Teacher-Student Relationships and Engagement: Conceptualizing, Measuring, and Improving the Capacity of Classroom Interactions*

17

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Abstract

Classrooms are complex social systems, and student-teacher relationships and interactions are also complex, multicomponent systems. We posit that the nature and quality of relationship interactions between teachers and students are fundamental to understanding student engagement, can be assessed through standardized observation methods, and can be changed by providing teachers knowledge about developmental processes relevant for classroom interactions and personalized feedback/support about their interactive behaviors and cues. When these supports are provided to teachers' interactions, student engagement increases. In this chapter, we focus on the theoretical and empirical links between interactions and engagement and present an approach to intervention designed to increase the quality of such interactions and, in turn, increase student engagement and, ultimately, learning and development. Recognizing general principles of development in complex systems, a theory of the classroom as a setting for development, and a theory of change specific to this social setting are the ultimate goals of this work. Engagement, in this context, is both an outcome in its own

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right and a mediator of impacts that teachers have on student outcomes through their interactions with children and youth. In light of this discussion, we offer suggestions or directions for further research in this area.

Introduction

Students spend at least one-quarter of their waking hours in schools, most of it in classrooms, one of the most proximal and potentially powerful settings for influencing children and youth. Students' relationships and interactions with teachers either produce or inhibit developmental change to the extent that they engage, meaningfully challenge, and provide social and relational supports. In this sense, relationships between teachers and students reflect a classroom's capacity to promote development, and it is precisely in this way that relationships and interactions are the key to understanding engagement. As just one example of this connection between engagement and relationships, the National Research Council (NRC, 2004) published a groundbreaking recasting of settings in terms of features that engage developmental mechanisms in adolescence in positive, promotive ways. Notably, the NRC report shifted discussions from how various contexts (e.g., classrooms, clubs) and programs should focus on reducing the rate of problems in child and adolescent development to one that recognizes that perhaps the best way for these contexts to benefit youth is to emphasize the positive ways that relational experiences in these settings provide children and youth experiences that draw them in—that engage with their desires and needs for feeling competent and connected to others. From the perspective of the NRC report, relationships are a mechanism or medium through which settings engage developmental processes.

Building on extensive observational work that had been underway in early childhood settings for the past two decades, as well as a very compelling literature demonstrating the value of adult-child relationships for promoting competence in the birth to 8 years period (see Pianta, Hamre, & Stuhlman, 2003), we embarked on a program of study to conceptualize, measure, and ultimately improve the quality of teacher-child relationships through a focus on their interactions, starting in the preschool and early elementary period. This work resulted in an observational tool for assessing interactions in early childhood and elementary classrooms, the Classroom Assessment Scoring System (CLASS; Pianta, La Paro, & Hamre, 2004); an accompanying conceptualization of classrooms, the CLASS framework (Hamre, Pianta, Mashburn, & Downer, 2010); and an approach to enhancing the quality of teacher-child interactions that we call MyTeachingPartner. Recently, we extended this approach to measuring and improving relationships to middle and high school classrooms (Pianta, Hamre, & Mintz, 2010). As we have deepened this work in the early grades and extended these ideas toward classrooms serving older children, evidence has been revealed not only for the NRC report but also for the recasting of classrooms as contexts in which perhaps the key mechanism through which classroom experiences add value for development is through the pivotal role of student-teacher relationships in the very process of engagement.

In our view, and reflected throughout this chapter, engagement is a relational process. It reflects students' cognitive, emotional, behavioral, and motivational states and capacities but is conditioned in part on interpersonal relationships as activators and organizers of these states and capacities in the service of some larger developmental task or aim (Allen & Allen, 2009; Crosnoe, 2000; Dornbusch, Glasgow, & Lin, 1996; Eccles, Lord, & Midgley, 1991). From this perspective, engagement is best understood by understanding relationships and their behavioral expression in interpersonal interactions in the classroom—through observation of exchanges and interpretation of their value and meaning with regard to fostering opportunity to learn and develop.

Engagement reflects relationally mediated participation in opportunity.

In this chapter, we describe this and related work in an effort to frame conceptually the discussion of student engagement not as a property of a child but rather as embedded in interactions and relationships. We organize our discussion in three main sections: the first provides a depiction of classrooms as a relational setting for development, the second describes efforts to conceptualize and measure teacher-student classroom interactions, and the third reports early results from efforts to enhance engagement in classrooms as a function of improving the quality of teacher-student interactions.

Underperformance of the Classroom Setting as a Context for Youth Development

There is little question that academic achievement, personal well-being, and civic-related outcomes for children and adolescents are in dire need of improvement and enhancement (Carbonaro & Gamoran, 2002; National Center for Education Statistics [NCES], 2003). For all of the resources devoted to schooling, the capacity of classrooms as settings that promote and enhance development is sorely lacking. For example, adolescents report that social and task-related disengagement and alienation are directly tied to classroom experiences that are disconnected from youths' developmental needs and motivations (Crosnoe, 2000; Dornbusch et al., 1996; Eccles et al., 1991). Youth describe school experiences as irrelevant and lacking appropriate and meaningful challenges. These patterns are exacerbated dramatically for youth attending schools in low-income communities, rural communities, large schools, and for those with histories of poor achievement or problem behavior (e.g., Crosnoe, 2001; Eccles, Lord, Roeser, Barber, & Jozefowicz, 1997).

Even more disconcerting is recent evidence from observational studies of large samples of fifth grade classrooms that the nature and quality of the instructional and social supports actually offered to early adolescents in classrooms is generally low and even lower for the groups noted above. Moreover, findings from studies of large and diverse samples of middle schools demonstrate quite clearly that competitive, standards-driven instruction in decontextualized skills and knowledge contributes directly to this sense of alienation and disengagement (Eccles et al., 1997; Shouse, 1996). Engagement in school begins to decline early in adolescence, and by entry into high school this decline is pronounced to the point where more than half of high school students from all types of schools report that they do not take their school or their studies seriously (Marks, 2000; Steinberg, Brown, & Dornbusch, 1996). Further, adolescents bring their peers along with them: doing well in school switches from being a positively valued behavior among peers in childhood to a somewhat negatively valued behavior by mid-adolescence. Yet, engagement and intrinsic motivation become pivotal in adolescence, as students at this age have the means to not only withdraw energy from educational pursuits but also the ability to drop out altogether (NRC, 2004).

