The Classroom Learning Activities Checklist:
Validity Evidence of an Observation Tool in Preschool

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Abstract

In this paper, the Classroom Learning Activities Checklist (CLAC) is proposed as a classroom observation measure that effectively captures the classroom environments and strategies that support self-regulation via task-oriented learning in young students. The CLAC's dimensionality, reliability, and concurrent and predictive validity evidence are presented. The study sample uses data from the Midwest Child-Parent Center (MCPC), an evidence-based PreK-3rd grade intervention and school reform model that provides comprehensive family and school support services to a cohort of at-risk children. Data from enrolled students (n = 677) in observed classrooms (N = 72) are included as part of this analysis. Examination of the tool's development and its descriptive statistics revealed high levels of construct validity evidence in assessing the construct task orientation. Factor analysis indicated a 2-factor model best describes the dimensionality of the data. Reliability estimates were consistently high and concurrent validity measures indicated CLAC was associated with different aspects of classroom quality. Finally, using linear and probit regression analyses, CLAC scores predicted students' math and literacy development. Implications for further tool refinement, dissemination, program monitoring and evaluation, and professional development are discussed.

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Chapter 1

Introduction

Out-of-family care for young children is increasingly moving into the public spotlight as parents and policymakers rely on regulatory entities and the research community to define and drive quality. Children at-risk, in particular, benefit from *quality* early childhood (EC) environments as achievement gaps are often well established before the first day of kindergarten.

Unpacking and defining the “quality” in early childhood classroom quality is a challenging task as it relies on the assumption that there is a) veritable consensus as what children should know and do at kindergarten entrance while b) being able to meaningfully identify, measure, and support these behaviors and skills. Quality is typically defined by either structural indicators (e.g., group sizes, teacher: child ratios, teacher qualifications) (Vandell & Wolfe, 2000) or process indicators (e.g., teacher-child interactions) (Phillipsen, Burchinal, Howes, & Cryer, 1997).

In center/classroom-based early childhood learning environments, specific aspects of classroom practice have been linked to children’s social and academic outcomes. For example, teachers’ levels of education (minimum bachelor’s degree) are associated with children’s development of social competence (Mashburn et al., 2008) and higher receptive language skills (Burchinal, Cryer, Clifford, & Howes, 2002). Further, high-quality instructional practices and teacher-child interactions in early childhood programming have replicated linkages to children’s academic and social development (Gosse, McGinty, Mashburn, Hoffman, & Pianta, 2014; Mashburn et al., 2008; Wasik & Hindman, 2014). Review of evidence indicates both quality factors are important in supporting at-risk children's gains, yet structural features may be necessary but insufficient at exclusively targeting children's learning.

Considering Child Characteristics

Another approach in defining classroom quality is a two-part process: 1) identify child-level characteristics and skills that predict later learning, and then 2) isolate specific classroom practices, characteristics, and environments that support them. Both children's academic and nonacademic skills predict later school success. While it seems fairly intuitive early academic skills (e.g., early math and emergent literacy skills) predict later learning (e.g., Reynolds, 2000; Storch & Whitehurst, 2002), a separate set of self-regulatory skills may independently contribute to children's achievement and wellbeing. Evidence suggests self-regulation development via self-directed learning and classroom engagement uniquely contributes to and fosters children's learning (e.g., Fantuzzo, Perry. & McDermott, 2004; Fitzpatrick & Pagani, 2013).

Self-regulation. Self-regulation is a broad construct that can be loosely defined as sets of skills that promote the development of children's purposeful control of thoughts and actions (Blair, Zelazo, & Greenberg, 2005). Self- regulatory skills form a critical foundation that undergirds children's cognitive and socio-emotional development. A balance between emotional physiology and cognitive regulation emerges from self-regulation. Children's goal-oriented learning is promoted through the management and control of attention and emotion.

Children's early self-regulation and their approach to learning have been linked to a wide range of outcomes, including literacy skill development and early math skills (Blair & Razza, 2007; Dobbs-Oates, Kaderavek, Guo & Justice, 2011); positive adaptive behavior and reductions to problem behavior (Rimm-Kaufman, Curby, Grimm, Nathanson, & Brock, 2009); and later achievement (Duncan et al., 2007). When translating self-regulatory behaviors into classroom skills that connect to later learning, specific behaviors of engagement, task orientation, effortful attention, and emotional regulation can be identified and isolated (Blair & Raver, 2014).

Task orientation. Task orientation is a classroom skill where children actively facilitate their learning via their direct and focused attention to the learning activities. For this dissertation study, I operationalize task orientation as the assumption that students are engaged in their learning; moreover, students are required to successfully navigate through a series of tasks to reach a learning goal or activity. Further, students regulate their emotions and reactions to effectively direct focused attention to the current task. Active participation is central to task orientation in this model where students are not passive recipients in their own learning. Self-control and self-directed learning are also critical in task orientation: students must effectively maintain their focus, drive their own learning, and regulate their behavior to match the needs of the task at hand. Task orientation is a unique contributor to later cognitive functioning (Kohn & Rosman, 1973).

Classroom Characteristics

Certain classroom features theoretically promote or, at a minimum, moderate students' task orientation and engagement in the classroom. A balanced instruction model of teacher-directed and child-initiated learning, accessibility to learning time, and the presence and absence of student misbehavior are characteristics that potentially facilitate, or conversely, impede task-oriented learning.

Instructional balance. There is evidence that a balanced approach of teacher-directed and child-initiated learning promotes achievement (Graue, Clements, Reynolds, & Niles, 2004). Early childhood instructional approaches can be categorized either as those that emphasize teacher-directed or child-initiated learning. The driver defines the distinction between the two approaches: In teacher-directed programming, learning is organized and sequenced by the teacher where child-initiated activities and environments may be planned by the teacher but chosen by the student. Conceivably, classrooms that employ a blended instructional approach will simultaneously have higher levels of task orientation.

Learning time. Children's access to quality interactions and environments (including those that promote task-oriented learning) hinges, in part, to the actual amount of learning time offered during program hours. Teachers' provision of learning time, both scheduled and actual observed time, can be significantly disrupted by transitions, routines (e.g., meals, bathroom breaks), or other classroom interruptions (e.g., taking attendance).

Student behavior. Student behavior in the classroom is affected by and in turn affects task orientation. First, an individual student's self-control and ability to follow classroom expectations may promote (or alternately inhibit) the individual learner while simultaneously affecting the overall classroom environment (e.g., disrupting others' attentive learning vs. demonstrating positive learning behaviors). Secondly, the classroom environment may promote task-oriented behaviors through effective classroom management strategies and clear and consistent behavioral expectations. Classroom-wide behavior management supports can reduce preschoolers' externalizing and internalizing problems (Han, Marciel, Catron, & Weiss, 2005) and promote appropriate student behavior (Hiralell & Martens, 1998).

A balanced instructional approach, ample learning time, and proactive behavior management strategies are undoubtedly interrelated and affect one another. While together they contribute to overall classroom quality, they support a more specific set of classroom environments and strategies that facilitate self-regulation via task-oriented learning.

To date, no process quality assessments specifically focus on task orientation (e.g., task persistence, attentiveness, self-directedness, active engagement). While other assessment tools, e.g., the Classroom Assessment and Scoring System (CLASS; Pianta, Hamre, & La Paro, 2008) and Early Childhood Environment Rating Scale-Revised (ECERS-R; Harms, Clifford, & Cryer, 2005), have highlighted aspects of these behaviors, they often aggregate specific task-oriented behaviors into larger constructs, prohibiting the ability to assess the behaviors' unique contribution. Additionally, given the extensive resources necessary to both train and assess classrooms using the available classroom instruments, needed in the early childhood field is a brief tool that measures the unique classroom behaviors that support students' self-regulation development via task orientation.

Purpose

In an attempt to detect and record specific behaviors that theoretically support the development of children's self-regulation via task-oriented learning, a classroom-level checklist was created and then implemented in over 70 pre-kindergarten (Pre-K) classrooms. The tool, the Classroom Learning Activities Checklist (CLAC), is a 28-item assessment with four subscales (teacher facilitation, observed student engagement and active participation, time management and student behavior). The purpose of this dissertation study is to examine the ability of CLAC scores to effectively measure a dimension of classroom quality: task-oriented learning.

Research Questions

This dissertation seeks to better understand the psychometric properties of the Classroom Learning Activities Checklist (CLAC) by answering four main questions relating the measure's dimensionality, reliability, and validity evidence:

1. What is the dimensionality and construct validity evidence of the tool? Specifically, I will describe the characteristics of the CLAC tool, its organization, general descriptive statistics and inter-correlations.

2. What is the reliability evidence of the CLAC measure, including internal consistency (Cronbach's alpha), inter-rater agreement, and factor structure description?

3. What evidence supports the concurrent validity of the measure?

    a. How does the assessment tool correlate to the widely used and well-evidenced Classroom Assessment and Scoring System (CLASS; Pianta, et al., 2008)? The relations between CLASS domains to CLAC variables will be evaluated.

    b. How does the CLAC tool correlate to measures of teacher-directed and child- initiated learning?

    c. How does the CLAC link to aspects of teacher quality? Relations among teacher characteristics (teacher education, experience, and ongoing professional development opportunities) and CLAC variables will be reported.

4. What is the predictive validity evidence?

   a. To what degree does CLAC predict children's later learning, using Teaching Strategies GOLD (*TS GOLD;* Heroman, Burts, Berke, & Bickart, 2010), a performance-based assessment of school readiness skills?

   b. What is the unique contribution of the CLAC measure on children's learning when including the CLASS in the prediction model?

Chapter 2

Literature Review

On a weekly basis, over half of children under five spend time in a nonrelative care (Laughlin, 2013) and ensuring the quality of these environments is critical as the early childhood (EC) field continues to learn more about the importance of first experiences and their consequent impact on short, mid, and life- long outcomes. Children from poverty, in particular, are poised to benefit the most from quality early programming, as they too often arrive to kindergarten with sets of risk factors that impede cognitive ability and school readiness, and affect later academic achievement and adult well-being (Barnett, 1998; Duncan, Magnuson, Kalil, & Ziol-Guest, 2012).

The deleterious effects of poverty on short, mid, and later academic outcomes are well documented. Compared to non-poor children, children in poverty are more likely to experience developmental delays and learning disabilities; are more likely to repeat grades, be expelled or suspended; are less likely to finish high school; and are more likely to have emotional or behavioral problems (Brooks-Gunn & Duncan, 1997). Additionally, the presence of poverty at different developmental time periods, most particularly early childhood, has the greatest impact on later achievement and high school completion (Duncan, Brooks-Gunn, Yeung, & Smith, 1998). While the mechanisms by which poverty affects later outcome measures are more complicated and can include parenting, health, and home environments (Brooks-Gunn & Duncan, 1997), building and sustaining quality EC care is a critical element in supporting children's development during this crucial time period.

Theoretical Underpinnings

As described by Bronfenbrenner’s (1979) ecological systems theory, children develop within multiple layers of influences across time. These overlapping influences are multi-directional and are nested in varying degrees of accessibility to children. Specifically to early childhood (EC) classroom quality, this framework demonstrates how multiple influences impact children’s development through direct and interactive pathways: *microsystem* (classroom practices that directly impact children’s social and academic gains, including teacher-child and child-child interactions, accessibility to and interactions with materials, teacher-child relationships, and learning activities); *mesosystem* (more distal features of classroom quality, including: type and use of curriculum, child: teacher ratios, group sizes, pedagogy, and teacher education, training, and experience); *exosystem* (the organizational structure of the larger EC care environment, incorporating professional development systems, funding streams, EC intervention and individualized support systems, and family support services); *macrosystem* (e.g., local and state policies, community values, and larger cultural belief systems); and finally, *chronosystem* (changes across time and context).

Undoubtedly parent, family, home, and community factors influence children’s development and any early childhood intervention should comprehensively target these multiple dimensions of influence. It is equally critical, however, to further scrutinize and understand the direct and promising role of quality care experiences as part of a larger holistic framework in addressing at-risk children’s disparate access to early and lifelong achievement. Specifically, attention should be focused on the interactions and strategies that leverage early childhood learning.

Quality is Key

Quality early childhood programming is a demonstrated effective approach in supporting early learning and, in turn, assisting in closing persistent achievement and opportunity gaps between young children arriving at kindergarten with risk to their counterparts (Barnett, 1995; Bingham, & Patton-Terry, 2013; Brotman et al., 2013; Campbell et al., 2002; Duncan & Sojourner, 2013; Hindman, Erhart, & Wasik, 2012; Schweinhart & Weikart, 1988; Wilson, Dickinson, & Rowe, 2013).

These positive effects are well established and represent a host of proximal and more distal outcomes. For example, the Child-Parent Center (CPC) program, an intensive, early childhood program serving primarily low-income African American children, increased participants' academic achievement in grades kindergarten through high school (Reynolds, Englund, Ou, Schweinhart, & Campbell, 2010), reduced grade retention and special education placement rates in elementary years (Conyers, Reynolds, & Ou, 2003), and led to higher levels of educational attainment (including elevated high school completion rates and college entrance) (Reynolds, Temple, Ou, Arteaga, & White, 2011).

Defining and Measuring Quality

While an absolute definition of "quality" is arguably subjective and interpretable, two broad constructs that outline classroom quality in EC care currently exist: structural and process variables. The structural indicators often refer to the "who", "what" and "where" aspects of care, such as teacher training, curriculum, class size, teacher: child ratio, and additional services to parents and families. These features are more readily regulable and are often represented through licensing or accreditation standards (Vandell & Wolfe, 2000).

Process quality generally refers to the “how”, i.e., the observed implementation of instructional strategies and the evidence of responsive caregiving. Other process-oriented characteristics include the provision of effective learning activities, teachers’ organization of routines and availability of interesting learning materials, and most critically, the interactions between teachers and children and among children (Phillipsen, Burchinal, Howes, & Cryer, 1997). While there is evidence to suggest variables within both aspects of quality independently predict child outcomes (e.g., Burchinal et al., 2002; Hamre & Pianta, 2005; Harms et al, 2005; Howes, 1990), much is unknown about the nuanced relations that exist between and among specific structural and process indicators to relevant learning outcomes.

Structural Quality

Structural quality can be viewed as malleable components within a classroom that can be readily changed to affect the environment (structure) or classroom requirements (e.g., class sizes, ratios, curricula, teacher qualifications). While these components undoubtedly serve important roles in ensuring children can benefit the most from early childhood programming, their unique and direct contribution to child outcomes is less clear.

In a study that examined child care quality, age of care, and family characteristics on children’s social adjustment, Howes et al. (1990) found a Pre-K composite structural variable of adult: child ratios, caregiver training, and stability of caregivers was associated with children’s kindergarten adjustment. Similarly, greater adherence to Pre-K standards (adult: child ratio, group size, caregiver education and caregiver training) has been positively associated with school readiness and language comprehension, and negatively associated with behavior problems (NICHD ECCRN, 1999).

Teachers are a critical component to classroom quality and unquestionably, their previous experiences, education, and expertise shape the classroom environment and more importantly, children's learning. Some evidence suggests children in classrooms whose teachers receive formal education (a minimum bachelor's degree) or those that more frequently attend in-service trainings have higher receptive language skills (Burchinal et al., 2002; NICHD ECCRN, 1999). Additionally, Burchinal et al. (2000) found teacher experience (14+ years) and teacher education (bachelor's degree) were independently correlated to better cognitive and receptive language development for girls. Receptive language skills were acquired more easily for girls whose teachers had bachelor's degrees.

More recent evidence, however, appears to contradict these findings. Despite a growing emphasis on requiring EC teachers to hold a bachelor's degree (e.g., Improving Head Start for School Readiness Act of 2007), teacher qualifications alone do not guarantee greater learning gains for children (Howes et al., 2008). Largely null findings were found and no trends appeared from the limited number of statistically significant correlations were found in a large-scale analysis of multiple studies (Early et al., 2007). No associations between teachers' highest degree to children's receptive language skills were found and only two studies found a significant difference for children whose teachers had a bachelor's degree. Three studies found an association between the pre-reading measure to teachers' highest degree. Limited significant correlations were found (two of the seven studies) between teachers' highest degree or bachelor's degrees to children's early math skills (Early et al., 2007).

