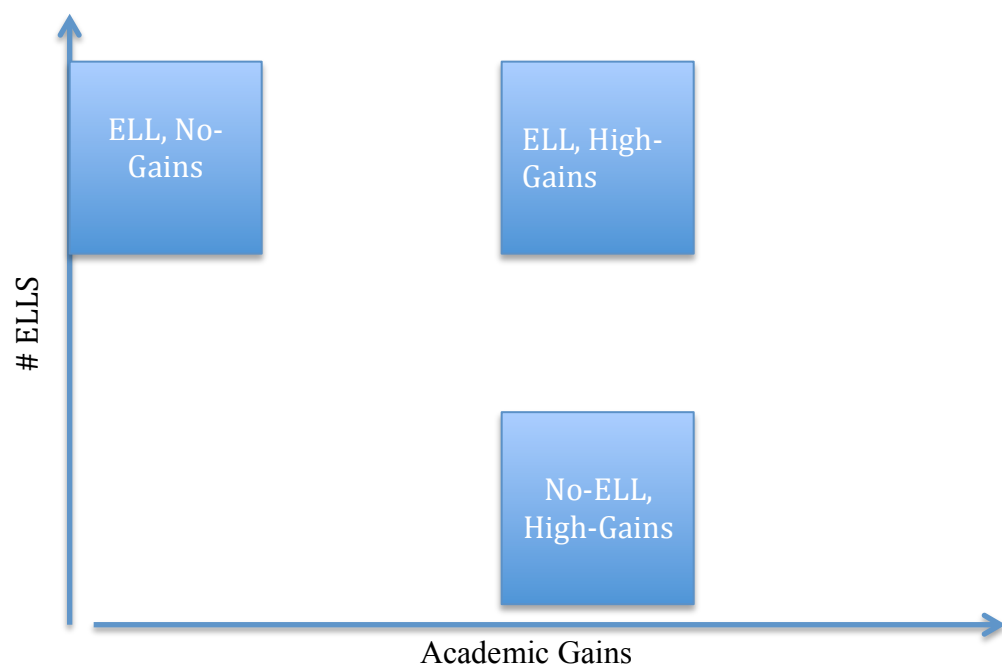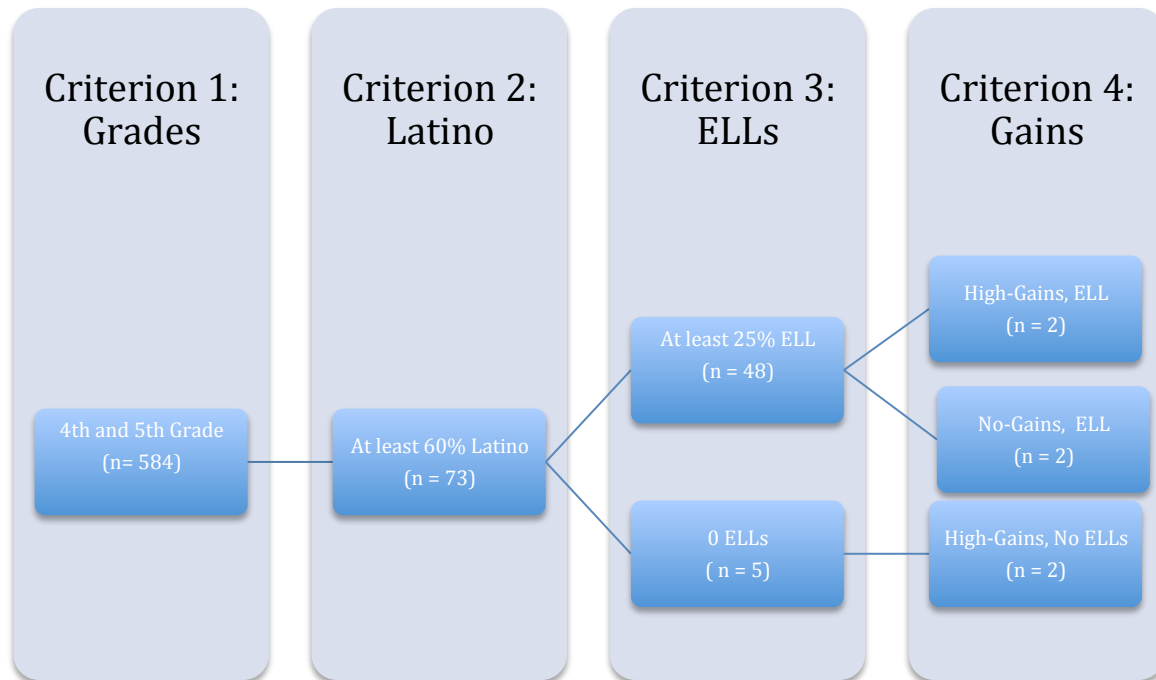|	CLASS-ES	CLASS-IS	SPS-Care
A	4.72	4	.9
B	4.78	4.06	1.13
C	4.8	4.19	.01
D	4.73	3.94	1.33
E	4.28	3.84	1.04
F	5.41	4.31	.13