With regard to achievement outcomes, there is recent evidence that middle and high school youth are underperforming in relation to expectations set by state standards tests and in international competitions. Moreover, performance gaps related to culture, race, and income are not closing despite years of rhetoric and attention (NCES, 2003). For example, after years of standards-based educational reform under No Child Left Behind (NCLB), roughly 40% of poor or African-American eighth graders in Virginia perform below standards for reading achievement, and the corresponding rates of failure for youth in the District of Columbia are close to 80% (Aratani, 2006). These rates of failure in reading, which was one of the spurs for NCLB, reflect a fundamental misunderstanding of the mechanisms by which students are engaged through relationships and the need to reconceptualize and redesign how we support teachers to build upon and foster relationships with students.

Consider a second target of school reform, the dropout rate. Fewer than 60% of ninth graders in certain demographic groups (NCES, 2003) actually graduate 4 years later. Yet for 10 years, decreasing the dropout rate has been a singular focus of most secondary schools, and the average *annual* dropout rate remains near 10% and ranges up for some groups. These figures make strikingly clear that the high school classroom as a setting for youth development is fundamentally flawed. Put another way, it does not appear to us that the central problem in school reform is curriculum, school/class size, or outcomes assessment but rather the extent to which teachers are supported to interact with students and form relationships with them that engage them in opportunities to learn and develop.

Youth report that they are highly concerned with the actual experiences they have in classroom settings, which they find lacking in terms of supportive relationships that draw them into meaningful challenges and competence-building experiences (Crosnoe, 2001; Csikszentmihalyi & Schneider, 2000; Marks, 2000; NRC, 2004; Roeser, Eccles, & Sameroff, 2000). Perhaps they are right, and the capacity of schools to support youth development, particularly for "high risk" youth, depends on whether the relationships and interactions among students and teachers within a classroom offer a developmentally meaningful and challenging experience (NRC). Because teacher-student interactions embody the relational capacity of the classroom to promote positive development, our focus is on improving and changing these relationships and interactions and involves working with teachers. Thus, our theory and method of change is centered on teachers' relationships and interactions with students.

A Theory of Engagement Within Classroom Settings

We start with a brief description of a typical classroom experience in a school in the United States, public or private, regardless of grade or content area. Whether based on observations of teacher-student interactions or youth reports, experiences in classrooms too often fail to capitalize on student interests, goals, and motivation and rather promote disengagement and alienation. One cannot read these accounts and escape the sense that school and classroom settings and the adults responsible for their quality are simply not involved relationally (Crosnoe, 2000; Dornbusch et al., 1996; Eccles et al., 1991). Yet, despite this generally dismal picture of classrooms, it is also true that nearly every student can describe, with enthusiasm and passion, a relationship with a teacher that they felt was meaningful and important to them, often with considerable evidence to back up those claims (Resnick et al., 1997).

The impressions gleaned from youth reports are confirmed in observations, some of which are ethnographic in nature while others rely on large-scale assessments of hundreds of classrooms. For example, evidence gleaned from observing large numbers of typical American classrooms in first, third, and fifth grades shows clearly that the nature and quality of adult-student interactions in classrooms are lacking in the kind of assets outlined in the NRC report. For example, in the NICHD Study of Early Child Care and Youth Development observations in more than 2,500 elementary classrooms, of the opportunities for academic activities and learning to which a typical student is exposed, more than 85% of those opportunities take place in the context of teacher-directed whole group instruction or individual seatwork, in contrast to small-group work that might capitalize on teacher-student relationships as key mediators of engagement. The typical student interacted with their teacher (individually or in a small group) fewer than four times in an hour, and in most cases, these exchanges were perfunctory and compliance-directed. Furthermore, most instructional exchanges had a pronounced and almost singular focus on performing basic skills, tasks that require a discrete answer that is correct or not rather than eliciting analysis, reasoning, or problem-solving around a more ambiguous challenge. From a relational standpoint, these exchanges were devoid of personal, emotional, motivational properties that would engage the student in the task at hand. Recalling the NRC

report's emphasis on meaningful challenges for cognitive development (as well as recent calls for raising standards for "twenty-first century skills"), this focus on basic skills neglects the ways in which reasoning, problem-solving, and more advanced cognition can be a force for engaging students in activities that are highly salient developmentally but which also require relational supports to sustain students' participation. Despite rhetoric that paints a picture of middle and high school as challenging and interesting, the actual experiences youth have in classroom settings (observed or reported) are often lacking in terms of meaningful challenges, supportive relationships, and competence-building opportunities (Crosnoe, 2001; Csikszentmihalyi & Schneider, 2000; Marks, 2000; NRC, 2002; Roeser et al., 2000).

Schools all fundamentally rise or fall on the success of what occurs within the classroom (e.g., Crosnoe, 2001; Nye, Konstantopoulos, & Hedges, 2004; Resnick et al., 1997) Ironically, close observation of most any secondary school in America reveals that adolescents—both at risk and high functioning—often display remarkably high degrees of motivation and engagement within the school setting. Rarely, however, does this occur *within* the classroom. High school hallways, playing fields, and lunchrooms literally brim over with youthful energy, excitement, and enthusiasm. Intense interactions occur in sports and extracurricular activities, and interactions with peers dominate students' perception of the social ecology of school. It is only when these students enter their classroom that energy levels decline precipitously, and it is rare that a given student will "connect" with a teacher or material in classroom or subject area in such a way that they perform at high levels of capacity or "flow" (Csikszentmihalyi & Schneider, 2000). The classroom setting looks equally bleak from the perspective of teachers, who are also dropping out and becoming more disengaged. Fifteen percent of the entire teaching workforce turns over every year. Rates of teachers leaving the profession are increasing. And those who stay report a sense of malaise and frustration—they feel their job is getting harder and they have fewer tools with which to work and feel effective (Hart, Stroot, Yinger, & Smith, 2005).

A fundamental principle in addressing the chronically resource-starved classroom is that modifying the classroom as a relational setting to engage children and youth more fully may be the single best way to unleash and expand the level of *human resources* (e.g., relationships and interpersonal interactions) available to the educational process (Sarason, 1982). Below, we discuss three features of classrooms likely to influence levels of behavioral/psychological engagement—relational supports, competence supports, and relevance. These features form the core theoretical foundation of our subsequent efforts to assess and improve the relational properties of classrooms and, thereby, engagement.

Understanding the primary role of interactions and relationships in creating the capacity for children and youth to engage the classroom as a setting for development is a fundamental precursor to understanding our approach to measuring interactions and to *changing* classroom settings' capacity for engagement. Readers will recognize applications and extensions of Vygotsky's (1978, 1991) ideas about the contextualized nature of learning and development and close, interdependent connection among relational supports, task-related challenges, and learning. Pianta (1999) also has discussed the connection between classroom contexts and learning in terms of the relational, structural, and motivational affordances available in classrooms. Central to each of these perspectives, and elaborated below, is an appreciation of engagement as a contextualized process mediated by relationships and interpersonal interactions.