These findings do not suggest teacher qualifications are not important features in quality early childhood programming. Better, they indicate teacher education and training is complex and better scrutiny is needed to understand both a) how to best define and measure critical features of pre-service and on-going education and b) how to effectively support specific practices aligned to children's learning.

In a study examining multiple quality components and their relation to children's academic, language, and social skills, Mashburn et al. (2008) found statistically significant relationships between two structural indicators to child outcomes: a) classrooms with teachers who hold bachelor's degrees were positively correlated with children's social competence and b) programs that served meals were associated with higher children's receptive language skills. None of the other structural elements (specialization in early childhood, certification in child development, class sizes (<20), comprehensive curriculum, child: adult ratio of less than 10:1, and programs with health and family services) were significantly associated with children's receptive and expressive language skills, phonological awareness, applied problem-solving skills, social competence or problem behaviors. Similarly, associations among ratios, program location and length have not been significantly associated with children's language skills, academic achievement, and social and motivation skills (Howes et al., 2008).

While there is some evidence to suggest that a number of structural components independently correlate to later children's outcome measures, these findings have not been replicated and further examination into structural types of variables do not provide sufficient evidence to suggest they alone can ensure quality in early care. Next, an overview of process quality variables will be presented along with their connection with learning gains.

Process Quality

Process quality measures the interactions and transactional exchanges among children to adults, among children, and materials within a learning environment. High-quality teaching practices and teacher-child interactions in early childhood programming have demonstrated and replicated linkages to children's academic and social development (Brophy-Herb, Lee, Nievar, & Stollak, 2007; Curby et al., 2009; Hamre & Pianta, 2005; Howes et al., 2008; Mashburn et al., 2008; Peisner-Feinberg et al., 2001; Wasik, Bond, & Hindman, 2006; Votruba-Drzal, Coley, & Chase-Lansdale, 2004). The quantity and quality of these different types of interactions have historically been measured using three widely used standardized observation tools: the Early Childhood Environment Rating Scale-Revised (ECERS-R; Harms et al., 2005); Classroom Assessment Scoring System (CLASS; Pianta et al., 2008); and Observational Record of the Caregiving Environment (ORCE; NICHD ECCRN, 1996). Each tool conceptualizes global classroom quality by identifying different dimensions of teacher- child interactions in the classrooms. Together, they independently contribute to an overall definition of classroom quality (with differing levels of evidence to support their use).

The ECERS-R (Harms et al., 2005) measures elements of process quality through live classroom visits that include: children's observed access to and interaction with the environment (the space, schedule, and learning materials), observed interactions between teachers and children and among children, and finally, health and safety practices. Over

69% of the total variance in the ECERS-R is captured through two independent factors: Teaching and Interactions and Provisions for Learning (Cassidy et al., 2005). The Teaching and Interactions factor is comprised of several items, including observed staff-child interactions, peer interactions, supervision, encouraging children to communicate, and using language to develop reasoning skills. The Provisions for Learning is a composite factor that includes safety provisions and the availability of furnishings and learning materials.

The CLASS (Pianta et al., 2007) assesses the quality of teacher-child relationships and specific types of interactions (e.g., teachers' repetition and expansion of children's language, teachers' explicit statements of clear behavioral expectations) between teachers and children that promote children's social and academic development. The tool is organized by three latent constructs: Emotional Support (warm and responsive caregiving); Classroom Organization (management of classroom practices that promote behavior and learning); and Instructional Support (strategies that foster language, continued learning, and higher-order thinking skills). Finally, the ORCE (NICHD ECCRN, 1996) assesses quality through four ratings on the presence of relationships with children and four ratings that assess the classroom setting.

Evidence suggests teacher-child interactions can be divided into two inter-related dimensions that directly correlate to young children's learning gains: instructional interactions and warm and responsive caregiving (Curby et al., 2009; Howes et al., 2008; Mashburn et al., 2008; Pianta et al., 2005; Wasik et al., 2006).

Responsive and sensitive caregiving. Caregiver relationships that are sensitive and responsive to children's needs and teachers' support for children's social and emotional functioning are positively connected with children's social and academic outcomes (Clarke-Stewart, Gruber, & Fitzgerald, 1994; Peisner-Feinberg & Burchinal, 1997). Specifically, teachers' emotionally-supportive relationships and positive classroom practices in pre-kindergarten are associated with social competencies (decreased problem behavior, sociability) (Burchinal, Vandergrift, Pianta, & Mashburn, 2010; Curby et al., 2009; Mashburn et al., 2008; NICHD ECCRN 2002); language and emergent literacy outcomes (expressive and receptive language, letter-word associations, letter identification, vocabulary, and verbal comprehension) (Howes et al., 2008; NICHD ECCRN 2000, 2002, 2005; Peisner-Feinberg et al., 2001); math skills (NICHD ECCRN 2002, 2005; Peisner-Feinberg et al., 2001; Pianta, La Paro, Payne, Cox, & Bradley, 2002); and measures of school readiness, cognitive ability (memory, attention), and achievement (NICHD ECCRN, 2000, 2002, 2005; Peisner-Feinberg et al., 2001; Vandell et al., 2010). These impacts are long-lasting: Responsive caregiving has been positively linked to academic gains in kindergarten through third grades (Burchinal et al., 2008; Hamre & Pianta, 2005; NICHD ECCRN 2005), higher levels of social adjustment and competency in elementary school (NICHD ECCRN, 2002); and growth in academic achievement at age 15 (Vandell et al., 2010).

Instructional interactions. Interactions that are cognitively stimulating and emphasize specific instructional skills between providers and children can impact young children's learning. High quality teacher-child instructional interactions are connected to later learning outcomes. Specifically, these strategies predict measures of children's receptive and expressive language and emergent literacy skills (Burchinal et al., 2008; Burchinal et al., 2010; Curby et al., 2009; Howes et al., 2007; Mashburn et al., 2008;

NICHD ECCRN, 2002). These instructional strategies are also associated with increases in children's math and reasoning skills (Burchinal et al., 2008; Curby et al., 2009; Mashburn et al., 2008; NICHD ECCRN, 2002).

Relation between Structural and Process Quality

Both structural and process variables contribute to children's socio-emotional and academic development and, unsurprisingly, correlate with one another. Higher levels of education are correlated with global measures of process quality and positive caregiving strategies (Burchinal et al., 2002; NICHD ECCRN 2000) yet were significant in only one of the seven studies reexamined by Early et al. (2007). A bachelor's degree is positively associated with global measures of process quality (Burchinal et al., 2002; Mashburn et al., 2008; Pianta et al., 2005) and specific process factors/domains (Early et al., 2007; Howes et al., 2008; Mashburn et al., 2008) but may be moderated by type of early childhood programming (Vu, Jeon, & Howes, 2008).

Lower teacher: child ratios and smaller group sizes (< 20 children) are also positively associated with various process outcomes (Howes et al., 2008; Mashburn et al., 2008). To a lesser degree, other structural variables have been associated with higher levels of process quality. Longer school days are associated with higher levels of process quality (Howes et al., 2008). Other program characteristics (i.e., located in schools, provides meals, family supports, and health services) have been linked to standardized measures of global process quality (Mashburn et al., 2008). Finally, the quality of caregiving mediates the relations between teacher education and child: teacher ratios to both children's cognitive and social competence (NICHD ECCRN, 2002).

Structure and Process Indicators Matter

These results help illustrate a more complex picture where both structural and process quality indicators play a critical role in the task of creating, improving, and replicating quality care environments more systematically. Notably, structural components alone cannot ensure children at risk receive the experiences necessary to thrive in early childhood environments whereas process variables have consistently been linked to measures of social and academic development. The relation between the two quality indicators suggest both are important in supporting children's gains, but process features likely serve as potential mediators between structural quality to children's achievement while some structural variables moderate the relations between process quality to children's development.

Continued investigation into process quality. As the literature indicates, process quality indicators have been consistently linked to children's performance on broader learning measures. Naturally, promoting practices that increase process quality and more importantly, those that increase children's learning gains, is a logical first step. Instead of simply boosting process quality scores on established observational measures (despite being a challenging feat in and of itself), further information is needed to identify the specific aspects of process quality that *cause* increases to children's learning. Further, a shift is needed where we move from global measures of process quality to a more focused examination into specific, causal classroom characteristics.

We must identify: a) specific types of learning activities, interactions, and provisions that impact learning, b) their necessary dosage and intensity, and c) contextual factors that directly facilitate these interactions. The use of child characteristics, more specifically those that best support learning can effectively facilitate this process. I propose one promising, yet understudied area of early childhood quality: the classroom characteristics that effectively promote young children's self-regulation by increasing opportunities for students to develop task orientation.

Self-Regulation

Self-regulation in early childhood has been extensively studied as more is learned about its role in supporting healthy social development and early learning (Blair & Razza, 2007; Bohlman, Maier, & Palacios, 2015; Sawyer et al., 2015). In this paper, I conceptualize self-regulation as a set of skills children use in controlling their thoughts and actions (Blair, Zelazo, & Greenburg, 2005). Common self-regulatory tasks assess children's ability to regulate and control their attention, regulate their emotions, and regulate their responses to external stimuli and are logically correlated with one another (Duckworth & Kern, 2011). Self- regulatory skills are particularly important for children to succeed in multiple domains at school because of the foundation they provide for successful functioning.

Early childhood is a key developmental period where children learn to interact with their surroundings and must learn how to regulate their attention, emotions, and reactions according to the demands of the environment. Ensuring early childhood environments, particularly those that serve children at risk, provide the appropriate supports for young children as they transition from external regulation (e.g., being rocked to sleep) to internal management (e.g., calming oneself down, shifting attention to a learning task at hand) is key.

Further, learning environments should promote a climate that facilitates self-regulation skill development for all learners. Peer effects of self-regulation have been demonstrated in early childhood classrooms: Classmates' self-regulation skills predicted both children's literacy achievement (passage comprehension and vocabulary growth), after controlling for individual self-regulation baseline scores and classroom socio-economic status levels (Skibbe, Phillips, Day, Brophy-Herb, & Connor, 2012).

Effect of early self-regulation. Early self-regulation and the numerous subskills it encompasses, have replicated effects on student learning, behavior, and long-term achievement (e.g., Duncan et al., 2007; Stipek, Newton, & Chudgar 2010; Valiente, Lemery-Chalfant, & Swanson, 2010; Welsh, Nix, Blair, & Nelson, 2010). Negative, significant relations between children's early self-regulation to later behavioral problems also have consistently been demonstrated (Hughes & Ensor, 2011, Murray & Kochanska, 2002, Rimm-Kaufman et al., 2009).

In a recent study, increases in children's self-regulation between ages four and six were associated with lower behavioral problems after controlling for family demographic characteristics and baseline self-regulation scores (Sawyer, Miller-Lewis, Searle, Sawyer & Lynch, 2015). These results suggest early childhood may be an optimal period to intervene on children who demonstrate low, stable self-regulatory skills.

The connection between early self-regulation to children's short and mid-term math achievement appears particularly strong. Self-regulation skills in preschool are associated with applied problem solving and quantitative concepts (Blair & Razza, 2007; Fuhs, Nesbitt, Farran, & Dong, 2014; McClelland, Morrison, & Homes, 2000; McClelland et al, 2007; Valiente et al, 2010; Welsh, Nix, Blair, & Nelson, 2010).

Similarly, Blair, Ursache, Greenberg, and Vernon-Feagan (2015) found effects between self-regulation measures to math achievement (applied problem solving) after controlling for family demographic characteristics in a large sample of mostly rural, low-income children (*N* = 1,292). Interestingly, no relations were found between the same early self-regulation assessments to early literacy learning measured through letter-word subtests. These disparate findings were explained through the underlying skill the math and literacy measure demanded: The math measure required a degree of reasoning, a skill closely associated to self-regulation skills of effortful control and executive functions whereas the literacy outcome tapped information processing speed and receptive vocabulary.

Despite the evidence previously presented, emergent literacy and language skills have been similarly linked to children's self-regulation. Self-regulatory skills, such as effortful control, behavioral regulation, and executive functions were correlated with later year- end literacy (letter- word identification) and language (oral comprehension) learning, and kindergarten language skill development (Blair & Razza, 2007; Fuhs et al., 2014; McClelland et al, 2007; Valiente et al, 2010; Welsh et al., 2010).

Stipek et al. (2010) examined a set of self-regulation-related behaviors (e.g., child works independently, seeks challenges) in low-income preschoolers and demonstrated these early behaviors were stronger predictors of 3rd grade literacy achievement than literacy skills at kindergarten and first grade. Moreover, these yearly assessments of self-regulation predicted each subsequent year's literacy outcome yet the literacy measures did not predict self-regulation measures, suggesting a unidirectional relation.

Self-regulation in young learners can be seen and measured through a number of expressed behaviors, including task orientation and relatedly, engagement and active participation. Self-regulation and these behaviors share an iterative, bi-directional relationship where the presence of one promotes the development of the other.

Task Orientation

Task orientation is a classroom skill where children actively facilitate their learning via their direct and focused attention to the activity at hand. Task orientation is first predicated on student engagement, where students are actively tending to the task or activity. Further, students must successfully navigate through a series of tasks to reach a learning goal or activity. Self-control and self-directed learning are critical in task orientation. Task-oriented students must effectively maintain their focus, drive their own learning, and regulate their behavior to match the needs to the task at hand. Students who score lower on dimensions of task orientation may exhibit inattentive behavior, be less likely to control impulses, and have more difficulty following classroom rules and expectations. Task orientation behaviors related to persistence, attention, and response to instructional situations are unique contributors to later cognitive functioning and early academic success (Kohn & Rosman, 1973; McWayne, Fantuzzo & McDermott, 2004; Petrill & Deater-Deckard, 2004).

Using time samples of student activities, task-oriented behaviors, including constructive play (self-initiated play) and constructive self-directed learning (independent classwork) were independent predictors of year-end achievement (vocabulary, comprehension, math computation, math concepts and problems, and language use and structure) (McKinney, Mason, Perkerson, & Clifford, 1975). Similar results were found in a more recent study. Fitzpatrick and Pagani (2013) studied the relationship between kindergarten task orientation to fourth grade achievement and measures of adjustment. Ratings of task orientation, using items such as "follows rules and instructions", "works autonomously", and "follows instructions", in kindergarten were associated with math achievement and teacher reports of academic success. Further, these task-oriented skills were also linked to measures of child-teacher conflict, inattention, victimization by peers, proactive and indirect aggression, and anti-social behavior.

Viljaranta et al. (2015) explored the relations among student task orientation, learning, and teacher interaction styles. The impact of low task orientation defined as high activity, lack of persistence, and high distractibility on math learning was mediated by increased levels of teachers' behavioral control. These results suggest teachers serve a critical role in fostering skill development for children with low levels of task orientation.

Student engagement. Student engagement is typically categorized as on-task behavior (vs. off task behavior) that is either 1) active or behavioral (e.g., singing, talking) or 2) passive or attention (e.g., listening or watching) (McWilliam, Scarborough & Kim, 2003). Student engagement and active participation with tasks, peers, and teachers are key components in promoting task-oriented learners. Student engagement with activities and teachers have been linked to self-regulation (Fantuzzo et al., 2004; Williford, Vick Whittaker, Vitiello & Downer, 2013) and achievement (Hofer, Farran, & Cummings, 2013; Ladd & Dinella, 2009; Reyes, Brackett, Rivers, White, & Salovey, 2012). These types of engagement are thought to undergird broader learning in early childhood (Hamre & Pianta, 2001).

Currently needed in the field is both a) better understanding of the direct links between children's task- oriented skills to early childhood environments, particularly an understanding of the classroom supports that directly facilitate their development and b) an effective method of identifying, quantifying, evaluating, and finally replicating these effective classroom practices.

Classroom Characteristics

The identification of classroom characteristics that potentially moderate or in fact, develop self-regulation through the promotion of children's task- orientation is critical. Effective management of behavior, adequate learning time, and a balanced instructional approach of both teacher-directed and child-initiated learning theoretically facilitate the development of task-oriented learning skills. Additionally, there is evidence of targeted curricula and interventions' effectiveness at promoting task orientation.