*Figure 1.*Types of cases selected.

Figure 2. Case selection process. "N" refers to the number of classrooms.
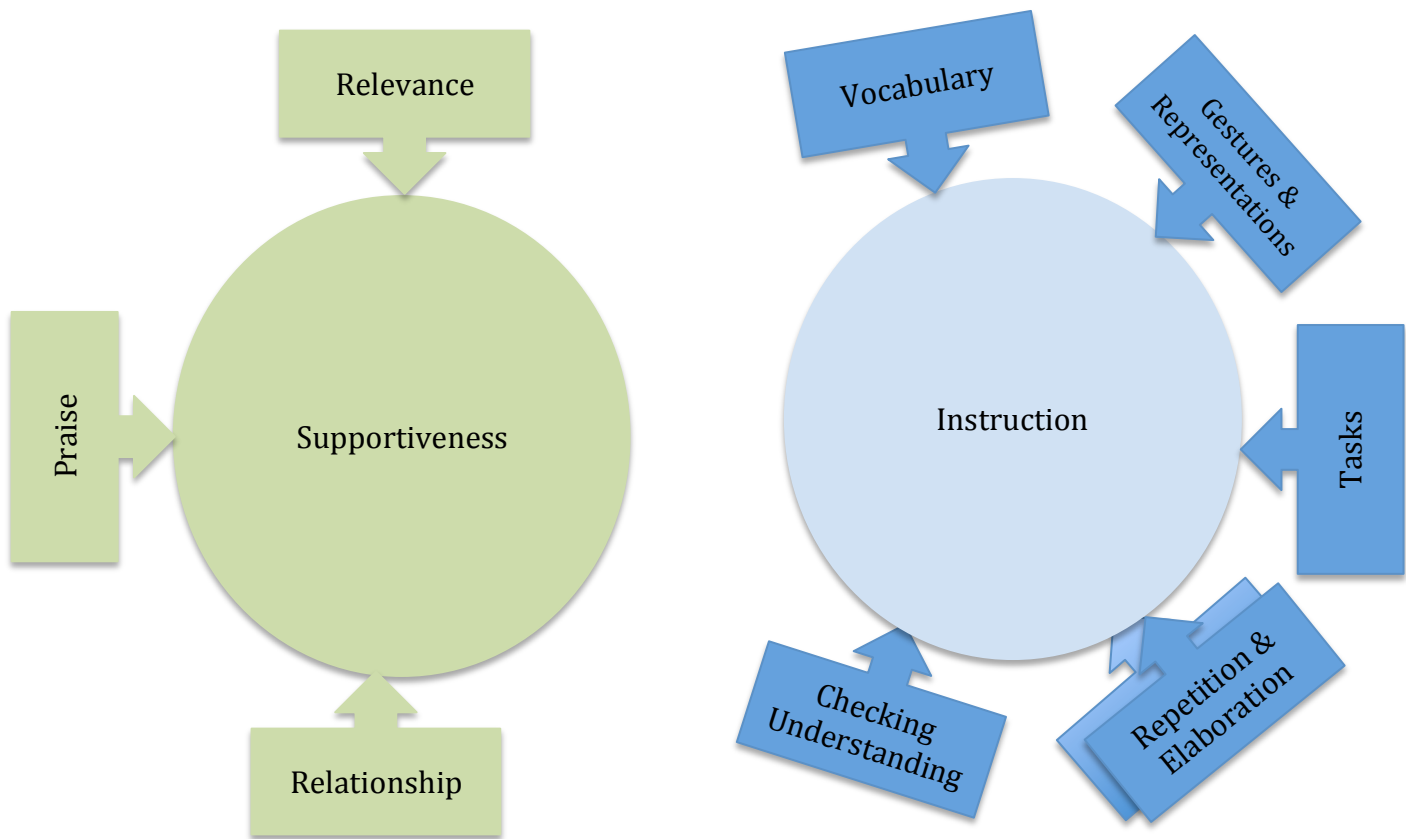
Figure 3. Summary of the codebook used in the present study. Some of these practices (relationship, relevance, vocabulary, and tasks) were not regularly observed.
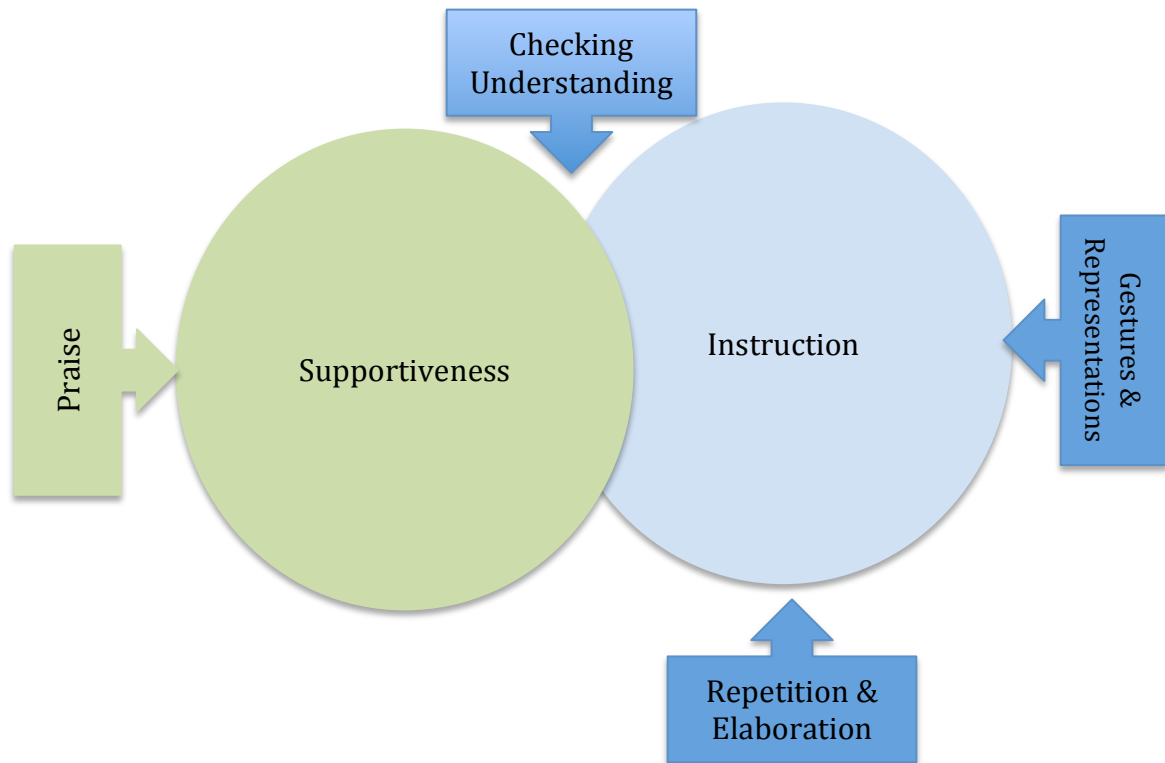
Figure 4. Practices used by ELL, high-gains teachers and one ELL, low-gains teacher: praise, repetition and elaboration, gestures and representations, and checking understanding, which also provided a context for showing support. No-ELL, high-gains teachers primarily used repetition and praise (not pictured). The other ELL, low-gains teacher used praise, repetition, some elaboration, and gestures and representations (not pictured).