Relational Supports

As a behavior setting, the classroom runs on interactions between and among participants: the relationship between the student and the teacher and the relationships of students with one another. These relationships and their value emotionally, instrumentally, and psychologically are fundamental supports to the value of their experience in the classroom setting for furthering development. It is not an overstatement to suggest that most children and adolescents *live* for their social relationships (Collins & Repinski, 1994), and for many young people, relationships with teachers

are core organizers of experience; they are fundamental to core developmental functions. Yet, the qualities of teacher-student relationships are frequently afterthoughts in battles over curricula, testing, school structure, and funding. Positive relationships with adults are perhaps the single most important ingredient in promoting positive student development. For example, when teachers learn to make modest efforts to form a personal connection with their adolescent students—such that the students feel known—they can dramatically enhance student motivation in school and emotional functioning outside of school (Roeser, Eccles, & Sameroff, 1998; Skinner, Zimmer-Gembeck, & Connell, 1998). In the early grades, when teachers spend nondirective individual time with children who they find challenging, the disruptive behavior of these students drops, and teachers report more harmonious and learning-oriented interactions (Mashburn et al., 2008).

Adolescents report both that they would learn more if their teachers cared about them personally and that such personal connections are rare (Public Agenda, 1997). A close, supportive relationship with a teacher is a key feature distinguishing at-risk children and adolescents who succeed in school from those who do not (Pianta, Steinberg, & Rollins, 1995; Resnick et al., 1997), and youths' sense of social connection within settings predicts outcomes ranging from higher achievement scores to greater student engagement and more positive academic attitudes (Bryk & Driscoll, 1988; Bryk, Lee, & Holland, 1993; Connell & Wellborn, 1991; Crosnoe, Johnson, & Elder, 2004; Ryan & Deci, 2000; see also, NRC, 2004, for extended review of other similar findings). Notably, even for relatively highly motivated late adolescents in college, recent experimental work has shown that a sense of isolation can significantly reduce energy for intellectual pursuits and that this reduction is powerful enough to temporarily depress results on IQ tests (Baumeister, Twenge, & Nuss, 2002), while increasing irrational and risk-taking behavior (Twenge, Catanese, & Baumeister, 2002). Thus, regardless of age or grade, interpersonal relational supports provided through teachers' interactions with students are a fundamental facet of classrooms' capacity to support development.

Autonomy/Competence Supports

Children and youth are engaged by challenges that are within reach and that provide a sense of self-efficacy and control: experiences that offer challenges viewed as "older" or adultlike but for which appropriate scaffolding and support are provided (Bandura, Barbaranelli, Caprara, & Pastorelli, 1996; Eccles et al., 1993). Any setting that intends to advance development and learning outcomes for children or youth must carefully craft the nature of experience it provides in order to give participants a developmentally calibrated sense of control, autonomy, choice, and mastery. Absent these considerations or in settings that rely on approaches characterized as overly top-down or passive, in which teachers are over- or underinvolved, classrooms are doomed to be places lacking in engaged participants. For example, one of the most tragically avoidable errors that some secondary school teachers make is to assume that youth strivings for autonomy and self-expression represent negative forces to be countered rather than positive energy to be harnessed. This basic misunderstanding of adolescent development (one often promoted in teacher education courses and reinforced by school policies) then takes form in highly controlling and punitive classroom and school settings and in instruction that is highly teacher-driven and discouraging of exploration and curiosity. At the other end of the age spectrum, all too often, teachers espouse a "child-centered" or "play-based" philosophy around learning and development that all too often expresses itself in children wandering around activity centers while teachers are not involved in actively scaffolding learning (Pianta, Mashburn, Downer, Hamre, & Justice, 2008). In both instances, overcontrolled responses to adolescents and underinvolved responses to young children, adult-child relationships, and interactions are not calibrated to developmental tendencies of students. This mismatch of classroom and development results in schools narrowing, rather than expanding, the "space" in which zones of proximal development can be created.

Relevance

For children and youth, the connection of academic skills and knowledge to their real-life experience is a near-universal property of classrooms that foster engagement. Adolescents, like adults, deploy a considerable amount of effort in attempts to make meaning in their lives. For many, adolescence is a period in which this becomes a focus for the first time. This process ultimately leads to a bias in adolescents' evaluation of experience (particularly those experiences offered by adults) toward choices they view as relevant, or connected to their emerging views on what is meaningful and what is not. Too often, the high school curriculum and the rationales behind it are taken as a "given" without recognition that these rationales need to be made clear to each new cohort of students. Drawing even very distal connections between what occurs within high school and the larger "real world" can alter student behavior. For example, involving students in significant, real-world, voluntary community service and then discussing it within the classroom in an ongoing way has been found to reduce disruptive behavior by 50% in randomly controlled trials, with similar effects upon other outcomes in youths' lives as well (Allen, Philliber, Herrling, & Kuperminc, 1997). Centuries ago, late adolescents were commanding armies and running countries (Barzun, 2000). Today, a generation of children and adolescents who grew up with the internet, social networks, and sophisticated video games is confined to a classroom for hours a day with little vision of how what occurs within that classroom relates to the larger world.

In the early grades, as we recounted previously, virtually no instruction occurs that does not have a "correct/incorrect" focus. Thinking, problem-solving, and reasoning with real-world information is conspicuously absent in the vast majority of classrooms (see Pianta, Belsky, Houts, Morrison, & NICHD ECCRN, 2007). When academic learning is almost completely organized and focused in this way, there is virtually no way in which teachers can make the content or activity relevant. Rather than drawing on relationships and interpersonal interactions with students as a front-end asset to draw them into solving a somewhat ambiguous and perhaps uncertain real-life problem, teachers end up relying on relationships and interactions to cajole or to address behavioral disruptions and inattention (i.e., disengagement) that are the inevitable by-product of miscalibration.

Consciously addressing the relevance of what occurs within the classroom to the larger world is critical to engaging otherwise restless young minds. On a smaller scale, teachers may increase the relevance of the classroom by making repeated, explicit ties between curricular material and real-world applications and engaging relational processes that scaffold participation in learning that is somewhat less constricted. The key factor here is that the real-world connections must be made in ways that are meaningful *as perceived by the student*. For some, it may be through a very close and comforting emotional connection to a teacher, while for others it will be through a teacher providing challenging problems.

These ideas about the central role of teacher-student interactions and relationships as the primary mechanism by which student engagement is fostered form the basis for our developmentally informed analysis of classroom effects on student outcomes. In our view, the capacity of classroom settings to engage children and youth is the core "criterion" by which they should be judged, and the features of relational supports, autonomy/competence supports, and relevance are how classrooms, through relationships and interactions, accomplish that goal.