Behavior management. Task orientation shares a bidirectional relation with student behavior. Student behavior, for example self-control, ability to focus, high activity, or distractibility, may promote or impede task-oriented skill development. Secondly, children with lower levels of task orientation may have more difficulty in regulating and developing behavioral control. Early childhood classrooms can help facilitate a positive, iterative process between task orientation and student behavior. For example, effective classroom-wide behavior management strategies reduce young children's externalizing (e.g., attention problems) and internalizing (e.g., emotionally reactive) problems (Han, Catron, Weiss, & Marciel, 2005) and further facilitate positive, developmentally-appropriate student behavior (attending to instruction) (Hiralell & Martens, 1998).

Using a sample of preschool teachers (N = 67) and their students (N = 398), Dobb-Oates et al. (2011) examined the relations among teachers' behavior management, children's task orientation, and emergent literacy and language development. Both teachers' behavior management strategies and children's task orientation were associated with emergent literacy skills (print awareness) but not receptive language development. Interestingly an interaction emerged between the classroom management and task orientation: To improve receptive language skill development, task orientation must be accompanied with high levels of classroom management skills.

There is a host of strategies and interventions that have successfully targeted classroom and teacher behavior management practices. For example, Hutchings, Martin-Forbes, Daley, and Williams (2013) evaluated a program designed to promote classroom management, the Incredible Years Teacher Classroom Management. Interactions among teachers, children, and classroom behaviors were examined using a sample of 107 children ages three through seven. Results indicate implementation of the program significantly reduced classroom off-task behavior, both negative child and teacher behaviors, and children's off-task behavior.

Improving classroom management reduces time spend managing disruptive behaviors and enables all students to better learn in the classroom environment. Other evidence-based practices and strategies include: group contingencies, individualized behavior plans, establishing routines, informal functional behavior analyses, and scaffolded transitions (Daddario, Anhalt & Barton, 2007; Park & Lynch, 2014; Reitman, Murphy, Hupp, & O'Callaghan, 2004).

Learning time. To effectively understand the classroom characteristics that support task orientation, the dosage or available amount of time must be taken into consideration. Given the instructional day is finite for young students (i.e., programming hours do not vary from day to day), there is considerable variation children's access to quality learning time. Lengthy transitions, routines, or other classroom interruptions impede children's opportunity to develop these skills.

Classrooms where teachers spent more time initially organizing learning activities (advanced organizers, instructions) at the beginning of the school year later provided increased time in child-initiated instructional activities and less time in transitions (Cameron, Connor, & Morrison, 2005). Further, teacher organization of learning time and activities is important. Children in classrooms where more time was spent in classroom organization activities in only the beginning of the year performed better on reading measures, after controlling for baseline learning (Cameron, McDonald Connor, Morrison, & Jewkes, 2008).

To describe the current landscape of time management in EC programming, a large- scale analysis of state-sponsored early childhood programs indicated preschoolers' days were somewhat equally divided into free choice, teacher-directed, and meals/routines. More troublesome, almost half (44%) of children's day was designated as "no coded learning activity" where they were unoccupied and unable to access early academic activities including language/literacy, math, science, social studies, art, fine motor, and gross motor (Early et al., 2010). Given this information, further examination into how children's time is actually spent (versus planned) is needed and commensurate program supports are implemented accordingly.

Instructional balance. Early childhood programming generally consists of two instructional approaches: Teacher-directed instruction (akin to what is typically thought of as formal schooling) and child-initiated learning where emphasis is placed on the child to choose and carry out self-initiated activities. Teacher-directed activities often rely on complete control of the teacher: Teachers regulate the content, pace, sequence, and products. Child-initiated activities and environments are selected and arranged by the teacher but chosen by the student.

There is evidence to suggest one approach may be more suitable than another for some groups of children. Qi, Kaiser, and Milan (2006) found that boys with low language abilities are more disruptive during teacher-directed activities where specific teacher-directed instructional strategies have been used to effectively teach emergent literacy skills to English language learners (Rahn et al., 2015).

Using a large sample of children (*n* = 989) who attended the Chicago Child-Parent Center (CPC) in preschools, Graue et al. (2004), examined curricular approaches (either teacher- directed or child-initiated learning) and their impact on children's short and long-term learning. Classrooms were rated either low or high in teacher- initiated activities, described as the use of direct instruction materials, and low or high in child-initiated approaches (emphasizing field trips and learning centers). Classrooms categorized as both high in teacher-initiated and child-initiated learning were associated with higher levels of school readiness at kindergarten entrance, 3rd and 8th grade reading achievement, and reductions in grade repetition, compared to classrooms considered low in either teacher-directed or child-initiated learning or low in both approaches.

A blend of the two approaches a) ensures children learn specific content and b) supports consistent exposure to target learning objectives while permitting choice, promoting control of one's learning, and maximizes engagement and active participation. Early childhood programming should challenge children by supporting them as they plan and execute activities of their choice (Schweinhart & Weikart, 1988).

Interventions/curricula. There are a number of evidence-based classroom practices, often through curricula or interventions, that target children's self-regulation and learning engagement (e.g., Bierman et al, 2008; Brotman et al., 2013; Schmitt, McClelland, Tominey & Acock, 2015). For example, *Tools of the Mind* (*Tools*; Bodrova & Leong, 2006) is an evidence-based curriculum that promotes self-regulation and attentive control; evaluating its effectiveness has yielded mixed findings. In an initial effectiveness trial, *Tools* implementation improved global classroom quality and reduced behavioral problems in the classroom, above and beyond comparison classrooms that received literacy-based curriculum (Barnett et al., 2008). Moreover, a recent randomized control trial indicated kindergarten students' executive functions, reasoning skills, attentive control, and academic outcomes (reading, vocabulary, and math) improved as a result of exposure to the curriculum. Additionally, effect sizes appeared higher for children in high-poverty schools (Blair & Raver, 2014).

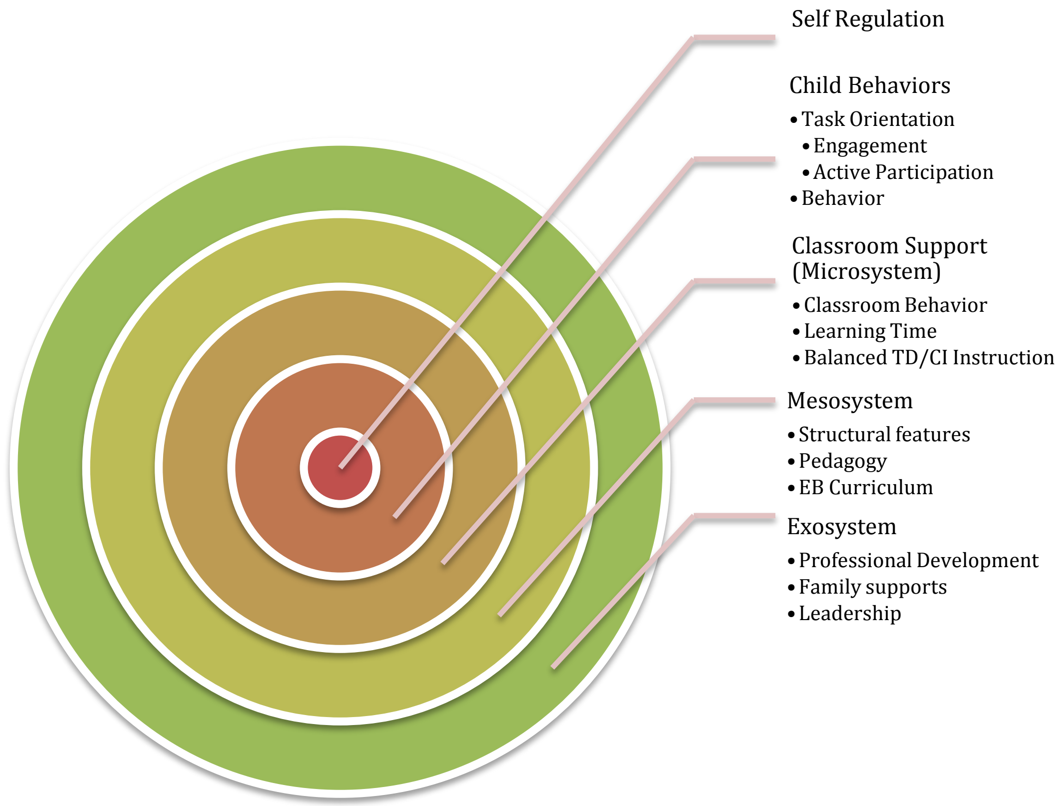
Conversely, in broader scale-up testing of *Tools'* effectiveness, no treatment effects on children's literacy knowledge, achievement, self-regulation, and teacher-reported behavior measures were found (Farran & Wilson, 2014; Lonigan & Phillips, 2012). In fact, when compared to a literacy-based curriculum or Business as Usual (BAU) programming, *Tools* led to lower literacy outcomes (for both literacy and BAU) and measures of school readiness (vs. literacy curriculum only) (Lonigan & Phillips, 2012). Further research is needed to determine if these mixed results are a function of poor implementation fidelity and up-take or rather an indication of inferior curriculum content and/or design.

Positive results on children's self-regulation skills were found in the Head Start REDI intervention with socio-economically disadvantaged preschoolers. The intervention consisted of two parts: 1) a curriculum (*Promoting Alternative Thinking Strategies*; Domitrovich, Greenberg, & Cortes, 2007) that explicitly targets early self-regulatory skills and 2) interactive reading program that supports children's reasoning, planning, and memory. The REDI intervention demonstrated small, yet significant effect sizes on two executive function measures, the Dimensional Chance Card Sort (DCCS; Zelazo, 2006) and task orientation (Bierman et al., 2008).

Revisiting Theory

Application of Bronfrenbrenner's ecological systems theory best illustrates the relations among the student's skills, their manifestation in behaviors, and the external supports that facilitate the skill development. This dissertation proposes the center of the ecological system (the young learner) has an even narrower target: the development of his/her self-regulation, depicted in Figure 1. A collection of child behaviors including task orientation (defined in part by active student engagement) operates as a conduit to self-regulation. The microsystem components facilitate self-regulation development via the promotion of child behaviors that include classroom behavior and management, learning time, and a balanced instructional approach of teacher-directed and child-initiated learning.

Figure 1.Ecological Framework of Self-Regulation Development in Early Childhood Classrooms



Still missing, however, is a method of assessing generalized classroom practices that promote self-regulation orientation and related behaviors in a standardized and reliable manner. Classroom strategies and environments that place an emphasis on a balanced instructional approach, ample learning time, clear behavior management, and specific targeted curricula or interventions must be effectively captured so we can, in turn, promote the very features and environments that foster young children's task orientation.

Chapter 3

Methodology

Midwest Child-Parent Center

The study sample used data from the Midwest Child-Parent Center (MCPC), an evidence-based PreK-3rd grade intervention and school reform model funded through a federal Investing in Innovation (i3) grant. The intervention provides comprehensive family and school support services to a cohort of children from prekindergarten through grade three. Family support services include home visits, parent workshops, and school/home activities to connect classroom content to home learning. School, classroom, and teacher services include an aligned professional development/coaching model, leadership support, classroom aides, and vertically- and horizontally-aligned curricula. Programs across the Midwest participate in the MCPC Expansion: Chicago, Normal, and Evanston, IL and St. Paul, Minnesota. See Table 1 for the number of students, classrooms, and schools served across the project in the first year.

To assess implementation, an array of fidelity measures was developed. One measure, the Classroom Learning Activities Checklist (CLAC) was created to assess a key project element: Effective Learning Experiences. This dissertation study examines the students, classrooms, and schools that were observed using the CLAC during the pre-kindergarten year. In all, 72 of the 127 classrooms from Chicago, Normal, and Evanston, Illinois and St. Paul, Minnesota were included in general descriptive analyses. Data from 677 enrolled students (32%) from Chicago schools were included in the predictive validity evidence analyses. Analyses included data from both intervention (n = 64) and control (*n* = 8) classrooms across a total of 32 schools. See Table 2 for a summary of CLAC-sampled schools, classroom, and students across the four districts.

Table 1.
Midwest Child-Parent Center School, Classroom, and Student Sample Sizes

Sample	Schools	Classrooms	Students	% 4-Year-Old [a]
CPC Intervention Total	25	88	2,323	67%
Chicago	16	66	1,724	60%
Saint Paul	6	10	287	97%
Evanston	2	7	212	71%
Normal	1	5	85	79%
Comparison	21	28	1,212	--
Total	46	116	3,535	--

Note. Two schools were childcare centers affiliated with schools. The Virginia (MN) site (53 children in 3 classrooms) was dropped from the project mid-year and is excluded. The Evanston comparison group was in the same school as CPC.
[a] -- = data unavailable

Table 2.
MCPC Classroom, School, and Student Sample Sizes Observed Using CLAC

Sample	Schools	Classrooms	Students [a]	% 4-Year-Old
CPC Intervention Total	23	64	975	68%
Chicago	16	46	712	61%
Saint Paul	6	10	170	92%
Evanston	2	5	93	50%
Normal	1	3	51	50%
Comparison	8	8	141	81%
Total	33	72	1,116	70%

[a] Reported enrollment on CLAC observation

Participants

Children. In the Pre-K year, 2,323 children participated in MCPC programming across 18 sites in rural, suburban, and urban districts; 1,212 children (comparison group) participated in “business as usual” programming in comparable schools matched on school demographics and 3rd grade achievement scores. Data from pre-kindergarten students (n = 677) in 23 classrooms in Chicago were used to answer one of this dissertation's research questions. A standardized assessment (TS GOLD) was completed in each of the Chicago-based sites. See Table 3 for the demographic characteristics of the student population.

Table 3.
Student Characteristic & Covariate Sample Sizes, Means, Standard Deviations, and Response Ranges

Student Variable [a]	*M*	*(SD)*	Range
Gender *(female)*	.52	(0.50)	0-1
Race	.71	(0.46)	0-1
Hispanic	.27	(0.44)	0-1
Special education	.08	(0.27)	0-1
Age in months	48.84	(6.40)	35.35-58.84
Free lunch eligibility	.86	(0.35)	0-1
Fall Assessment Date (before November 1)	.40	(0.49)	0-1

[a] n = 751

Teachers. There were 89 teachers who participated in the implementation of the MCPC Expansion; 39 educators taught in the comparison sites. Of the 116 teachers, 72 were observed using the CLAC and 97 completed year-end teacher surveys (76%). Teacher survey data were used to evaluate a portion of the concurrent validity evidence. Overall, the prekindergarten teachers were very well-educated: 98% had at least a Bachelor's degree and had an average of almost 8 years teaching experience.

Classroom Learning Activities Checklist

As part of the study, classrooms observations were conducted using the Classroom Learning Activities Checklist (CLAC), an internally-created assessment that captured the nature and quality of student task orientation and the classroom practices that support it. Roughly one-half of the pre-kindergarten classrooms in each of the implementation sites and one classroom from each control site were randomly sampled. In total, 72 prekindergarten classrooms were assessed by trained observers; data from enrolled students in Chicago-based classrooms (677 students, 26% of the entire sample) were included as part of this analysis.

The CLAC is organized into 4 theoretically-constructed domains: a) items one through six inquire about observed student task-oriented behaviors, b) items seven through 17 measure the provision and facilitation of learning activities that support task orientation, c) items 18a, 18b, 18c, 19 and 20 assess how instructional time is spent, and d) items 21-23 measure the presence and absence of student misbehavior.

For this study, each of these items is coded on a 1-5 Likert scale (Likert, 1931) (1 = strongly disagree/never/none, 2 = disagree/rarely/few, 3 = neutral/sometimes/some, 4= agree/ most of the time/many, 5 = strongly agrees/always/nearly all) and have descriptions of each of the scores in a scoring rubric. Item 24 approximates the amount of time in either teacher-directed (TD) or child-initiated (CI) learning into ordinal values: 1 = 100%TD/0%CI, 2 = 75%TD/25%CI, 3 = 50%TD/50%CI, 4 = 25%TD/75%CI, 5 = 0%TD/100%CI. Similarly, item 25 organizes the instructional approach into categorical responses: Low TD/Low CI, Low TD/High CI, High TD/Low CI, High TD/High CI. Finally, item 26 (CLAC26) rates the overall level of task orientation in the classrooms. Assessors incorporate the four constructs into a single 1-5 score: 1 = very low, 2 = moderately low, 3 = somewhat, 4 = moderately high, 5 = very high. See Table 4 for a list of CLAC items 1-23, 26.