Appendix A.

The following provides an expanded example of transcribed language from teachers with accompanying field-notes. This excerpt was coded as an example of using concrete representations. Bolded print represents our additional notes, including a part of an analytic memo. All language was transcribed verbatim; non-verbal elements such as student or teacher gestures; tone of voice; classroom configurations; or student work were added as narrative notes.

Students are clustered in desks arranged as tables. The teacher has both the Smartboard and a projector going. She starts the lesson off by going over the homework with students and displaying the problems they are solving on the projector. She is calling on different students to solve different parts of the same problem.

1. T: What's the second part we're doing with our partial products algorithm, S?
2. S: 7x5
3. T: Ok, now, is it 7x5?
4. S: Times 50.
5. T: Times *50 **(said with emphasis).*** That part is really, really important. So remember this—we're not doing 7 groups of 5, because if we did that, we'd just have 35, wouldn't we? We're doing 7 groups of 50. **(*Teacher holds up five "longs", or base-10 blocks representing one tenth*)**. So if I have my tens cubes, these longs, and I have five of them, so I have five of those (***the teacher places groups of five longs on the projector as she counts out seven groups of five longs***), that's one group, if I get five more that's another group, five more, another group **(*she counts out 7 groups of five longs on the projector*).**

Below is an abbreviated example of an analytic memo written at the end of a transcript. The memo includes both the reader's observations, references to the lesson, and quotes from the lesson. This memo focuses on the no-ELL, high-gains teacher who asked her students to make inferences about a biography, an example discussed during the results section.

Like in the last lesson on decimals, she uses manipulatives to underscore different points she is making and to be precise about what she is teaching—she repeatedly shows students what the numeral in the tens place value actually represents so that they'll remember to multiple by a tens value and not a ones value during the second step of the partial products algorithm. She stops the student who says the second step is "5x7" and uses base-10 block longs to show him why 5x7 is really 50x7. She emphasizes accuracy that way. And like the previous lesson, she gives them lots of opportunities to practice what they are learning independently while she circulates. I realized during this lesson that I can always follow her explanations, whereas sometimes I struggle to understand what some of the other teachers are trying to tell their students, either because the explanation is convoluted or incorrect. She does a lot of repeating and elaborating of student responses in this lesson too—in particular she gives students opportunities to talk and then she extends on what they are saying.

Appendix B.

IRB Exemption

UNIVERSITY of VIRGINIA

Holland Banse <hwb5pg@virginia.edu>

Pertaining to SBS Number 2014025600
1 message

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mjm6ny@virginia.edu <mjm6ny@virginia.edu>   Thu, Jul 10, 2014 at 11:39 AM
To: hwb5pg@virginia.edu, nap5s@virginia.edu
Cc: mjm6ny@virginia.edu

In reply, please refer to: Project # 2014-0256-00

July 10, 2014

Natalia Palacios
Leadership, Foundations & Policy
Bavaro Hall 234 A

Dear Natalia Palacios:

Thank you for submitting your project entitled: "Study of Teacher Practices Related to ELL's Mathematical Achievement Using Gates MET Data" for review by the Institutional Review Board for the Social & Behavioral Sciences. The Board reviewed your Protocol on July 10, 2014.

The first action that the Board takes with a new project is to decide whether the project is exempt from a more detailed review by the Board because the project may fall into one of the categories of research described as "exempt" in the Code of Federal Regulations. Since the Board, and not individual researchers, is authorized to classify a project as exempt, we requested that you submit the materials describing your project so that we could make this initial decision.

As a result of this request, we have reviewed your project and classified it as exempt from further review by the Board for a period of four years. This means that you may conduct the study as planned and you are not required to submit requests for continuation until the end of the fourth year.

This project # 2014-0256-00 has been exempted for the period July 10, 2014 to July 9, 2018. If the study continues beyond the approval period, you will need to submit a continuation request to the Board. If you make changes in the study, you will need to notify the Board of the changes.

Sincerely,

Tonya R. Moon, Ph.D.
Chair, Institutional Review Board for the Social and Behavioral Sciences