These supports, enacted in teacher-student interactions, produce cycles of student engagement, teacher efficacy, and student performance. We suggest that in the best classrooms, these supports operate in concert to initiate self-reinforcing linkages among engaged students, effective teachers, and growth in student performance. Relationships and interactions in the classroom are the media through which relational, competence, and relevance supports are made available to students. In the next section, we present our conceptualization and technical approach to interactions and relationships between teachers and students as the focus of measurement and change.

Conceptualizing and Measuring Teacher-Student Classroom Interactions

To help organize the diverse literatures that inform conceptualization and assessment of classroom processes, Hamre and Pianta (2007) presented the Teaching Through Interactions (TTI) framework, a theoretically driven and empirically supported system for conceptualizing, organizing, and measuring classroom interactions between teachers and students into three major domains—emotional supports, classroom organization, and instructional supports. This framework recognizes that the starting point for understanding contextual influences on development is to recognize that development occurs through interactions between the capacities and skills of the person and the resources available to them in various settings, and that this process is very dynamic (Bronfenbrenner & Morris, 1998; Magnusson & Stattin, 1998).

A feature of the TTI framework is that the latent structure of teacher-child interactions applies consistently across grades from preschool through to secondary grades; thus, the three-domain TTI latent structure is hypothesized as grade invariant. Critically, although latent structure is hypothesized as *invariant*, the TTI framework reflects the developmentally relevant construct of *heterotypic continuity* and allows for variation across grades in the specific behavioral indicators that reflect positive and negative features of interactions.

In the section that follows, we briefly review the three major domains of teacher-student interactions described in the TTI framework (emotional, organizational, and instructional), including a summary of the developmental theories and empirical studies on which they are based. Within each of these three broad domains of interaction, we then describe in subsections a number of specific dimensions that form the basis of behavioral interactions and observations of interactions. Thus, we present two levels of the TTI framework—three broad domains and the dimensions of behavioral interactions between teachers and students that more specifically define these domains. Much of what we present below is based on work in elementary classrooms; however, as is evident in the discussion above and in reports such as that of the NRC (2004), these concepts of the TTI framework and their relevance for understanding engagement are applicable to adolescents as well.

Emotional Interaction Domain

Teacher efforts to support students' social and emotional functioning in the classroom, through positive facilitation of teacher-student and student-student interactions, are key elements of effective classroom practice. Two broad areas of developmental theory guide much of the work on emotional support in classrooms—attachment (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1969; Pianta, 1999) and self-determination theory (Connell & Wellborn, 1991; Ryan & Deci, 2000; Skinner & Belmont, 1993). Attachment theorists posit that when parents provide emotional support, and a predictable, consistent, and safe environment, children become more self-reliant and are able to take risks as they explore the world because they know that an adult will be there to help them if they need it (Ainsworth et al., 1978; Bowlby, 1969). This theory has been broadly applied to and validated in school environments (Birch & Ladd, 1998; Hamre & Pianta, 2001; Howes, Hamilton, & Matheson, 1994; Lynch & Cicchetti, 1992; Pianta, 1999). Self-determination (or self-systems) theory (Connell & Wellborn, 1991; Ryan & Deci, 2000; Skinner & Belmont, 1993) suggests that children and youth are most motivated to learn when adults support their need to feel competent, positively related to others, and autonomous. Throughout schooling, students who are more emotionally connected to teachers and peers demonstrate positive trajectories of development in both social and academic domains (Hamre & Pianta, 2001; Harter, 1996; Ladd, Birch, & Buhs, 1999; Pianta et al., 1995; Roeser et al., 2000; Ryan, Stiller, & Lynch, 1994; Silver, Measelle, Essex, & Armstrong, 2005; Wentzel, 1998). Within this domain, we focus on behavioral interactions related to emotional climate, teacher sensitivity, and regard for student perspectives.

Emotional Climate

Classrooms are, by their very nature, social places. Teachers and children laugh and play together, share stories about their lives outside of the classroom, and work together to create an environment in which all learning occurs. The classroom climate can be described along positive and negative dimensions. Positive climate encompasses the degree to which students experience warm caring relationships with adults and peers and enjoy the time they spend in the classroom. Negative climates are those in which students experience frequent yelling, humiliation, or irritation in interactions with teachers and peers.

The aspect of climate that has been studied most extensively in the past 10 years is the nature and quality of teachers' relationships with students. There is strong evidence for the salience of student-teacher relationships as an important context for children's development (see Pianta et al., 2003); student-teacher relationships are associated with children's peer competencies (e.g., Birch & Ladd, 1998; Howes, 2000; Howes et al., 1994) and trajectories toward academic success or failure (Birch & Ladd, 1996, 1998; Hamre & Pianta, 2001; Ladd et al., 1999; Pianta et al., 1995; Silver et al., 2005; van Ijzendoorn, Sagi, & Lambermon, 1992). There is evidence that certain teachers have tendencies to develop more positive relationships, across multiple students in their classroom, than do others (Hamre, Pianta, Downer, & Mashburn, 2005; Mashburn, Hamre, Downer, & Pianta, 2007). Children and youth in classrooms with higher levels of teacher support have higher levels of peer acceptance and classroom engagement than do their peers in less supportive classrooms, even after controlling for individual levels of teacher-support (Hughes, Zhang, & Hill, 2006).

Teacher Sensitivity

Teachers provide more than a warm and caring social environment. They must be attuned and responsive to the individual cues and needs of students in their classrooms, a dimension of teaching referred to here as teacher sensitivity. Highly sensitive teachers, through their consistent, timely, and responsive interactions, help students see adults as a resource and create environments in which students feel safe and free to explore and learn (Pianta et al., 2004). Highly sensitive teaching requires teachers to attend to, process, and respond to a lot of information simultaneously. For example, during whole group instruction, a sensitive teacher may, within quick succession, notice some children not paying attention, see that one child is frustrated because he does not understand her questions, and observe a sad look on a child she knows is generally very happy and engaged. The sensitive teacher not only notices these subtle cues from students, but knows her students well enough to respond in ways that help alleviate their problems. She may, for example, change the tone of her voice to reengage those students not participating, take a quick moment to restate her question in simpler language, and make a mental note to check in with the sad student at recess. In contrast, an insensitive teacher may completely miss these subtle cues or respond in ways that aggravate, rather than alleviate, students' problems.