Table 4.
Classroom Learning Activities Checklist Items 1-23, 26

1. Children appear fully engaged in activities.
2.Children are active participants in their learning.
3. Children appear to be working/oriented towards a goal/learning objective.
4. Children are engaged with peers and/or materials.
5. Children's attention to the lesson is evident.
6. Child sharing of answers and thoughts is frequently observed.
7. Organization of lesson and materials are conducive to task orientation.
8. Teaching methods promote engagement.
9. Teaching methods facilitate active participation.
10. Teacher shows openness/responsiveness to active participation and student engagement.
11. Individual attention to children is evident.
12. Extra help is provided to children when needed.
13. Responsiveness to children's work and behavior is frequent.
14. Activities provided consistently engage children.
15. Activities support active participation.
16. A variety of activities are provided.
17. There is a blend of teacher- directed and child- initiated activities.
18 (a). Learning time was lost due to lack of teacher preparedness
18 (b). Learning time was lost due to student misbehavior
18 (c). Learning time was lost due to non-instructional time/routines
19. The pace of activities matches children's interests and attention.
20. The amount of time in the lessons/activities matches children's interests and attention.
21. Child misbehavior is a problem in this class.
22. Children follow rules and directions.
23. Children demonstrate positive peer relations
26. Overall Task Orientation.

Note: Each item was coded 1-5 (1 = Strongly Disagree/Never/None; 2 = Disagree/Rarely/Few; 3 = Neutral/Sometimes/Some; 4 = Agree/Most of the Time/Many; 5 = Strongly Agree/Always/Nearly All).

Other recorded information. Additional information was collected on the CLAC tool: number of assistants, observation start and end times, number of children present, description of activities (open- ended), content focus (art, fine motor, language/literacy, math/number concepts, science, socio- emotional), group organization (whole group, small group, individual time, free choice, and routines), age ranges (3’s, 4’s or mix), program length, and curricula used.

Measures

CLAC variables, including the overall CLAC score, factor scores, and individual items were the primary variables of interest and were used to assess the tool’s dimensionality, reliability, and construct, concurrent, and predictive validity evidence. CLAC variables will be further described in response to the first research question.

Concurrent measures. A number of classroom quality measures were used to assess the concurrent validity evidence of the CLAC. Included were a) a measure of global classroom quality, b) an assessment of instructional time, and c) a set of teacher quality indicators.

Classroom Assessment and Scoring System (CLASS) domains. The Classroom Assessment and Scoring System (CLASS; Pianta et al., 2008) is a global measure of classroom quality that focuses on process-level indicators of quality, mainly the nature and quality of interactions and relationships. The CLASS consists of three distinct constructs: Emotional Support (ES) (warm and responsive caregiving); Classroom Organization (CO) (management of classroom practices that promote learning, behavior, and time management); and Instructional Support (IS) (strategies that foster language development, continued learning and participation, and higher-order thinking skills).

Each CLASS domain measures a distinct construct of classroom quality and is measured on a 7-point scale (Low = 1, 2; Mid = 3, 4, 5; High = 6, 7). Data were collected through an approximate 2-hour observation where trained observers coded and assessed behaviors using standardized scoring criteria across four 20-minutes cycles. The scores were then aggregated and averaged into three construct scores. Reliability estimates across time suggest there is a high degree of internal consistency for the CLASS domains: .91 Emotional Support and Classroom Organization; .89 Instructional Support (Pianta et al., 2008). A number of studies have linked CLASS scores to other classroom quality measures (ECERS-R; Pianta et al., 2005), aspects of classroom quality (e.g., teacher education)(Early et al., 2007; Howes et al., 2008; Mashburn et al., 2008), and student outcomes (e.g., Burchinal et al., 2010; Downer et al., 2007; Hamre & Pianta, 2005; Howes et al., 2008; NICHD ECCRN, 2002) suggesting high levels of concurrent and predictive validity evidence. For this study, the three CLASS domain-level scores were correlated with the CLAC: Emotional Support, Classroom Organization, and Instructional Support.

Monthly Classroom Activity Report (MCAR). Prekindergarten teachers who participated in the study completed monthly reports of their instructional focus and use of time. First, teachers designated the percentage of time that was used across different content areas (i.e., language and literacy, science, math, social-emotional learning). Secondly, they reported how much time was spent either in teacher-directed (TD) or child-initiated (CI) activities during language/literacy, math, and science learning.
For this analysis, 12 MCAR variables were created using teachers' reports of language/literacy, science, and math instruction.

Teacher survey items. A number of teacher-related items were used to assess the relations among aspects of teacher quality and CLAC scores. Pre-K teachers, both those participating in the MCPC implementation and control sites, completed comprehensive surveys at the end of the school year. Included in the survey were items related to curriculum use, parent involvement, professional development (PD), and classroom experience. Six variables were analyzed in this study: two items pertaining to professional development (taken any college courses in the past year, number of PD events attended); two items on education (highest level and field of study); and two questions relating to the number of years of experience teaching Pre-K and teaching Pre-K-12.

Outcome measures. Student achievement was described using a standardized teacher-report of student skills, the Teaching Strategies GOLD (*TS GOLD;* Heroman et al., 2010). For this dissertation, continuous and dichotomized literacy, language, math, and socio-emotional variables were used. Continuous and dichotomized total scores across domains were also used. Data included enrolled students from implementation and comparison sites in Chicago, IL. Other partner districts used alternate assessments or were unable to collect representative levels of TS GOLD data.

The Teaching Strategies GOLD Assessment System (*TS GOLD;* Heroman et al., 2010) is a performance-based observation system for children zero through kindergarten age. It has 38 objectives with 66 indicators organized into 10 developmental domains: social-emotional, physical, language, cognitive, literacy, mathematics, science and technology, social studies, arts, and English language acquisition. In the MCPC project, this observation-based assessment tool was administered in the fall (October- November) and the end of the prekindergarten year (mid-May) by classroom teachers.

The following subscales with their summed individual items (after adjusting for age) were used in this dissertation study: oral language (6 items), literacy (12 items), social-emotional (9 items), and mathematics/numeracy (7 items). Each item was given a score from 0 (not yet meeting objective) through 9 (full mastery of objective). A total score was comprised of all raw scores in all domains. Additionally, proficiency variables were created using performance at or above national norms where 1 = met national norm on 4 or more subscales, 0 = less than 4 were met (Lambert, Kim, & Burts, 2014).

Item reliabilities are .99 for each of the six scales, person reliabilities and internal consistency estimates range from .95-.98, .96-.98, respectively. Inter-rater reliability was at or above .80 (HCRC Final Report: Minnesota Head Start Assessment, 2011). Additionally, TS GOLD scores highly correlate with other direct assessments (Lambert et al., 2014) and may be used with diverse learners and populations—differential item analysis indicates the measure demonstrates validity evidence for children with special needs and English Language Learners (HCRC Final Report: Minnesota Head Start Assessment, 2011).

Covariates. To account for individual, family, and school/neighborhood differences, a comprehensive set of control variables was included in predictive validity evidence analyses. Previous learning was controlled by using a continuous measure of fall performance: the baseline variable matched the outcome variable (e.g., literacy score baseline was used for literacy outcomes). To account for learning/maturation effects due to the date of assessment, an assessment date variable was included as a control and was defined as: 1 = assessment completed prior to October, 0 = after October. Race was dichotomously coded as 1 = African American and 0 = other. Ethnicity was coded 1= Hispanic, 0 = non-Hispanic. Gender was dichotomized (1 = female; 0 = male). Special education status was defined as 1 = yes, 0 = no. Age was coded as the students’ age in months at kindergarten entry. Free and reduced lunch status was used as an indicator of socio-economic status: 1 = free lunch eligible and 0 = not eligible. See Table 3 for the means, standard deviations, and response ranges for the covariates included in the regression models.

Procedures

Training and reliability. Trained observers conducted all of the CLAC observations. Prior to conducting the CLAC, observers participated in a 6-hour training where constructs/subscales, items, and the general purpose of the tool were described. Observers learned about the organization of the tool and viewed subscale- and item-level video clips. Scoring guidelines and observation protocols were presented and finally, participants jointly practiced coding video clips using the CLAC.

Reliability was established by assessors independently viewing and coding two 20-minute online Pre-K classroom videos. The videos were intentionally selected so that a range of low-, mid-, and high-range behaviors was presented. Additionally, both whole group instruction and free choice groupings were selected to assess observers' ability to reliably code behaviors in different classroom structures.

For the purposes of training and quality assurance, each item was scored for each video and master scores were created through consensus from two of the tool authors. Each author independently watched the videos, scored the CLAC items, and jointly discussed where scoring discrepancies existed. An agreed- upon final code was given for each CLAC item 1-26. These scores were used to gauge observers' knowledge of the CLAC's content and scoring structure. A small number of dual-coded field observations were also conducted throughout the observation window. To examine the internal consistency across observers, more robust inter-rater reliability estimates were used.

Observation Process. In each observed classroom, trained assessors (see next section for an overview of training/calibration and inter-rater reliability) conducted a 25-30-minute classroom observation. This length was selected because 1) it ideally permitted more than one group setting in Pre-K classrooms while 2) remaining a brief snapshot of a typical day. There was an approximate one-week window from the initial CLAC training and reliability testing to data collection in the field. The observer recorded specific: 1) student behaviors associated with engagement and active participation (e.g., participating in learning activities, watching the teacher, volunteering responses when prompted); 2) teaching strategies and behaviors that promoted engagement and active participation (e.g., asking students questions, commenting on specific responses from children, facilitating activities in a way that expands their involvement); 3) time management strategies (effective/ineffective use of time); and 4) student behaviors, both strategies that promote positive student behavior and observed student behavior). At the end of the observation, the assessor referred to a complementary matrix for item-level descriptions and response ranges, and coded each item on the 5-point Likert scale.

***CLASS observing process*.** For each observed classroom in the Midwest Child-Parent Center (MCPC) expansion, trained coders (per CLASS protocol) conducted four 20-minute cycles and then averaged the scores into three domain scores. The observations were conducted in October through May, with the majority occurring in May (48 of the 85, 56%). The classrooms were randomly selected. The Chicago Public Schools, as part of a separate district initiative, used the CLASS tool in their Pre-K programs. In an effort to coordinate time and resources, they agreed to oversample MCPC project sites and share data.

Analyses

Study design. A series of descriptive statistics were used to evaluate the psychometric properties of the CLAC. Basic descriptive analyses were examined to explore the construct validity evidence, dimensionality, and reliability of the CLAC. Correlation coefficients were used to interpret the concurrent validity evidence between the CLAC variables to other measures of teacher quality. Both linear and probit regression analyses were used to assess the predictive ability of CLAC variables to standardized student outcome scores.

Question one- evidence of dimensionality and construct validity. To examine the construct validity evidence, an overview of the measure's construction, including the planning and development of the tool is presented. Next, the tool's organization, including the subscales, items, and scoring are described. The descriptive statistics of each of the items (1-23), the four theoretically-constructed subscales, and overall task orientation items are presented. The correlation coefficients among the items, subscales, and overall items are also reported.

Exploratory factor analysis was conducted using SPSS version 14 and was used to a) identify the dimensionality of the task orientation via reviewing the variance structure and b) create factor scores that describe characteristics of task orientation for later regression analyses. The variables constructed from factor analysis were used in later concurrent and predictive validity evidence analyses. Exploratory factor analysis presented the nature of the data as they related to another and broader constructs. Relationships among the items, though perhaps not intuitive, described their interdependence and account for the maximum amount of variance. To construct the bestfitting factor structure, four criteria were used:1) using factors with an Eigen value of at least one; 2) visually determining the leveling off point (elbow) of the slope curve; 3) increasingly adding and running factors until the total amount of variance no longer increases substantially; and 4) ensuring each factor had more than three items as unique contributors.

Question two- reliability. The reliability evidence of the measure was investigated and included a description of the inter-rater reliability (IRR), factor structure (including factor descriptions and loadings), and correlations among the CLAC factor scores using both SPSS and STATA. The internal consistency of the CLAC using Cronbach's alpha was also calculated.

Question three- evidence of concurrent validity. To understand how the CLAC links to other aspects of classroom quality, its association to Classroom Assessment and Scoring System (CLASS; Pianta et al., 2008) was assessed. The three CLASS domain scores (Emotional Support, Classroom Organization, and Instructional Support) were correlated with the overall CLAC scores (Item 26) and CLAC factor scores.

Additionally, the correlations among the CLAC measures to a different classroom measure, the Monthly Classroom Activities Report (MCAR), were described. A set of MCAR variables were correlated to the CLAC variable set (overall CLAC scores and two factor scores). The strength of each of the correlation coefficients was qualified as .1 = weak, .3 = moderate, and .5 = strong. These relative effect size interpretations are Cohen's *d* (Cohen, 1988).

Finally, the correlations of the CLAC to other aspects of teacher quality were examined. Teacher survey data were correlated to the overall CLAC score and two factor scores to determine if there is a relation between these sets of variables that operationalize "quality" in early childhood programming.

Question four- predictive validity evidence. To assess the validity evidence of CLAC scores predicting later children's learning, probit and multiple linear regression were used using STATA IC13. Multiple regression analyses measured the relation of CLAC predictor variables to continuous outcome variables— children's TS GOLD scores in language, literacy, math, socio-emotional, and total sum scores. To capture the potential impact on a minimum threshold of necessary learning, probit regression analyzes dichotomized outcomes of children's proficiency where 1 = met national scores; 0 = did not meet nationally-normed averages. Similarly, the relations among the CLAC variables with covariates to these binary scores were used to predict children's language, literacy, math, and socio-emotional proficiency scores.

Regression coefficients in each model were used as indicators of the strength of relation between predictor variables (or covariate) and the outcome measure. Coefficients, either negative or positive, with a p-value below .05 were considered significantly associated with the TS GOLD outcome.

Given the sample size is small—predictive validity analyses required both a) enrolled students in Chicago with TS GOLD outcomes and b) attendance in a randomly sampled classroom— our ability to ensure we were yielding as much information as possible from students was limited. Ideally, there would have been three data points (fall, winter, spring) in each TS GOLD measure for all enrolled students available for analysis. Instead of removing incomplete observations (where one or two time points were missing) and decreasing power from lower sample sizes (Nakagawa & Freckleton, 2008), regression models were analyzed using an imputed dataset. Multiple imputation of missing data using an EM algorithm was used to generate maximum likelihood estimates. This imputation method is often considered superior to other procedures that handle missing data (Buhi, Goodson, & Neilands, 2008; Cox, McIntosh, Reason, & Terenzini, 2014) while maximizing the available sample. EM algorithms provide excellent parameter estimates that are close to the population average (Graham, 2009). Outcome and demographic variables, including fall baseline performance scores, assessment date, age, race, special education status, free lunch eligibility, gender, proficiency in three or more domains, and a school-level reading achievement were included in the algorithm to produce missing case parameter estimates (means, variances, and co-variances). In the analysis, each value computed in place of missing TS GOLD domain scores included at least one outcome data point (multiply-imputed with student outcomes (MISO)).

In favor of the other models, I decided this method of imputation best minimizes model error while including potentially valuable data (via increased sample size). For comparison, models of non-imputed and multiply-imputed using available student information (MIASI) data, i.e., multiple imputation without requiring one outcome measure score, are presented in the appendix.

Finally, assuming the CLAC and CLASS both predict later measures of children's gains (as assessed using TS GOLD), I examined the CLAC's unique contribution to the prediction model while controlling for the CLASS variables. The value added of the CLAC in the various achievement outcome models is examined. For each model where a CLAC predictor variable significantly predicts the outcome variable (i.e., TS Gold outcomes), three separate models were run, controlling for: 1) Emotional Support, 2)

Classroom Organization, and 3) Instructional Support CLASS domain scores. All covariates were included in the proposed models.

Chapter 4

Results

The purpose of this study was to explore the psychometric properties of the Classroom Learning Activities Checklist, including its internal design and structure, reliability, and validity evidence.

Research Question 1: What is the construct validity evidence and dimensionality of the tool?

Tool development. Measuring self-regulation and active, engaged learning was the central idea behind the creation of the Classroom Learning Activities Checklist. Critical was creating numerous opportunities for children to select and drive their own learning with teacher facilitation. Based on this tenant and supporting evidence that both child-initiated and teacher-directed learning is critical (Graue et al., 2004), the CLAC observation tool sought to capture a unique aspect of classroom quality: Task-oriented learning and the classroom supports that facilitate it.

Using a large longitudinal database (Chicago Longitudinal Study; Reynolds, 2000), items from a teacher-reported child checklist were selected that relate to task-oriented learning (e.g., concentrates on work, follows directions, takes responsibility for actions). Individual items with significant ($p < .05$) relations to the Iowa Test of Basic Skills were retained for initial instrument design (Iowa Test of Basic Skills; Hieronymus, Lindquist, & Hoover (1980)). Additional items were created and categorized into one of four categories: a) student behaviors of engagement and active participation, b) teacher methods and strategies that support student engagement and active participation, c) observed use of instructional time, and d) observed student and classroom behavior.

The CLAC tool was piloted in two university early childhood programs. Several dual-coded observations were conducted where observers debriefed the scoring process, scoring consistencies, and areas in need of review or attention. Revisions were made and another round of dual-coded observations were conducted. This cycle continued until observers were able to consistently reach the same scores via consensus using to the CLAC scoring guidelines and rubric.

During scale construction, authors grouped items into conceptual or logical clusters. Using these clusters, subscale scores were created to examine the underlying foundation of the CLAC tool design: Student Participation (items 1-6), Teacher Facilitation (items 7-17), Learning Time (items 18a, 18b, 18c, 19, 20), and Student Behavior (items 18b, 21-23). An overall measure of classroom task orientation, CLAC26, was created as a single item encompassing student participation, teacher facilitation, learning time, and student behavior.

Classroom observation features. The average CLAC observation was conducted in 31 minutes (*M* = 30.6, *SD* = 5.2) with 1.3 support staff members (in addition to the lead teacher) (*M* = 1.3, *SD* = .67) and 15 children (*M* = 14.6, *SD* =3.1). Nearly all of the observations were conducted in the morning, excluding classrooms that offered ½ day programming in the afternoon. At the beginning of the school year, the classroom enrolled either a) exclusively 3-year olds (8.3% of all observations), b) exclusively 4 year-olds (33%), or c) a mix of 3 and 4-year olds (40.3%).

***Content topics*.** As seen in Table 5, the observed learning areas varied but language/literacy activities were consistently present (in 81% of all observations). Science and math activities were present in roughly the same number of observations

(28% and 27%, respectively). Finally, fine motor and socio-emotional learning was observed in 19% and 21% of the classroom observations, respectively. CLAC observers also indicated the primary content area: language/literacy learning was the dominant content area in 73% of all observations.

Grouping. Whole group instruction was often observed (72% of the time). Free choice was offered in 39% of all observations; small group instruction was present in 27% of observations. Across CLAC observations, routines (e.g., meals, transitions) were noted 3% of the time. Whole group instruction was recorded as the primary grouping in over 77% of the CLAC observations.

Table 5.
Classroom Characteristics' Sample Size, Mean, Standard Deviation, and Response Range

Variable	*N*/ Frequency[a]	*M*/ Percent	*SD*	Range
CLAC observation length *(min)*	66	30.55	5.2	20-45
Number of support staff	69	1.29	0.67	0-3
Number of children	70	14.57	3.06	5-20
Classroom ages				
Classrooms with 3 year olds	6	8.3		
Classrooms with 4 year olds	24	33.3		
Mixed classrooms of 3s and 4s	29	40.3		
Primary content area				
Fine motor	1	1.4		
Language/literacy	25	34.7		
Math	1	1.4		
Science	3	4.2		
Socio-emotional	4	5.6		
Observed content area *(1 = yes; 0 = no)*				
Art	67	.12	.33	0-1
Fine motor	67	.19	.40	0-1
Language/literacy	67	.85	.36	0-1
Math	67	.27	.45	0-1
Science	67	.28	.45	0-1
Socio-emotional	67	.21	.41	0-1
Primary grouping				
Whole group	37	51.4		
Small group	2	2.8		
Free choice	9	12.5		
Observed grouping *(1 = yes; 0 = no)*				
Whole group	67	.72	.45	0-1
Small group	67	.27	.45	0-1
Free choice	67	.39	.49	0-1
Individual time	67	.09	.29	0-1
Routines	67	.03	.17	0-1

[a] Reported values from CLAC observations

CLAC dimensionality. See Table 6 for a complete list of the sample sizes, means, standard deviations, and response ranges for items 1-23, 26. There were between 66 to 72 cases for each of the items. The missing data appears to be random: in examining the paper-copy observations, missing values were across different observations and different observers. Observations with missing item information were included in subsequent descriptive analyses. Item averages, correlations, and factor scores used all available item-level scores.

Table 6.
CLAC Items Sample Sizes, Means, Standard Deviations, and Response Ranges

Variable	*N*	*M*	*SD*	Skew	Kurtosis	Range
CLAC 1.	72	4.31	0.68	-.73	3.44	2-5
CLAC 2.	70	4.26	0.72	-.66	3.06	2-5
CLAC 3.	72	4.31	0.68	-.47	2.19	3-5
CLAC 4.	72	4.11	0.83	-.65	2.81	2-5
CLAC 5.	70	4.27	0.74	-.69	2.87	2-5
CLAC 6.	70	3.94	0.92	-1.03	3.95	1-5
CLAC 7.	70	4.26	0.83	-1.28	5.24	1-5
CLAC 8.	70	4.04	0.75	-.48	3.01	2-5
CLAC 9.	66	3.95	0.81	-.61	3.11	2-5
CLAC 10.	68	4.16	0.78	-.66	2.97	2-5
CLAC 11.	71	4.15	0.69	-.47	3.13	2-5
CLAC 12.	68	4.06	0.73	-.32	2.62	2-5
CLAC 13.	70	4.13	0.74	-.42	2.60	2-5
CLAC 14.	72	3.99	0.74	-.40	2.95	2-5
CLAC 15.	70	4.16	0.83	-1.22	5.26	1-5
CLAC 16.	69	3.99	1.12	-.86	2.83	1-5
CLAC 17.	71	3.11	1.14	-.11	2.21	1-5
CLAC 18a.	70	4.90	0.35	-3.65	16.58	3-5
CLAC 18b.	72	4.61	0.64	-1.39	3.72	3-5
CLAC 18c.	70	4.69	0.65	-2.15	7.22	2-5
CLAC 19.	72	4.07	0.83	-.73	3.15	2-5
CLAC 20.	72	3.99	0.76	-.56	3.26	2-5
CLAC 21.	72	4.44	0.85	-1.40	3.95	2-5
CLAC 22.	70	4.29	0.82	-1.36	5.60	1-5
CLAC 23.	70	4.33	0.68	-.78	3.64	2-5
CLAC 26 Overall Score	72	3.83	0.69	-.80	4.10	2-5
Subscale 1 Student Participation	68	25.13	3.49	-.69	3.45	15-30
Subscale 2 Teacher Facilitation	59	43.83	6.78	-.91	4.66	21-55
Subscale 3 Learning Time	69	22.24	2.27	-1.17	4.07	15-25
Subscale 4 Student Behavior	69	17.68	2.28	-.74	2.48	15-20

Overall, CLAC items scores were above the scale mean— all but one were above 3.83 on a 5-point Likert scale. As indicated by the means, all of the items were negatively skewed. Several other items (items 7, 15, 18b, 18c, 21, and 22) were negatively skewed between -1.22 and -2.15, suggesting the distributions were not normally dispersed. Item 17 (Learning time was lost due to teacher unpreparedness) appeared particularly problematic: the standard deviation was small (*SD* = .35) with a negatively skewed (-3.65) and leptokurtic distribution (16.58).

In subsequent analyses, items 18a, 18b, 18c, and 21 were reverse coded to reflect the positive coding schema of the other CLAC items. These items (e.g., Item 21 "Child misbehavior is a problem in this class") were negatively worded and changing the scoring structure allowed for easier interpretation across items. Once the reverse-coded items were converted, they also reflected the overall scoring trend of the other CLAC items.

Item correlations. Overall, the CLAC items were highly correlated with one another. See Table 7 for the complete correlation matrix of the CLAC items. The majority of the items were strongly correlated with one another: Significant associations ranged from .26 to .72 with most associations between .4-.5. Using guidelines by Cohen (1988), 66% (214/325) of these significant associations can be described as moderate or large, exceeding a correlation coefficient of .30.

Table 7.

Correlation Matrix of CLAC Items 1-23, 26

CLAC Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18a	18b	18c	19	20	21	22	23
1. Fully engaged in activity	--																								
2. Active particpnts	**.55**	--																							
3. Oriented toward goal	**.67**	**.55**	--																						
4. Engaged w/ peers	**.56**	**.54**	**.56**	--																					
5. Attention to lesson	**.72**	**.49**	**.69**	**.47**	--																				
6. Sharing thoughts	**.37**	**.55**	.23	**.35**	**.41**	--																			
7. Lesson promotes task orientation	**.57**	**.44**	**.63**	**.40**	**.58**	**.44**	--																		
8. Methods promote engagmnt	**.42**	**.45**	**.42**	**.43**	**.48**	**.69**	**.54**	--																	
9. Methods facilitate active part.	**.36**	**.50**	**.35**	**.45**	**.33**	**.56**	**.56**	**.72**	--																
10. Tchr open to active part.	**.36**	**.57**	**.30**	**.37**	**.39**	**.55**	**.40**	**.65**	**.68**	--															
11. Individ. attention is given	**.36**	**.27**	.23	**.45**	**.28**	**.36**	**.41**	**.46**	**.46**	**.53**	--														
12. Extra help is provided	**.26**	**.31**	**.28**	**.40**	.13	**.30**	.22	**.46**	**.34**	**.37**	**.57**	--													

CLAC Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18a	18b	18c	19	20	21	22	23
13. Respnsve to work & behavior	**.34**	.23	**.29**	**.40**	**.29**	**.45**	**.34**	**.58**	**.52**	**.55**	**.65**	**.50**	--												
14. Activities provided engage children.	**.59**	**.57**	**.48**	**.51**	**.43**	**.54**	**.44**	**.53**	**.46**	**.55**	**.40**	**.45**	**.40**	--											
15. Activities support active part.	**.44**	**.53**	**.45**	**.69**	**.39**	**.55**	**.50**	**.67**	**.63**	**.49**	**.49**	**.56**	**.45**	**.62**	--										
16. Variety of actvties	**.35**	**.47**	**.31**	**.55**	**.30**	**.39**	**.39**	**.62**	**.47**	**.43**	**.39**	**.57**	**.28**	**.63**	**.77**	--									
17. Blend of TD/ CI	**.26**	**.39**	.19	**.42**	**.35**	**.45**	**.35**	**.49**	**.48**	**.39**	**.38**	**.37**	**.37**	.17	**.57**	**.48**	--								
18. Time lost to lack of teacher prep	.01	**.28**	.02	-.06	.17	.21	.14	**.25**	.04	**.28**	-.05	.03	.01	**.28**	.11	**.36**	.14	--							
18b. Time lost to misbehavr	**.60**	**.48**	**.34**	**.37**	**.50**	**.43**	**.43**	**.42**	**.43**	**.39**	.20	.24	**.25**	**.55**	**.39**	**.38**	.14	-.21	--						
18c. Time lost to routines	.02	.11	-.04	-.07	-.01	.05	.10	-.04	-.06	.15	.08	-.05	-.01	**.24**	.02	.11	.02	**-.31**	-.23	--					
19. Pace of activity match interest	**.51**	**.55**	**.41**	**.40**	**.50**	**.44**	**.56**	**.46**	**.47**	**.46**	**.25**	**.41**	.15	**.62**	**.55**	**.60**	**.47**	**.27**	**.48**	**.07**	--				
20. Time matches interest	**.41**	**.44**	**.33**	**.38**	**.44**	**.57**	**.64**	**.63**	**.63**	**.51**	**.33**	**.35**	**.26**	**.52**	**.60**	**.53**	**.53**	.16	**.45**	.14	**.76**	--			
21. Child misbehavr	**.46**	**.24**	**.39**	**.27**	**.31**	.20	.22	.19	.18	**.25**	.17	**.27**	.21	**.39**	.22	.18	.11	-.06	**-.53**	-.22	**.29**	**-.27**	--		

CLAC Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18a	18b	18c	19	20	21	22	23
22. Children follow rules	**.48**	.22	**.40**	.18	**.49**	**.26**	**.29**	.12	.16	**.26**	.10	.00	.22	**.29**	.06	.00	.01	.01	**.38**	-.04	.14	.05	**.38**	--	
23. Positive peer relation	**.49**	**.43**	**.59**	**.34**	**.47**	.21	.24	**.29**	.16	**.24**	.00	.06	.17	**.38**	.15	.13	.05	.14	**.33**	.03	**.21**	.11	**.44**	**.56**	--
26. Overall task orientation	**.64**	**.52**	**.53**	**.60**	**.62**	**.62**	**.55**	**.65**	**.62**	**.55**	**.56**	**.48**	**.55**	**.60**	**.62**	**.48**	**.49**	.06	**.46**	-.08	**.59**	**.53**	**.29**	**.29**	.17

Note: Bold values indicate significant at $p < .05$

Subscale descriptive statistics. Table 6 shows each subscale's descriptive statistics. Apart from the largest subscale with the most items, Teacher Facilitation, they had similar means, standard deviations, and response ranges. The four conceptually created subscale scores were highly correlated with one another. Table 8 presents the correlations among the four subscales with the overall task orientation score. The Student Participation subscale was correlated above .6 across the three other subscales. Teacher facilitation was positively correlated with Learning Time ($r(55) = .69$, $p < .05$) and Student Behavior ($r(54) = .32$, $p < .05$). Overall task orientation (CLAC 26) was significantly associated with each of the subscales.

Table 8.
Bivariate Correlations of CLAC Subscales Overall Task Orientation Item

Variable	1	2	3	4
Student Participation	--			
Teacher Facilitation	**.75**	--		
Learning Time	**.62**	**.69**	--	
Student Behavior	**.63**	**.32**	**.48**	--
Overall Task Orientation	**.79**	**.77**	**.53**	**.37**

Note. Bold values indicate significant at $p < .05$.

Factor analysis. Factor analysis, a statistical technique of data reduction, was used to better capture the dimensionality of the CLAC. The smallest number of interpretable factors then represented latent constructs within the tool. Factor analyses were conducted using 25 CLAC items, including items 1-17, 18a-c, 19-23.

Factor analysis process. The factor analysis process included two major questions: a) if any, how many factors best describe the CLAC tool? and b) What do they represent? Four criteria were used to determine factor retention: a) using factors with an Eigenvalue of least one, b) visually determining the leveling off point (elbow) of the slope curve on the Scree plot, c) adding factors until the total variance no longer increases substantially, and d) ensuring each factor had more than three items as unique contributors.

The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) analysis indicated our data was factor analyzable, given the output score was .81, well above the recommended minimum threshold of .5 (Kaisen, 1970). For the extraction method, the models used Principal Component Analysis (PCA). An oblique extraction method (Direct Oblimin) was used. An orthogonal extraction method (Varimax) was also conducted and included in Appendix A.

Item loadings were defined as: 0-.2 = negligible/to be dropped; .3 = retained but not used as a factor indicator, and .4+ = factor contributors. Items were considered uniquely loading on one factor if the value was above .4 on one factor and below .3 on the others. Those items with factor loadings between .3 and .4 on multiple factors were counted as loading on each factor.