Students in classrooms with sensitive teachers are more engaged and self-reliant in the classroom and have lower levels of mother-reported internalizing problems than do those with less sensitive teachers (NICHD ECCRN, 2003; Rimm-Kaufman, Early, & Cox, 2002). Sensitive teaching is important to not only social outcomes, but also to academic outcomes. For example, among a group of preschoolers, those who experienced more responsive teacher interactions in preschool displayed stronger vocabulary and decoding skills at the end of first grade (Connor, Son, & Hindman, 2005). Sensitivity—timing and responsiveness to student cues—is perhaps one of the single most important features of interaction in relation to engagement as these behaviors on the part of the teacher literally denote the extent of calibration in drawing the student toward an opportunity.

Regard for Students' Perspectives

The final dimension of emotional support is the degree to which classrooms and interactions are structured around the interests and motivations of the teacher, versus those of the students.

In some classrooms, teachers frequently ask for students' ideas and thoughts, follow students' lead, and provide opportunities for students to have a *formative* role in the classroom. In these classrooms, students are not just allowed to talk but are actively encouraged to talk to one another (Pianta et al., 2004). At the other end of the continuum are classrooms in which teachers follow very scripted plans for how the day should run, show little flexibility or response to students' interests and motivations, and provide few opportunities for students to express their thoughts or to assume responsibility for activities in the classroom. Teachers in these classrooms may also be very controlling of student movement, requiring, for example, young children to sit quietly on the rug with their legs crossed and hands in their laps for long periods of time, or for older children, requiring long stretches of drill.

Children and adolescents report more positive feelings about school, display more motivation, and are more engaged when they experience more student-focused and autonomy-supportive instruction (deKruif, McWilliam, Ridley, & Wakely, 2000; Gutman & Sulzby, 2000; Pianta, La Paro, Payne, Cox, & Bradley, 2002; Valeski & Stipek, 2001). Students in more teacher-directed classrooms have higher levels of internalizing problems (NICHD ECCRN, 2003). There are some findings, however, suggesting that the optimal level of teacher control may vary depending on factors such as learning objectives (Brophy & Good, 1986; Soar & Soar, 1979) and grade (Valeski & Stipek, 2001). Interestingly, there is ample support that adolescents also thrive when given some degree of control and choice over their learning (NRC, 2004).

Classroom Organization Domain

Educational research and practice place tremendous emphasis on the role of organization and management in creating a well-functioning classroom. In the TTI framework, classroom organization is the domain of teacher-student interactions through which teachers organize *behavior*, *time*, and *attention* (Emmer & Stough, 2001). Teachers using more effective behavior management strategies (Arnold, McWilliams, & Arnold, 1998; Emmer & Strough, 2001; Evertson, Emmer, Sanford, & Clements, 1983; Evertson & Harris, 1999), having more organized and routine management structures (Bohn, Roehrig, & Pressley, 2004; Cameron, Connor, & Morrison, 2005), and implementing strategies that make students active participants in classroom activities (Bowman & Stott, 1994; Bruner, 1996; Rogoff, 1990; Vygotsky, 1978) have less oppositional behavior, higher levels of engagement in learning, and ultimately, students who learn more. Thus, the dimensions of teacher-student interaction that are reflected in the classroom organization domain include effective behavior management, productivity, and learning formats.

Effective Behavior Management

Behavior management is a term that is often applied to a broad spectrum of classroom management strategies, including teachers' abilities to engage students and make constructive use of time. Within the TTI framework, behavior management is defined more narrowly as teacher-student interactions intended to *promote positive behavior* and *prevent or terminate misbehavior* in the classroom. There is general consensus around a set of practices associated with more positive student behavior including: (a) providing clear and consistent behavioral expectations; (b) monitoring the classroom for potential problems and proactively preventing problems rather than being reactive; (c) efficiently redirecting minor misbehavior before it escalates; (d) using positive, proactive strategies such as praising positive behavior rather than calling attention to misbehavior; and (e) spending a minimal amount of time on behavior management issues (Emmer & Stough, 2001; Pianta et al., 2004). At the low end of this dimension, classrooms are chaotic with very few consistently enforced rules and a great deal of student misbehavior.

Most of the research on behavior management was conducted by process-product researchers in the 1970s and 1980s with studies consistently

showing that classrooms with positive behavior management tend to have students who make greater academic progress (Good & Grouws, 1977; Soar & Soar, 1979). Intervention studies suggest that teachers who adopt these types of practices after training are more likely than teachers in control groups to have students who are engaged and learning (Emmer & Strough, 2001; Evertson & Harris, 1999; Evertson et al., 1983). Surprisingly, researchers have yet to examine the extent to which these specific behavioral strategies are associated with the more recent concept of self-regulated learning behaviors, though prior work would suggest clear linkages.

Productivity

In productive classrooms, teachers are not only effective managers of behavior, but are well organized, spend a minimal amount of time on basic management activities such as taking attendance or passing out and collecting homework, and are prepared for instructional activities so that little time is lost in transition. Highly productive classrooms may resemble a "well-oiled machine" in which everyone in the classroom seems to know what is expected of them and how to go about doing it (Pianta et al., 2004). In contrast, when teachers do not manage time efficiently, students may spend extraordinary amounts of time looking for materials, waiting for the next activity, or simply sitting around.

Early work by process-product researchers focused attention on the importance of time management, providing consistent evidence that students are most engaged in productive classrooms, and that this engagement is, in turn, directly associated with student learning (Brophy & Evertson, 1976; Coker, Medley, & Soar, 1980; Good & Grouws, 1979; Stallings, 1975; Stallings, Cory, Fairweather, & Needels, 1978). Several more recent studies suggest that teachers observed to foster productive classrooms spend more time creating efficient routines at the beginning of the school year and that this early investment pays off for students and teachers by enabling them to spend less time in transition and more time in child-managed activities later in the school year (Bohn et al., 2004; Cameron et al., 2005).

Instructional Learning Formats

The instructional learning formats dimension of interaction focuses directly on the extent to which teachers provide interesting activities, instruction, centers/projects, and materials and facilitate those activities so that students are actively engaged through various modalities. Consistent with constructivist theories as well as information-processing views of learning and cognition (Bowman & Stott, 1994; Bruner, 1996; Rogoff, 1990; Vygotsky, 1978), formats for instruction should foster *active* participation in a specific learning opportunity such that the students are not only participating behaviorally but they are engaged cognitively as well. In classrooms low on this dimension, teachers may rely on one format, typically lecture, and fail to format instruction or provide opportunity for interaction that foster students' engagement. Again, formatting instruction developmentally is not solely contingent on the *type* of instruction or number of materials a teacher uses but rather how effectively the teacher interacts to use instruction and materials to engage students (Rimm-Kaufman, La Paro, Downer, & Pianta, 2005).