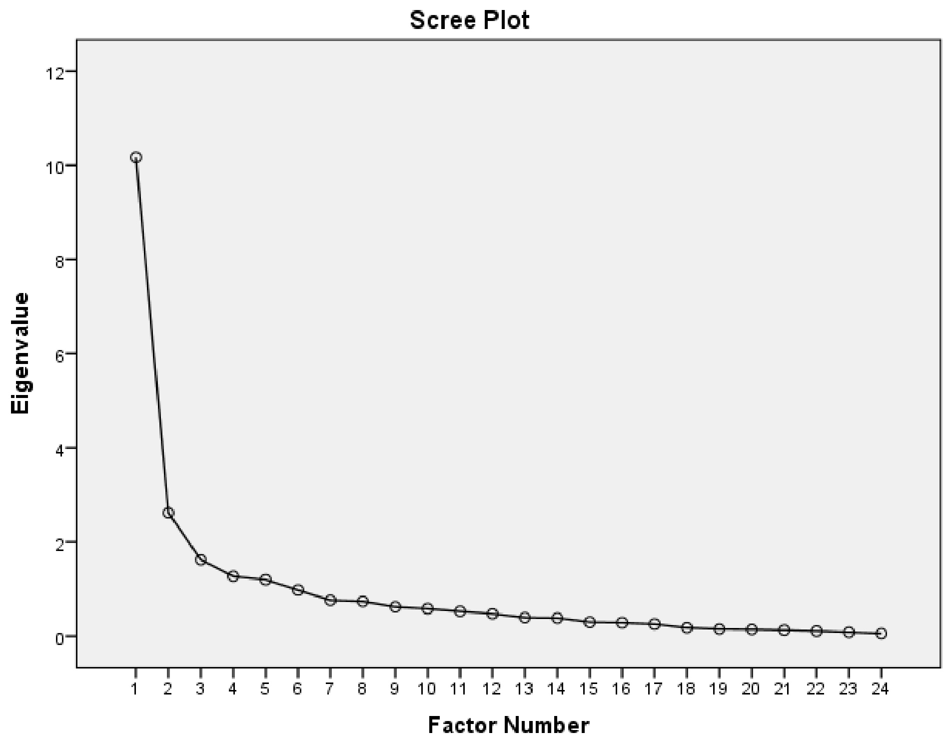
Results. In assessing the first criteria, there were six factors with Eigenvalues above a value of one, as seen in Table 9. The rest of the factor criteria, however, indicated a 2-factor solution a better fit for the data. The Scree plot suggested the leveling off point between two and three factors, indicating a two-factor model better described the data, see Figure 2. The cumulative variance was more difficult to interpret. The first factor explained 41% of the variance, a second factor added approximately 11%. For social sciences and humanities, the common variance can be as low as 50-60% (Hair, Black, Babin, Anderson, & Thatham, 2006).

Table 9.
Percentage of Total Variance Explained in Factor Analysis

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	10.18	40.71	40.71	10.18	40.71	40.71	6.72
2	2.62	10.48	51.19	2.62	10.48	51.19	4.91
3	1.78	7.11	58.31	1.78	7.11	58.31	2.25
4	1.37	5.46	63.77	1.37	5.46	63.77	5.63
5	1.25	4.98	68.75	1.25	4.98	68.75	5.55
6	1.02	4.08	72.83	1.02	4.08	72.83	2.21
7	0.85	3.40	76.23				
8	0.74	2.95	79.18				
9	0.71	2.86	82.04				
10	0.61	2.45	84.49				
11	0.58	2.31	86.79				
12	0.49	1.96	88.75				
13	0.47	1.88	90.64				
14	0.39	1.54	92.18				
15	0.33	1.32	93.49				
16	0.30	1.18	94.67				
17	0.28	1.12	95.79				
18	0.25	1.01	96.80				
19	0.18	0.70	97.50				
20	0.14	0.57	98.07				
21	0.13	0.54	98.60				
22	0.12	0.46	99.06				
23	0.01	0.40	99.46				
24	0.08	0.33	99.78				
25	0.05	0.22	100.00				

Note. Extraction Method: Principal Component Analysis.
[a] When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Figure 2. Scree Plot of CLAC Items



Overall, results indicate a two factor model best described the data, given the Scree plot and lack of higher-magnitude and distinctive item loadings on the 3rd-6th factors. Factor one, labeled "Instructional Responsiveness", was largely defined through observed teacher behaviors and the establishment of classroom practices that promote task orientation. Items included teachers' responsiveness, assistance, and attention to individual students, teaching methods promoting engagement and active participation, provision of activities that promote active engagement and a balanced instructional approach, and pace and timing of lessons.

The items in the second factor, labeled “Student Engagement”, were student-observed behaviors and included observed engagement, students’ focus on learning activities, student behavior, and peer relations. Several of the items that loaded Student Engagement reflected observed child behavior (e.g., children follow rules, pay attention to lesson, classroom levels of misbehavior, and subsequent time lost due to misbehavior).

Three items loaded on both factors: items 2, 7, and 14. It is unclear if the items theoretically loaded on both factors or there are internal issues with the items. Finally, CLAC items 18a (Time lost to a lack of teacher preparedness) and 18c (Time lost in routines) were included but did not load on either factor above the .3 criteria. See Table 10 for pattern matrix with factor loadings for the 2-factor model.

Table 10.
CLAC 1-23 Factor Analysis Pattern Matrix

	Component	
	1	2
15. Activities support active participation.	**.86**	-.01
8. Teaching methods promote engagement.	**.81**	.05
16. A variety of activities are provided.	**.80**	-.06
9. Teaching methods facilitate active participation.	**.78**	.01
20. The amount of time in the lessons/activities matches children's interests.	**.74**	.06
17. There is a blend of teacher- directed and child- initiated activities.	**.74**	-.17
12. Extra help is provided to children when needed.	**.71**	-.15
11. Individual attention to children is evident.	**.71**	-.12
10. Teacher shows openness/responsiveness to active part. and engagement.	**.69**	.11
6. Child sharing of answers and thoughts is frequently observed.	**.65**	.12
13. Responsiveness to children's work and behavior is frequent.	**.62**	-.002
19. The pace of activities matches children's interests and attention.	**.60**	.24
14. Activities provided consistently engage children.	**.53**	**.39**
4. Children are engaged with peers and/or materials.	**.52**	.29
7. Organization of lesson and materials are conducive to task orientation.	**.47**	**.38**
2.Children are active participants in their learning	**.47**	**.41**
18a. Time is lost to lack of teacher preparation. *(reversed)*	.20	.06
23. Children demonstrate positive peer relations	-.18	**.84**
22. Children follow rules and directions.	-.23	**.80**
1. Children appear fully engaged in activities.	.21	**.74**
3. Children appear to be working/oriented towards a goal/learning objective.	.15	**.72**
5. Children's attention to the lesson is evident.	.20	**.70**
21. Misbehavior is a problem in this class. *(reversed)*	.01	**.61**
18b. Time is lost due to child misbehavior. *(reversed)*	.26	**.56**
18c. Time is lost due to routines. *(reversed)*	.04	.09

Note. Factor loadings > .30 are in bold face and are included in factor. Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.

Factor variables and correlations. Factor items with loadings above .4 and at least .1 higher than the other factor were used in creating factor variables (i.e., items 7 and 14 were included only in factor one; CLAC items 2, 18a, and 18c were not included in either). Instructional Responsiveness included items 2, 4, 6-17, 19, and 20; Student Engagement contained items 1-3, 5, 7, 14, 18b, and 21-23.Weighted items were used in constructing the two factor scores: Each item's loading was multiplied by the item score to reflect its relative contribution (e.g., CLAC15*.86 + CLAC8*.81+ CLAC16*.8). Factor 1 is highly negatively skewed, with skewness of -1.05 with a range of 19-51, *M* = 40.01, *SD* = 6.21, as seen in Figure 3. Similarly, Factor 2 values ranged 15 to 25 (*M* = 21.74, *SD* = 2.70) and its distribution has negative skew, -.61. Figure 4 illustrates the variable distribution for Factor 2, Student Engagement.

Figure 3. Distribution of Factor 1: Instructional Responsiveness.

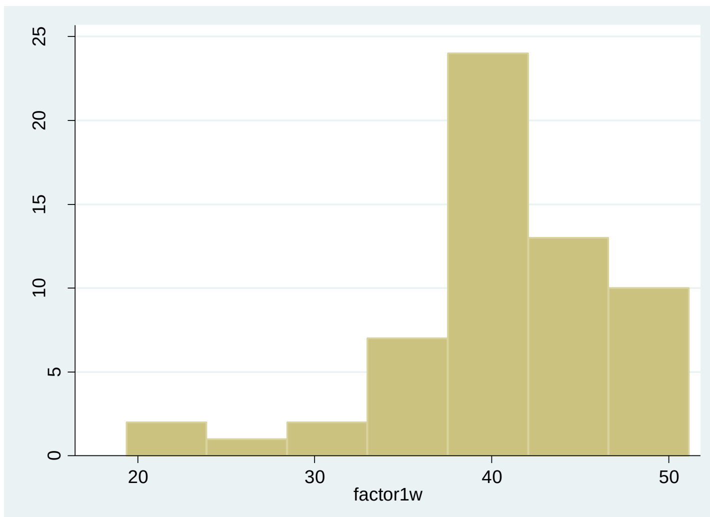
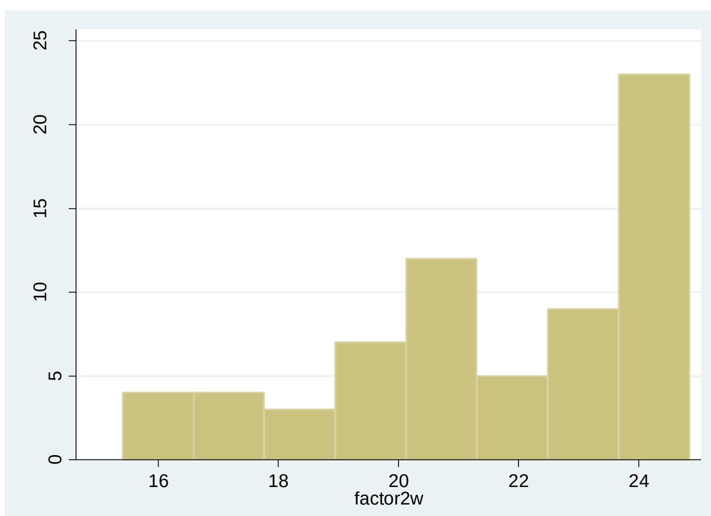


Figure 4. Distribution of Factor 2: Student Engagement



The correlation matrix for the two factors, see Table 11, indicates the two factors were significantly correlated with one another, $r(56) = .43$, $p < .001$. Both Instructional Responsiveness and Student Engagement were also associated with overall task orientation scores, $r(59) = .79$, $p < .001$ and $r(67) = .54$, $p < .001$, respectively.

Table 11.
Bivariate Correlations of CLAC Factors and Overall Task Orientation

CLAC Variables	1	2
Factor 1- Instructional Responsiveness	--	
Factor 2- Student Engagement	**.43**	--
Overall Task Orientation (CLAC 26)	**.79**	**.54**

Note. Bold values indicate significant at $p < .001$.

Research Question 2: What is the reliability evidence of the CLAC measure, including internal consistency, factor structure description, inter-rater reliability, and test-retest reliability?

Internal consistency. To assess the interrelatedness of the CLAC items, the internal consistency of the measure was assessed using Cronbach's alpha (Cronbach, 1951). The CLAC as a whole (items 1-23, 26) had high internal consistency, $\alpha = .937$, indicating the CLAC items measure a same construct with a limited error variance (.122). See Table 12 for the overall measure of the scale reliability, item-test correlations, and each item's alpha coefficient (overall reliability when recomputed without the item). Additionally, the tau equivalent model assumes that each CLAC item contributes to the overall scale by measuring the same common factor on a similar scale. The standardized item alpha ($\alpha = .9373$) was negligibly higher than the Cronbach alpha ($\alpha = .9371$), thus indicating this assumption has not been violated.

Since a two-factor model best described the CLAC data (as established by factor analysis), Cronbach alpha coefficients for both factor-based scales were reported. Instructional Responsiveness and Student Engagement had high levels of internal consistency, α = .933 and α = .890, respectively. Both of these estimates are considered high (Bland & Altman, 1997; George & Mallery, 2003).

Table 12.
Cronbach's Alpha with Unstandardized Item Information, CLAC Items and Total CLAC Score

Item	Observations	Sign	Item-Test Correlation	Item-Rest Correlation	Average Inter-item Covariance	Alpha
CLAC1	72	+	0.718	0.690	0.222	0.933
CLAC2	70	+	0.716	0.686	0.222	0.934
CLAC3	72	+	0.648	0.615	0.225	0.934
CLAC4	72	+	0.686	0.648	0.220	0.934
CLAC5	70	+	0.683	0.649	0.222	0.934
CLAC6	70	+	0.690	0.649	0.218	0.934
CLAC7	70	+	0.701	0.666	0.219	0.934
CLAC8	70	+	0.772	0.746	0.219	0.933
CLAC9	66	+	0.709	0.675	0.219	0.933
CLAC10	68	+	0.711	0.678	0.220	0.933
CLAC11	71	+	0.578	0.540	0.226	0.935
CLAC12	68	+	0.560	0.518	0.226	0.936
CLAC13	70	+	0.567	0.521	0.226	0.935
CLAC14	72	+	0.769	0.742	0.219	0.933
CLAC15	70	+	0.798	0.771	0.216	0.92
CLAC16	69	+	0.698	0.648	0.213	0.934
CLAC17	71	+	0.583	0.517	0.218	0.937
CLAC18a	70	+	0.241	0.215	0.238	0.938
CLAC18b	72	+	0.636	0.603	0.226	0.935
CLAC18c	70	+	0.135	0.082	0.239	0.940
CLAC19	72	+	0.722	0.688	0.218	0.933
CLAC20	72	+	0.726	0.695	0.220	0.933
CLAC21	72	+	0.472	0.416	0.227	0.937
CLAC22	70	+	0.385	0.328	0.231	0.938
CLAC23	70	+	0.463	0.415	0.231	0.937
CLAC26	72	+	0.804	0.782	0.220	0.932
Test scale					0.223	0.937

Inter-rater reliability. Three methods of assessing inter-rater reliability provided the consistency of measurement agreement across observers: Intra-class correlation (ICC), Cohen's kappa (Cohen, 1960), and weighted Cohen's kappa (Cohen, 1968). Inter-rater reliability estimates were assessed using data from the CLAC training video process (see Procedures). A total of 16 dual-coded samples were included in inter-rater reliability estimates. For ICC, a Two-way Mixed model with absolute agreement was used for our finite pool of observers ($N = 8$). The ICC of the first video was quite high, ICC (3, 8) = .98, 95% CI [.97-.99]. ICC for the second video was slightly lower but still demonstrated strong agreement among the raters, ICC (3, 8) = .84, 95% CI [.72-.92].

An averaged Cohen's kappa was also computed across each pair of observers. Cohen's kappa was calculated for each pair of observers ($N = 28$; Observer 1-Observer 2, Observer 1-Observer 3, Observer 2-Observer 3, etc.) and then averaged into one score. Video One's unweighted values ranged from $\kappa = .21$, $p < .05$ to $\kappa = .66$, $p < .001$ with an average of $\kappa = .39$; video 2's mean kappa was much lower, $\kappa = .242$ (range from $\kappa = .03$ to $\kappa = .47$ ($p < .01$)). The weighted kappa values were also calculated to better measure the *degree* of agreement. Again Video One had a higher degree of agreement across observers, $\kappa = .66$ (range of $\kappa = .52$, $p < .001$- $\kappa = .79$, $p < .001$) than Video Two, $\kappa = .31$ (range from $\kappa = .07$ to $\kappa = .54$, $p < .001$).

Using guidelines established by Landis and Koch (1977), all indicators met the minimal threshold of "fair" strength (.21 -.40). The ICCs for both videos were the highest—these coefficients were considered "excellent". The unweighted kappas had the lowest scores but were still considered a "fair" strength of agreement. See Table 13 for reported inter-rater agreement estimates.

Table 13.
CLAC Inter-Rater Reliability Estimates

	Intra-class coefficient			Cohen's kappa (average)			Weighted Cohen's kappa (average)		
Video	*N*	Coef.	95% CI	*N*	Coef.	Range	*N*	Coef.	Range
1	8	.98***	.97-.99	28	.39	.21*-.66***	28	.66	.52-.79***
2	8	.84***	.72-.92	28	.242	-.11-.47 ***	28	.31	.07 -.54***

* $p < .05$, *** $p < .001$

Research Question 3: What evidence supports the concurrent validity of the measure?