Instructional Interaction Domain

Instructional methods have been put in the spotlight in recent years, as more emphasis has been placed on the translation of cognitive science, learning, and developmental research to educational environments (Carver & Klahr, 2001). The theoretical foundation for the conceptualization of instructional supports in the TTI framework comes primarily from research on cognitive and language development (e.g., Carver & Klahr, 2001; Catts, Fey, Zhang, & Tomblin, 2001; Fujiki, Brinton, & Clarke, 2002; Romberg, Carpenter, & Dremock, 2005; Taylor, Pearson, Peterson, & Rodriguez, 2003; Vygotsky, 1991; Wharton-McDonald, Pressley, & Hampston, 1998). This literature highlights the distinction between simply learning facts and gaining "usable knowledge," which is built upon learning how facts are interconnected, organized, and conditioned upon one another (Bransford, Brown, & Cocking,

1999; Mayer, 2002). A student's cognitive and language development is contingent on the opportunities adults provide to express existing skills and scaffold more complex ones (Davis & Miyake, 2004; Skibbe, Behnke, & Justice, 2004; Vygotsky, 1991). The development of "metacognitive" skills, or the awareness and understanding of one's thinking processes, is also critical (Veenman, Kok, & Blöte, 2005; Williams, Blythe, & White, 2002). The exemplary work of the National Research Council's series, *How Students Learn* (Donovan & Bransford, 2005), summarizes research across disciplines to emphasize how specific teaching strategies can enhance students' development and application of these core thinking skills (Bransford et al., 1999). Within this broad, cognitively focused definition of instruction, we describe below three aspects of teachers' interactions with students that not only promote engagement but student learning outcomes as well.

Concept Development

Through instructional behaviors, conversations, and activities, teachers foster students' development of *concepts and higher-order thinking skills* (Pianta et al., 2004). In an extension of Bloom's Taxonomy (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956), Mayer (2002) offers a helpful description of the teaching and learning practices associated with the development of these cognitive skills. According to Mayer, learning requires not only the acquisition of knowledge (retention), but the ability to access and apply this knowledge in new situations (transfer). Teachers can facilitate this transfer process by providing students with opportunities to: *understand*—build connections between new and previous knowledge; *apply*—use procedures and knowledge to help solve new problems; *analyze*—divide information into meaningful parts; *evaluate*—make conclusions based on criteria or standards; and *create*—put pieces of knowledge together to produce new ideas. These features of students' cognitive engagement are directly promoted through teacher-student interactions. At the high end of this dimension, teachers are opportunists who not only plan activities in ways that will stimulate higher-order thinking, but they take advantage of the moment-to-moment opportunities *within* their daily interactions to push students toward deeper thinking. In contrast, in classrooms low on concept development, interactions between teachers and students focus on *remembering* facts, or simple tasks in which they must *recognize* or *recall* information.

Interactions that stimulate concept development predict greater achievement gains for students (Romberg et al., 2005; Taylor et al., 2003; Wharton-McDonald et al., 1998). As noted by Brophy (1986), this does not require that all of a teacher's questions are "higher level" questions, but that there is a balance in which teachers use higher level questions to help focus student attention on the process of learning rather than solely on the product. In one recent study, Taylor and colleagues (2003) examined the role of these teacher practices in reading development among children in 88 high-poverty classrooms (first to fifth grade) across the United States. They observed in classrooms three times over the course of the year and examined growth in a randomly selected nine students per classroom. Their observations consisted of mixed methods in which they collected quantitative information on the types and frequency of questions used by teachers, as well as detailed qualitative information on teacher practices. Results suggested that children in classrooms in which teachers emphasized higher-order thinking skills, through questioning and activities, displayed more reading growth over the course of the year.

Feedback

In order to get the most benefit from the instructional opportunities described above, students need feedback about their learning. Feedback refers to a broad range of teachers' interactions with students in which the teacher provides some information back to the student about their performance or effort. Research on feedback has typically focused on praise (Brophy & Evertson, 1976; Stallings, 1975), behavioral feedback, or attributional feedback, in which teachers make statements to students attributing their performance to either ability (e.g., "you did this well

because you are a good reader") or effort (e.g., "you did this well because you worked hard") (Burnett, 2003; Dohrn & Bryan, 1994; Mueller & Dweck, 1998). Although the TTI definition includes these forms of feedback, the focus is on feedback that provides students with specific information about the content or process of learning. High-quality feedback is described as communication from teachers that provides students with specific information about not only whether or not they are correct (Brophy, 1986), but about how they might get to the correct answer, how they might perform at a higher level, or how their performance meshes with larger goals. Teachers providing high-quality feedback provide frequent feedback loops or back-and-forth exchanges in which a teacher responds to an initial student comment by engaging with the student, or group of students, in a sustained effort to reach deeper understanding (Pianta et al., 2004).

Most research on feedback has focused on quantity rather than the quality. For example, within a group of elementary, middle, and secondary Kentucky schools, those identified as successful in reducing the achievement gap between White and African-American students had teachers who were more likely to provide frequent corrective and immediate feedback to students (Meehan, Hughes, & Cavell, 2003); in this regard, timing was clearly important. In studies in which quality of feedback was observed, these interactions were associated with gains in literacy and language across the preschool and kindergarten years (Howes et al., 2008) and a closing of the achievement gap among first grade students coming from disadvantaged backgrounds (Hamre & Pianta, 2005).

Language and Instructional Discourse

Children's ability to navigate the instructional and social opportunities in classrooms is dependent in large part on their language skills (Catts, Fey, Zhang, & Tomblin, 1999; Fujiki et al., 2002) and in turn requires that teachers engage students in conversations that promote the development of specific language skills such as social language and pragmatics (Ninio & Snow, 1999; Whitehurst et al., 1988), vocabulary (Justice, 2002; Penno, Wilkinson, & Moore, 2002), and narrative skills (Catts et al., 1999; Zevenbergen, Whitehurst, & Zevenbergen, 2003). In classrooms offering high levels of language modeling, teachers often converse with students, ask many open-ended questions, repeat or extend children's responses, and use a variety of words, including more advanced language which is explicitly linked to words the students already know. Although there is a mix of teacher and student talk in these classrooms, there is a clear and intentional effort by teachers to promote students' language use, including explicit attempts to facilitate peer conversations (Justice, Mashburn, Hamre, & Pianta, 2008; Pianta et al., 2004). At the low end, classrooms are dominated by teacher talk, and student utterances are rarely attended or responded to in any meaningful way.

Young children exposed to high-quality language modeling, at home and at school, display more positive language development (Catts et al., 1999; Justice, 2002; Ninio & Snow, 1999; Penno et al., 2002; Reese & Cox, 1999; Schuele, Rice & Wilcox, 1995; Whitehurst et al., 1988; Zevenbergen et al., 2003) which, in turn, is associated with more positive social adjustment (Hemphill & Siperstein, 1990; Pianta & Nimetz, 1991) and greater reading abilities (Catts et al., 1999). In one example, Justice, Meier, and Walpole (2005) tested the degree to which teacher-child interactions influenced kindergarten children's increases in vocabulary. Results suggest that when children are explicitly introduced to new words through providing a definition (e.g., a *marsh* is a very wet place where there are wetlands covered with grasses) and using the new word in a supportive context (e.g., like, we took a boat through the *marsh* and we saw lots of birds and alligators), they show greater vocabulary development relative to a comparison group (Justice et al., 2005). In contrast, simple exposure to new words through book reading was not associated with significant vocabulary gains.

In the upper grades, language-related interactions between teachers and students can be characterized in terms of instructional discourse in the classroom. Teachers promoting rich instructional discourse do so through verbal interactions that foster exchanges of ideas, concepts, and

perspectives as well as student control over discourse. Because of the fundamental importance of language as both a social medium and a medium for conveying information, teachers' language and their interactions around language with and among students are fundamental to the ways in which teacher-student interactions are a medium for student engagement.

Measuring Teacher-Student Interactions

When approaching the task of translating the Teaching Through Interactions framework into a measurement tool for observing teacher-student relationships and interactions, we proposed a model (Hamre & Pianta, 2007) that organizes teacher-student interactions at four levels, from broad to micro in nature. As described earlier, the broad *domain* of emotional supports is defined in terms of three *dimensions*: classroom climate, teacher sensitivity, and regard for student perspectives. Each dimension is operationalized at more granular levels of analysis in terms of a set of specific *behavioral indicators* that are then defined in terms of observable *behavioral interactions*. Classroom climate includes observable behavioral indicators such as the frequency and quality of teachers' affective communications with students (further specified in terms of smiles, positive verbal feedback) as well as the degree to which students appear to enjoy spending time with one another. This multilevel conceptualization of the interactions between a student and teacher can be observed in actual classroom environments, moving from broad theoretically based domains (as described above in the TTI framework) to very specific behaviors. The resulting articulation of the TTI framework into the four levels of description and accompanying scaling into examples of interaction from "low" to "high" quality along a seven-point rating scale is described in the Classroom Assessment Scoring System, or CLASS (Pianta, Mashburn, et al., 2008). The CLASS is the measurement tool for observing and evaluating teacher-student interactions derived from the TTI theoretical framework.

In an attempt to test the validity of the three-domain organization of the TTI across multiple grade levels, Hamre and colleagues (2010) drew from a sample of over just under 4,000 preschool to fifth grade classrooms that were a part of several large national and regional studies. Results of a confirmatory factor analysis suggested adequate fit of the three-factor model, and that the fit of this model was superior to a one- or two-factor model. This means that all three of the domains of teacher-child interactions described in the TTI framework and assessed by CLASS are important for describing teacher-child interactions and understanding the impacts that classrooms have on students; no single domain on its own may be enough. That is, interactions and relationships between teachers and students reflect a number of facets and features, common across grades and ages, but nonetheless multidimensional.

We also were interested in the extent to which classroom processes at different levels (behavior, indicator, dimension, domain) predict differentially to outcomes (gains). Put another way, do teacher-child interactions encoded at the level of dimension based on global 1–7 ratings of teacher-interaction across a 15–20-min period predict to student achievement gains better or worse than teacher-student behavior encoded as counts or checklists of discrete teacher interactions toward a student? This question concerning level of analysis reflects major conceptual issues regarding the actual level at which developmentally meaningful or salient connections between the child and classroom context occur. Drawing on Sroufe's (1996) work and a developmentally informed theory of teacher-child interactions as embedded in a relationship (Pianta, 1999), the TTI framework posits that the level at which interactions with adults predicts development is best captured at the level of *dimensions* of interaction that take place over time. In the case of the CLASS as a measure, this is operationalized by ratings on a seven-point dimension made after 20 min of observation. In preliminary analyses, we find fairly consistent support for prediction of achievement and social gains at the level of dimensions of teacher-student interaction (i.e., seven-point ratings) rather than for counts or time samplings of discrete teacher behaviors.

Moreover, we find that discrete teacher behaviors are highly unstable from moment to moment across time, and the frequency of their display is highly contingent on the nature of the activity. In terms of a theory of relationships and engagement, these results suggest that to capture the qualities of interactions and relationships that foster and reflect engagement, it may be important to conceptualize and assess those interactions over episodes and patterns of behavior rather than discrete instances. In other words, the whole may be greater than the sum of the parts.

Conceptually, the reason for expecting that discrete teacher behaviors would be less strongly related to student growth is that measures of isolated behaviors, by definition, do not capture aspects of the teacher's behavior that reflects either a *response to the child* or a *calibrated intent to stimulate development* that are both stable across moment-to-moment fluctuations and reflect reliable differences between individual teachers in their approach (Magnusson & Stattin, 1998). This ongoing process of calibration is where we believe the focus on interactions maps well onto the discussion of student engagement and its importance. Not surprisingly, we find that indeed, dimensions of teacher-student interactions are rather stable across time and reflect variance that is reliably located between teachers (Mashburn et al., 2007).

The dimensions of interaction assessed by the CLASS elementary version predict growth in literacy and math as well as reduced teacher-child conflict and problem behavior from pre-K through fifth grade (Hamre & Pianta, 2005; Howes et al., 2008; NICHD ECCRN, 2004). The CLASS is one of the most current and widely used standardized assessments of social and instructional interactions in classrooms (Hart et al., 2005; NICHD ECCRN, 2002, 2005; McCaslin, Burross, & Good, 2005). The CLASS-Secondary version, or CLASS-S, is explicitly designed to capture precisely those aspects of classroom interactions that we hypothesize above to be resources for adolescent engagement. As such, it builds on and incorporates all of the strengths of the CLASS system at elementary levels, while adding specific dimensions conceptualized and operationalized to maximize adolescent engagement.

Changing Interactions Between Teachers and Students in Classrooms

In this section, we briefly outline results from descriptive research using CLASS that forms the basis and rationale for the steps we have taken to improve teacher-student interactions. It then summarizes our approach to professional development, which we call MyTeachingPartner, which is designed explicitly around the CLASS as a focus for changing interactions.