Evaluating the validity evidence of the tool is fundamental in gauging the utility of the CLAC. Concurrent validity evidence was examined by correlating the CLAC scores (two CLAC factor scores and overall task orientation) with three indicators of classroom quality: Classroom Assessment and Scoring System (CLASS), teacher reports of child-initiated and teacher-directed instruction, and the education and experiences of classroom teachers. Table 14 describes each of the concurrent measure's descriptive statistics.

Classroom Assessment and Scoring System (*CLASS*; Pianta et al., 2008). Trained observers conducted CLASS observations in 84 of the MCPC classrooms; a total of 57 classrooms were observed using both CLAC and CLASS measures. Three CLASS domain-level scores were used in concurrent validity analyses: Emotional Support, Classroom Organization, and Instructional Support.

Monthly Classroom Activities Report (MCAR). I evaluated relations of several MCAR variables to overall task orientation (CLAC26), Instructional Responsiveness, and

Student Engagement. For language/literacy, science, and math domains, correlations among the continuous MCAR variables, the dichotomized "balanced instructional approach" variables, and two sets of ratio variables were correlated with the two primary CLAC factor scores and overall task orientation.

Descriptive statistics. As seen in Table 14, the average CLASS scores in the 57 classrooms where both CLAC and CLASS were observed were Emotional Support (ES) (M = 6.22, SD = .46), Classroom Organization (CO) (M = 6.09, SD = .71), and Instructional Support (IS) (M = 3.33, SD = .80). These scores are moderately higher than the national averages: ES (M = 5.42, SD = .65), CO (M = 4.42, SD = .82), and IS (M = 2.18, SD = .79) (LaParo, Pianta, & Stuhlman, 2004).

The average percentage of child-initiated instruction in language/literacy ranged from 13%-80%, with an average of 49.32 (SD = 14.08). The science instruction percentage scores were slightly higher: The mean percentage was 56.72 (SD = 18.58) and range was 20-99. Similarly, the CI math instruction average was 51.19 (SD = 13.12). Note the teacher-directed percentages were inversely related to child-initiated instruction in each domain.

Secondly, a dichotomized variable of a "balanced instructional approach" was created where: 1 = average teacher-directed instruction was between 35-65%; 0 = average teacher-directed instruction was 0-34% to 66-100% of the time (see Table 14). Of the 60 teachers whose classrooms were observed using CLAC and also completed the MCAR at least once, 43 teachers (72%) met the MCPC's criterion of balanced instructional approach for language and literacy. The balanced instructional approach for science was split: 55% of the classrooms had a score of "1" (n = 33), 45% scored "0" (n = 27). For math instruction, 48 of the teachers (80%) reported a balanced instructional approach, *M* = .80, *SD* = .40.

Table 14.
CLASS MCAR and Teacher Quality Variables Sample Sizes, Means, Standard Deviations, and Ranges

Concurrent Variable	*N*	*M*	*SD*	Response range
CLASS Domains				
Emotional Support	57	6.22	0.46	4.94-6.94
Classroom Organization	57	6.09	0.71	4.5-7
Instructional Support	57	3.32	0.80	1.67-5.25
MCAR				
Child-initiated average				
Language literacy	60	49.65	14.32	13.33-80
Science	60	56.72	18.58	20-99
Math	60	51.19	13.12	13.33-80
Balanced Instruction Met (35-65%)				
Language/literacy	60	.72	.45	0-1
Science	60	.55	.50	0-1
Math	60	.80	.40	0-1
Ratio- Language/literacy				
CI/TD	60	1.20	0.84	0.15-4
TD/CI	60	1.24	.95	0.25-6.5
Ratio- Science				
CI/TD	60	3.83	12.96	.25-99
TD/CI	60	1.02	.90	.01-4
Ratio- Math				
CI/ TD	60	1.24	0.81	.15-4
TD/ CI	60	1.14	0.91	0.25-6.5
Teacher Characteristics				
Years teaching early childhood	55	8.62	7.63	1-38
Years teaching any grade	55	12.25	9.43	1-43
Taken college coursework in past 9 months	55	.42	.50	0-1
Number of PD events, workshops in past 9 months	55	6.76	7.14	0-50

Note. CI = child-initiated; TD = teacher-directed.

Finally, two ratio variables were created and defined for language/literacy, science, and math as: 1) the average percentage of teacher-directed (TD) instruction divided by the percentage of child-initiated (CI) instruction and 2) the percentage of CI instruction over the average percentage of TD learning, see Table 14. For language/literacy, the CI/TD ratio variable (*M* = 1.20, *SD* = .84) was slightly smaller than the TD/CI ratio, (*M* = 1.24, *SD* = .95). There was considerably larger variation between the science ratio variables: the CI/TD ratio mean was 3.83 (*SD* = 12.96), over three times larger than the TD/CI ratio (*M* = 1.02, *SD* = .90). Two science values were changed from 100 to 99 for CI instruction (and from zero to 1 for TD average) so ratios could be readily interpreted. Lastly, the CI/TD ratio was larger than the TD/CI ratio for the math domain, indicating there was slightly more child-initiated instruction reported, CI/TD (*M* = 1.24, *SD* = .81), TD/CI (*M* = 1.14, *SD* = .91).

CLAC correlations. Table 15 presents correlations for CLASS and the Monthly Classroom Activities Report (MCAR) with CLAC variables. Correlations were calculated for three CLASS domains with overall task orientation (CLAC26) and the two factor scores (Instructional Responsiveness and Student Engagement). See Table 15 for the correlation coefficients. Correlations ranged from .05 to .29, and only one relation, CLASS Emotional Support and CLAC Instructional Responsiveness, exceeded critical values for significance, $r(49) = .29$, $p < .05$. The positive correlation was expected, given the Emotional Support domain's emphasis on teacher sensitivity, individualized attention, and student expression.

Table 15.
Correlations of CLAC Overall and Factor Scores with CLASS and MCAR Variables

Concurrent Variable	Instructional Responsiveness	Student Engagement	Overall Task Orientation
CLASS Domains			
Emotional Support	.29*	.06	.11
Classroom Organization	.09	-.05	.20
Instructional Support	.05	.15	.14
MCAR			
Child-initiated average			
Language/literacy	.14	.29*	.12
Science	.29*	.40**	.33*
Math	.28	.29*	.22
Balanced Instruction Met (35-65%)			
Language/literacy	.06	-.03	-.01
Science	-.02	-.34*	.07
Math	-.13	-.24	-.05
Ratio- Language/ literacy			
CI/TD	.14	.23	.10
TD/CI	-.19	-.17	-.19
Ratio- Science			
CI/TD	.08	.23	.08
TD/CI	-.28	$-.26^{\dagger}$	-.34**
Ratio- Math			
CI/TD	.36*	.33*	.26*
TD/CI	-.23	-.09	-.23

Note. CI = child-initiated; TD = teacher-directed.
* $p < .05$, ** $p < .01$, † $p = .051$)

There were several moderate and moderate-to-strong relations among various MCAR variables to CLAC scores. All child-initiated variables were significantly associated with Student Engagement with correlations between .23-.40. There were significant, positive correlations between child-initiated science learning and each CLAC variable: Instructional Responsiveness, ($r(60) = .29$, $p < .05$); Student Engagement, ($r(60) = .40$, $p < .01$); and Overall Task Orientation, ($r(60) = .33$, $p < .05$). Two negative associations emerged: The balanced approach of science instruction was negatively correlated with Student Engagement, ($r(56) = -.31$, $p < .05$) and science TD/CI ratio variable and overall task orientation, ($r(60) = -.34$, $p < .01$), were significantly correlated. None of the other MCAR balanced approach variables were significantly correlated with the CLAC variables.

Teacher quality. Teachers completed surveys at the end of the school year that included information on educational experiences, curricula use, professional development (PD) activities, and other items around parent involvement, teacher assistant, and administrative supports. In total, 97 teachers completed the Pre-K survey; 55 of those were also observed using the CLAC. Data analyses include Pre-K teachers that completed the survey and were observed using the CLAC ($n = 55$).

Professional development. Pre-K teachers, on average, attended six PD events or workshops over the previous nine months ($M = 6.76$, $SD = 6.76$). As seen in the standard deviation and response range (0-50), there was considerable variation in the continuing education across teachers. Twenty-three of the 55 teachers (42%) indicated they had taken college coursework in the previous 9 months.

Experience. On average, Pre-K teachers in the study had taught Pre-K for almost 8 years ($M = 8.62$, $SD = 7.63$) and Pre-K through 12^{th} grade for over 12 years ($M = 12.25$, $SD = 9.43$). There was considerable variation in the number of years teaching Pre-K and Pre-K-12^{th} grade: teachers taught between 1 and 38 years and 1 and 43 years, respectively.

Education. Most of the teachers' primary field of study was early childhood education (75%), followed by elementary education (11%), special education/early intervention (5%), and undefined (9%). Over two-thirds (65%) of the teachers had a

Master's degree and 19 teachers (35%) had a Bachelor's degree. See Table 14 for the descriptive statistics of the continuous and binary teacher measures.

The three continuous variables (number of years teaching, number of years teaching Pre-K, and the number of professional development events attended) were analyzed with the CLAC variables. The correlations among the teacher characteristics and CLAC variables ranged from -.02 to .24; none of which were statistically significant at an *a priori* level of $p < .05$.

Using Student's t-tests, there were no group differences on any of the CLAC outcomes between teachers who participated in any college courses on education in the previous nine months to those who had. One-way ANOVAs tested group differences among highest level of education and field of study. No significant group differences emerged in relation to CLAC classroom scores (two factor scores and overall task orientation). Finally, an ANCOVA model was used to distinguish mean differences between levels of education and highest level of education to the CLAC variables: no significant differences were found.

In this dissertation study, Research Question Three sought to examine the CLAC's ability to correlate with other aspects of classroom quality. Three distinct indicators were used: 1) a well-known classroom observation tool, CLASS; 2) an internally-created measure of the balance of teacher-directed and child-initiated learning, MCAR; and 3) teacher training and experience. Overall, the CLAC demonstrated nonsignificant to moderate associations with other measures of classroom quality, including the CLASS-Emotional Support domain and classrooms with higher levels of child-initiated learning across language/literacy, science, and math domains. Of the

MCAR continuous measures of child-initiated instruction, five of the nine variables (56%) were significantly associated with CLAC variables and only one of the nine dichotomized balanced approach variables were linked to CLAC. Three of the 18 MCAR ratio variables had moderate, significant relations with CLAC scores. Finally, none of the structural teacher variables were significantly associated with the CLAC variables.

Research Question 4: What is the predictive validity of the CLAC measure (its overall and two factor scores) to children's learning using the Teaching Strategies GOLD?

Research Question Four examined the Classroom Learning Activities Checklist's (CLAC) ability to predict children's learning using standardized assessments of year-end learning. Specifically, three questions were addressed: to what extent can a) Instructional Responsiveness, b) Student Engagement and c) overall task orientation variables uniquely predict student's TS GOLD scores, above and beyond a set of potential explanatory variables. See Table 16 for fall and spring TS GOLD score descriptive statistics.

Table 16.
Pre-K Baseline and Spring TS GOLD Score Descriptive Statistics

	Mean		*SD*		Response Ranges	
	Fall	Spring	Fall	Spring	Fall	Spring
Continuous scores						
Literacy	34.00	60.73	15.42	16.37	0-85	9-104
Language	28.39	38.56	7.60	6.86	1.5-48	14.25-54
Math	22.85	37.87	8.49	8.86	0-56	8-60
Socio- emotional	40.09	56.49	12.39	10.98	0-73	15-81
Total	192.13	286.69	57.24	55.23	10.45-379	105.39-431
Proficient scores						
Literacy	.10	.80	.30	.40	0-1	0-1
Language	.12	.68	.32	.47	0-1	0-1
Math	.06	.78	.24	.41	0-1	0-1
Socio-emotional	.08	.77	.27	.42	0-1	0-1
Total	.09	.65	.28	.48	0-1	0-1

Each model included a CLAC predictor variable and variables controlling for gender, race, ethnicity, special education status, age, and free lunch eligibility. As expected, there are several statistically significant relations among the risk covariates to TS GOLD outcome variables. See Table 17 for a correlation matrix of the model covariates with each outcome measure.

Table 17.
Correlation Matrix of Covariates and Spring Outcome Scores

	1	2	3	4	5	6	7	8	9	10	11
1. Gender	--										
2. Race	-.01	--									
3. Hispanic	.01	**-.91**	--								
4. Special Ed	**-.17**	**-.14**	**.12**	--							
5. Age	.001	**-.06**	**.08**	-.001	--						
6. Free Lunch	.04	**.19**	**-.15**	-.04	**.07**	--					
7. Assess Date	**.04**	**-.11**	**.11**	-.01	**.10**	-.001	--				
8. Language	**.12**	**.07**	**-.07**	**-.27**	**.62**	.001	**.16**	--			
9. Literacy	**.08**	**.12**	**-.11**	**-.20**	**.65**	.02	**.15**	**.87**	**--**		
10. Math	**.07**	**.07**	**-.07**	**-.22**	**.65**	-.02	**.17**	**.87**	**.93**	**--**	
11. Socio-emotional	**.13**	-.03	.03	**-.21**	**.62**	-.004	**.18**	**.90**	**.82**	**.83**	**--**
12. Total Score	**.10**	**.05**	**-.05**	**-.22**	**.67**	.007	**.17**	**.96**	**.95**	**.94**	**.94**

Note: Bold values indicate significant at $p < .05$

For this dissertation study, three predictor variables were analyzed: Overall task orientation (CLAC26), Instructional Responsiveness and Student Engagement. Dichotomized outcome variables were created and used to determine a threshold effect: Can the CLAC variables predict student learning above national normed averages? Using *a priori* alpha level of .05, variables with coefficients that fell below this threshold were considered predictors of the student outcomes. Each model accounted for nesting by clustering the standard error at the classroom level and included the following covariates: baseline performance, assessment date, gender, race, ethnicity, special education status, age, and free lunch eligibility.

Three datasets were prepared for analysis, including a) observed data with missing values; b) multiply-imputed with student outcome (MISO) data; and c) multiply-imputed using available student information (MIASI) data. In general, overall beta-values were similar (mean percent difference = 137%); a trend was detected where the beta-values were somewhat higher and p-values somewhat lower for regressions using imputed data, arguably as a function of the larger sample sizes. See Table 18 for a description of the sample sizes of students with CLAC predictor data across the three datasets.

Table 18.
Sample Sizes with CLAC Variable Data and Student Outcome Data

	Non-imputed					Multiply-Imputed with Student Outcomes (MISO)	Multiply-Imputed using Available Student Information (MIASI)
	Language	Literacy	Math	Socio-emo	Total		
CLAC 26	573	525	541	575	507	677	851
CLAC Factor 1	511	465	479	513	449	612	765
CLAC Factor 2	523	477	494	525	464	625	789

For model comparison, I also examined the models' Root Mean Square Error (RMSE), a measure of the differences between the models' predicted values to observed values. A pattern emerged assessing the models' fit of observed to predicted values. The models' RMSE for each outcome measure (language, literacy, math, socio-emotional, and sum score) was examined using the 1) non-imputed; 2) multiply-imputed with student outcomes (MISO); and 3) multiply-imputed using available student information (MIASI) datasets with the three CLAC predictors. A trend emerged (with the exception of the socio-emotional outcome models) where RMSE values were very similar yet slightly decreased moving from non-imputed to the multiply-imputed datasets.

Depending on the outcome variable, the differences ranged from .42 (model with language and Instructional Responsiveness: the RMSE of the non-imputed = 3.548; MISO = 3.423; and MIASI data = 3.120) to 4.898 (model with total sum score with Student Engagement: the RMSE of the non-imputed data model = 31.233; MISO data =

28.893; and model using MIASI = 26.335).While no criterion exists for interpreting RMSE values across models, I concluded the observed values were relatively and consistently close to one another.