Improving Teacher-Student Interactions

We posit four levers producing developmental change for teacher-student relationships and interactions: (1) *teachers' knowledge and cognitions* related to their interactions with students, (2) availability of ongoing *relational supports for teachers* themselves, (3) teachers' regular *exposure to individualized feedback* about their actual interactions with students, and (4) *a standard and valid "target" around which to focus* efforts to change interactions. The hypothesis we are testing in our ongoing work is that intervention packages that activate these levers in a coordinated way are most likely to induce and maintain change, given the systemic nature of teacher-student relationships and interactions in classrooms. Here we describe the theoretical and technical features of MyTeachingPartner (MTP), an innovative professional development approach that by design incorporates these four levers for changing teacher-student interactions and relationships. MTP utilizes a collaborative consultation process and web-based resources to provide ongoing, classroom-focused in-service training across a distance.

MTP is an ongoing, systematic professional development program for teachers, one feature of which centers on a supportive consultation relationship, which is sustained via web-based interactions in which teachers have the opportunity to view video of their own and others' interactions with students, annotated using the CLASS framework in language that is both at the level of specific behaviors and indicators but also connects to the level of dimensions.

These opportunities are provided in the context of a college course (Hamre et al., 2010), a library of annotated video clips that are exemplars of highly rated interaction, and a web-mediated process of ongoing individualized consultation (Pianta, Mashburn, et al., 2008).

The web-based consultation revolves around observation-based reflection, and feedback is enacted through a regular cycle of interactions between a teacher and consultant. Every 2 weeks, teachers videotape their practices in the classroom and share this footage with consultants. Together, they then use the CLASS (Pianta et al., 2007) as a common lens with which to observe and reflect upon aspects of teaching and teacher-child interactions that have known links to children's skill development and start by choosing a dimension of the CLASS that will serve as the basis for consultation and feedback.

MTP consultants provide direct, individualized, regular, and systematic feedback to teachers based on validated, observational assessment of the classroom environment. The MTP consultancy process functions by increasing teachers' knowledge and skills to observe the qualities of their interactions with students and the contingencies involved, and their awareness of the meanings of these interactions in terms of their contributions to motivational, relational, and competence-enhancing processes. The process also encourages reflection on the teachers' own personal motivations and tendencies in these interactions and their impact on interactive behaviors in an effort to internalize change and sustain it.

Recent controlled evaluations of these professional development assets demonstrate several benefits for improving the quality of teachers' interactions with children (Pianta, Belsky, et al., 2008), children's attentiveness and literacy outcomes in pre-K (Mashburn et al., 2008), as well as student reports and observation of engagement in secondary classrooms, and student test scores (Allen et al., 2010). Preliminary evaluations of a course that focuses on teachers' learning of CLASS dimensions and indicators show positive effects on teachers' knowledge and beliefs about teaching and significant effects on their interactive behaviors in the classroom. Opportunities for observing annotated video exemplars of other teachers' effective interactions with students shows positive effects for improvements in teacher-child interactions (assessed by the CLASS) for teachers with low levels of experience, and consultation involving ongoing observation, analysis, and feedback regarding one's own behavior shows clear positive impacts on teacher-child interactions, with particular benefits for teachers in high-need classrooms.

Interestingly, as we further interpret these results, particularly in light of focus group interviews with teachers, we have started to hypothesize that the process of changing teacher-child relationships and interactions involves entering the systems (behavioral, psychological, emotional) that teachers use to self-regulate around their interactions with students. In terms of the psychological processes involved, we find that teachers routinely report the value of the CLASS as a "roadmap" for how to improve their teaching, or that CLASS validates and provides a structure for their own explanations, interpretations, and analysis of their practice. Teachers regularly note that having a common language and lens for their interactions with students that is directly, overtly, and explicitly articulated in a set of professional development resources is of great benefit to them as it grounds those resources in the realities of their practice and experience. Although teachers describe their interactions with reference to the more molar dimensions of the CLASS framework, what is of most use to them is the very detailed and explicit descriptions of interaction at the levels of behavioral indicators and behavioral interactions. Our hypothesis is that this more granular level of analysis meshes well with the psychological and behavioral systems that teachers and students use to calibrate their engagement with one another and with the focus of classroom activities. We plan further tests of this idea in subsequent studies.

Conclusions and Future Directions

Although classrooms are complex social systems and student-teacher relationships and interactions are also complex, multicomponent systems, we

posit that the nature and quality of interactions between teachers and children are fundamental to understanding student engagement, can be assessed through standardized observation methods, and can be changed by providing teachers knowledge about developmental processes relevant for classroom interactions and personalized feedback/support about their interactive behaviors and cues.

A theory of classroom settings must be premised on an understanding of the developmental significance of those settings' influence on children and youth and the mechanisms of these effects. Once that knowledge base is established, then theory can move to how those mechanisms (in this case, student-teacher interactions) themselves can be changed. In this chapter, we focused on the theoretical and empirical links between interactions and engagement and presented an approach to intervention designed to increase the quality of such interactions and in turn increase student engagement and, ultimately, learning and development. Recognizing general principles of development in complex systems, a theory of the classroom as a setting for development and a theory of change specific to this social setting are the ultimate goals of this work. Engagement, in this context, is both an outcome in its own right and a mediator of impacts that teachers have on student outcomes through their interactions with children and youth. In light of this discussion, we offer the following suggestions or directions for further research in this area.

First, it is apparent that researchers must distinguish, in their conceptual models and empirical work, the positioning of engagement in the causal chain—as an input to learning, a mediator situated between experience and outcomes, or as an outcome in its own right. Failure to specify this role can easily lead to confusion and misinterpretation. In the context of a focus on interactions and relationships, we have focused on engagement as a mediator and potential outcome. By specifying the role of engagement in a putative causal chain, investigators can then more strategically and systematically confirm or disconfirm hypotheses rather than report assortments of correlations.

Relatedly, a molar, pattern-oriented view of relationships and interactions appears most helpful when using assessments to capture classroom inputs related to engagement. Approaches that are highly focused on occurrences of granular, discrete behaviors captured in isolation or extracted from the ongoing behavioral stream are less likely to yield interpretable or meaningful findings. This does not mean that a focus on specific teacher behaviors is not of use; in fact, in our professional development work, we are highly focused on analysis of teachers' specific behaviors but always in reference to broader dimensions and patterns of interaction. It appears important to us that programs of research conceptualize and assess relationships and interactions in coherent systems that reflect multiple levels of analysis.

Finally, we believe it is critical to subject hypotheses to experimental tests in research on classroom processes. Classrooms are indeed complex, and there is no shortage of description and theoretical narrative available. In too many cases, descriptive studies simply confirm the narrative and theory and do not provide tests that could actually disconfirm hypotheses and helps simplify complexity into actionable models. In a literature focused so heavily on processes—engagement, relationships, and interaction—it might be even more important for research designs to have the capacity to disconfirm hypotheses or speculation. Thus, we posit that advances in both theory and intervention concerning engagement and relational processes can benefit from a dialectical balance in research design—experiments and rich description of processes.

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