Multiple imputation using student outcome data maximized sample size while limiting error in estimates. Available evidence suggests imputed models can effectively preserve important dataset characteristics (Graham, 2009). Non-imputed tables of models with CLAC26, factor 1 and factor 2 can be seen in Appendices D, E, and F; models with fully-imputed data (MIASI) for overall task orientation and both factors 1 and 2 are in Appendix G, H, and I, respectively.

Overall task orientation. Task orientation, along with covariates, was used as a predictor in linear and probit regression models for each TS GOLD outcome measure: Both continuous and dichotomous measures of language, literacy, math, and socio-emotional were evaluated. A total continuous TS GOLD measure was created by compiling subscale scores. A proficiency total score was created by dichotomizing the total subscale score. Table 19 presents each regression model with task orientation and covariates predicting each outcome measure. Each column, labeled A-J, represents a linear/probit model of continuous/dichotomous outcome and are presented in the following order: language, literacy, math, socio-emotional, and a total score. Included in each model were variable coefficients, observations, and models' R^2/pseudo R^2.

After controlling for potential confounds and nesting effects within classrooms, classroom levels of task orientation predicted both the continuous (i.e., linear model) and dichotomous (probit model) measures of math learning, $\beta = 1.48$, $p < .05$ and, $\beta = .37$, $p < .05$, respectively. See Models E and F in Table 19. As seen in Models C and D, higher levels of classroom task orientation also predicted students' year-end literacy scores (both continuous and proficiency measures), $\beta = 2.55$, $p < .05$ and $\beta = .31$, $p < .05$, respectively. Special education status also predicted most of the TS GOLD outcomes (seven of the nine outcomes) when overall task orientation was included.

Instructional Responsiveness. The first factor, Instructional Responsiveness, was also used as a predictor for the continuous and dichotomous TS GOLD domain and overall scores. As seen in Table 18, Model E, classroom levels of Instructional Responsiveness significantly predicted later continuous and dichotomized math scores, $\beta = .19$, $p < .01$ and $\beta = .04$, $p < .05$, respectively. Similar to the overall task orientation models, baseline scores and special education status were also consistently significant predictors in the models. See Table 18 for the complete models' coefficients, p-values associated with the coefficients, and R^2/pseudo R^2 values for each of the outcome variables. To control for nesting within classrooms, standard errors were clustered at the classroom level.

Student Engagement. The second CLAC factor, Student Engagement, was used to predict children's learning at the end of the Pre-K year. See Table 19 for the complete models with Student Engagement as a predictor. Again, each model, labeled A-J includes each predictor's coefficient, p-values above .05, and R^2/pseudo R^2 and standard errors were clustered at the classroom level. Student Engagement was not significant in any of the linear or probit regression models.

As expected, the dichotomized baseline performance scores often perfectly predicted proficient outcome measures. Consequently, the continuous baseline measures were used in the models to control for previous achievement. Fall assessment date, ethnicity, age, free lunch eligibility, and gender also predicted outcomes in various models. The total amount of variance accounted for in the models was quite high for the measures: Between 64-77% of the variance was accounted for by the individual models, i.e., $R^2 = .645$, $p < .001$, $R^2 = .769$, $p < .001$.

To account for potential school-level correlations (e.g., site-based trainings of TS GOLD assessment) and reduce the overall number of clusters, regression models with school-level clusters were also analyzed. As seen in Appendices I, J, and K, similar results were found across the CLAC predictor models. All but one model (CLAC26 with covariates in prediction model of continuous literacy learning) remained significant at the *a priori* threshold of $p < .05$ while robust standard errors were similar across the independent variables.

Finally, new CLAC factor variables were created by dichotomizing each factor score at one standard deviation above the mean. One standard deviation above the mean was used as the cut-point to better define the negatively skewed distributions of the two CLAC factor variables. These CLAC variables replaced the previous factor variables in the regression models predicting student learning. All but one of the 18 models failed to demonstrate the factor variables as significant predictors within the models. The dichotomized Factor 2: Student Engagement variable positively predicted oral language proficiency, $\beta = 0.04$, $p < .001$.

Table 19.

Linear and Probit Regression Models Predicting TS GOLD Outcomes with Overall Task Orientation

	Language		Literacy		Math		Socio-emotional		Total	
	Model A Continuous	Model B Proficient	Model C Continuous	Model D Proficient	Model E Continuous	Model F Proficient	Model G Continuous	Model H Proficient	Model I Continuous	Model J Proficient
CLAC26	0.52	0.15	2.55*	0.31*	1.48*	0.36*	-0.24	0.06	5.15	0.24
Baseline score	0.70***	0.19***	0.70***	0.09***	0.71***	0.16***	0.62***	0.07***	0.70***	0.03***
Baseline date	2.36**	0.76***	2.40	0.51*	1.47	0.37	2.60	0.36	14.02	0.75**
Gender	0.27	0.08	1.04	-0.10	-0.48	-0.34**	0.92*	0.21**	1.47	-0.05
Race	0.83	-0.02	0.05	-0.19	-0.78	0.10	-0.19	-0.24	0.55	0.04
Hispanic	-0.22	-0.03	-2.17	-0.23	-1.11	-0.15	-0.95	-0.36	-5.21	-0.09
Special education	-0.79	-0.48	-5.18**	-0.85***	-4.04***	-1.11***	-2.92	-0.08	-15.44*	-0.84**
Age (months)	0.07	-0.06**	0.32	-0.07***	0.20	-0.09***	0.15	-0.02	0.86	-0.08**
Free lunch eligible	-0.15	-0.20	1.46	-0.17	0.89	-0.55*	1.06	0.02	5.35	-0.11
Observations	677	677	677	677	677	677	677	677	677	677
R^2/ Pseudo R^2	0.763	.479	.650	.396	.699	.431	.644	.283	.737	.446

Note. Standard error adjusted for 49 classroom-level clusters.
* $p < .05$, ** $p < .01$, ***$p < .001$

Table 20.
Linear and Probit Regression Models Predicting TS GOLD With CLAC Factor 1: Instructional Responsiveness

Variable	Language		Literacy		Math		Socio-emotional		Total	
	Model A Continuous	Model B Proficient	Model C Continuous	Model D Proficient	Model E Continuous	Model F Proficient	Model G Continuous	Model H Proficient	Model I Continuous	Model J Proficient
Factor 1	0.04	0.01	0.55	0.02	0.19**	0.04*	-0.02	-0.002	0.55	0.01
Baseline score	0.67***	0.19***	0.66	0.09***	0.67	0.15***	0.60***	0.07***	0.67***	0.02***
Baseline date	2.32**	0.77***	2.07***	0.50*	1.69	0.34	2.63	0.39	15.09*	0.75**
Gender	0.38	0.14	1.19	-0.003	0-.21	-0.26	0.99*	0.23**	2.77	-0.005
Race	1.24	0.11	0.41	-0.11	-0.26	0.25	0.14	-0.18	3.60	0.13
Hispanic	-0.67	-0.13	-2.74	-0.32	-2.03	-0.29	-1.39	-0.44	-8.91	-0.21
Special education	-0.65	-0.50	-5.97***	-0.85***	-4.38***	-1.30***	-2.25	-0.08	-14.74*	-0.82**
Age (months)	0.11	-0.06*	0.37*	-0.07***	0.24*	-0.07***	0.20	-0.02	1.20	-0.07**
Free lunch eligible	-0.12	-0.22	1.72	-0.13	1.13	-0.58**	1.29	0.07	5.92	-0.09
Observations	612	612	612	612	612	612	612	612	612	612
R^2/ Pseudo R^2	.769	.494	.650	.379	.699	.410	.635	.299	.736	.437

Note. Standard error adjusted for 43 classroom-level clusters.
* $p < .05$, ** $p < .01$, *** $p < .001$

Table 21.

Linear and Probit Regression Models Predicting TS GOLD with CLAC Factor 2

	Language		Literacy		Math		Socio-emotional		Total	
	Model A	Model B	Model C	Model D	Model E	Model F	Model G	Model H	Model I	Model J
	Continuous	Proficient	Continuous	Proficient	Continuous	Proficient	Continuous	Proficient	Continuous	Proficient
Factor 2	.20	.02	.55	.03	.23	.05	.21	.05	1.36	.07
Baseline score	.66***	.20***	.66***	.09***	.67***	.15***	.59***	.07***	.66***	.03***
Baseline date	2.11**	.68**	2.07	.40	1.26	.35	2.37	.26	13.00	.69*
Gender	.41	.16	1.19	-.10	-.31	-.26*	.88*	.22**	2.16	.0004
Race	.89	.08	.41	-.10	-.74	.17	-.42	-.21	.45	.16
Hispanic	-.55	-.05	-2.74	-.32	-1.70	-.16	-1.48	-.39	-8.13	-.08
Special education	-.96	-.69*	-5.97**	-.93***	-4.24***	-1.12***	-2.90	-.03	-17.34*	-1.06***
Age (months)	.09	-.06**	.37*	-.06***	.23*	-.08***	.17	-.02	1.06	-.08**
Free lunch eligible	.08	-.12	1.72	-.11	1.14	-.52*	1.51	.12	6.80	-.03
Observations	625	625	625	625	625	625	625	625	625	625
R^2/ Pseudo R^2	.770	.494	.644	.381	.682	.405	.635	.294	.735	.451

Note. Standard error adjusted for 44 classroom-level clusters.

* $p < .05$, ** $p < .01$, *** $p < .001$

CLAC and CLASS. As part of the fourth and final research question, I sought to understand the value added of the CLAC in regression models when including CLASS scores. In separate models, none of the CLASS variables (Emotional Support, Classroom Organization, and Instructional Support) significantly predicted any of the dichotomous or continuous outcome measures (total score, language, literacy, math, and socio-emotional).

Using models where a CLAC variable significantly predicted a learning outcome, three additional CLASS variables (Emotional Support, Classroom Organization, and Instructional Support) were independently included and analyzed. To assess the effect on both continuous and proficient literacy scores, overall task orientation, covariates, and CLASS domain scores were examined using linear and probit regression. As seen in Table 22, Models 1 and 3, overall task orientation continued to significantly predict continuous measures of literacy learning, after controlling for the Emotional Support and Instructional Support scores

Similarly, overall task orientation (CLAC26) continued to predict the dichotomous literacy measure after including the CLASS domain score: Emotional Support ($\beta = 3.70$, $p < .001$), Classroom Organization ($\beta = 3.32$, $p < .001$), and Instructional Support ($\beta = 3.56$, $p < .001$). See Table 23 for each of these models. Table 24 demonstrates related findings using the CLAC variables on measures of math learning. Across each of the six models where either CLAC26 or Factor 1 variables were analyzed with a CLASS domain score and covariates, each CLAC predictor continued to exceed the threshold for significance ($p < .05$) while none of the CLASS variables reached significance.

Table 22.
Linear Regression Models Predicting TS GOLD Literacy Scores with Overall Task Orientation and CLASS Variables

	1	2	3
Baseline score	0.69***	0.67***	0.69***
Baseline date	2.09	2.86	2.79
Gender	1.26	1.3	1.23
Race	-1.11	0.02	-0.09
Hispanic	-1.00	-1.56	-1.83
Special education	-4.26	-4.88*	-5.47*
Age (months)	0.35	0.36	0.34
Free lunch eligible	2.02	2.03	2.17
CLAC 26	3.70*	3.32 †	3.56*
CLASS Emotional Support	-3.30		
CLASS Classroom Organization		-0.57	
CLASS Instructional Support			-1.82
Pseudo R^2	.650	.645	.650

Note. n = 601 observations. Standard error adjusted for 44 classroom-level clusters.
* $p < .05$, ** $p < .01$, ***$p < .001$, † = .053

Table 23.
Probit Regression Models Predicting Literacy Proficiency with Overall Task Orientation and CLASS Variables

	1	2	3
Baseline score	0.10***	0.10***	0.09***
Baseline date	0.38	0.56*	0.58*
Gender	-0.12	-0.09	-0.08
Race	-0.39	-0.18	-0.17
Hispanic	0.052	-0.06	-0.12
Special education	-0.56*	-0.68**	-0.76**
Age (months)	-0.08***	-0.08***	-0.07***
Free lunch eligible	-0.21	-0.11	-0.10
CLAC 26	0.55***	0.57***	0.48***
CLASS Emotional Support	-0.81**		
CLASS Classroom Organization		-0.37 †	
CLASS Instructional Support			-0.12
Pseudo R^2	.427	.409	.400

Note. n = 601 observations. Standard error adjusted for 44 classroom-level clusters.
* $p < .05$, ** $p < .01$, ***$p < .001$, † = .056

Table 24.
Linear Regression Models Predicting TS GOLD Math Scores with CLAC and CLASS Variables

	1	2	3	4	5	6
Baseline score	0.71***	0.70***	0.69***	0.69***	0.67***	0.66***
Baseline date	1.03	1.39	1.68	0.96	1.48	1.69
Gender	-0.50	-0.43	-0.5	-0.15	-0.11	-0.17
Race	-2.04	-1.42	-1.22	-1.51	-0.74	-0.65
Hispanic	-0.72	-1.12	-1.15	-1.71	-2.09	-2.06
Special education	-3.95***	-4.28***	-4.56***	-4.47***	-4.86***	-5.07***
Age (months)	0.21	0.21	0.22	0.24*	0.25*	0.25*
Free lunch eligible	1.50	1.67	1.43	1.73	1.79	1.61
CLAC 26	2.19**	2.13*	1.87**			
CLAC Factor 1				0.27**	0.23*	0.22**
CLASS- Emotional Support	-2.29			-2.61		
CLASS- Classroom Organization		-1.02			-0.70	
CLASS- Instructional Support			-0.28			-0.27
Observations	601	601	601	551	551	551
R^2	.712	.707	.704	.714	.705	.703
Classroom clusters	44	44	44	39	39	39

* $p < .05$, ** $p < .01$, ***$p < .001$, † = .056

Finally, as seen in Table 25, both CLAC variables continued to predict math proficiency after controlling for early risk factors and CLASS scores. Only one CLASS variable significantly (and negatively) predicted any of the outcome measures: Table 25, Model 3 shows both overall task orientation and Classroom Organization as significant predictors, $\beta = 0.78$, $p < .001$ and $\beta = -0.59$, $p = .018$, respectively.

While sample sizes decreased after combining CLAC and CLASS variables, the results indicate the CLAC scores continue to significantly predict measures of students' literacy and math learning.

Table 25.
Probit Regression Models Predicting Math Proficiency with CLAC and CLASS Variables

	1	2	3	4	5	6
Baseline score	0.18***	0.20***	0.17***	0.18***	0.19***	0.17***
Baseline date	0.28	0.37	0.47	0.11	0.29	0.39
Gender	-0.45**	-0.45**	-0.4**	-0.36*	-0.32*	-0.3
Race	-0.57	-0.34	-0.39	-0.35	-0.08	-0.15
Hispanic	-0.35	-0.28	-0.43	-0.5	-0.53	-0.57
Special education	-1.13***	-1.16***	-1.23***	-1.41***	-1.47***	-1.49***
Age (months)	-0.1***	-0.11***	-0.09***	-0.08***	-0.09***	-0.08***
Free lunch eligible	-0.45	-0.38	-0.42	-0.48*	-0.43	-0.43
CLAC 26	0.62**	0.78***	0.54***			
CLAC Factor 1				0.06**	0.06**	0.05**
CLASS- Emotional Support	-0.52			-0.72		
CLASS- Classroom Organization		-0.59*			-0.38	
CLASS- Instructional Support			0.02			0.004
Observations	601	601	601	551	551	551
Pseudo R^2	.477	.490	.466	.461	.453	.440
Classroom clusters	44	44	44	39	39	39

* $p < .05$, ** $p < .01$, *** $p < .001$, † = .056

Chapter 5

Discussion

The purpose of this dissertation study was to examine the ability and utility in using the Classroom Learning Activities Checklist (CLAC) to assess classroom levels of task orientation and the instructional supports that facilitate it. Specifically, I sought to understand and evaluate the CLAC's dimensionality and internal validity evidence. Four separate research questions were proposed: 1) What is the dimensionality and construct validity evidence?; 2) What is the tool's reliability?; 3) What is the concurrent validity evidence? and 4) What is the predictive validity evidence of the CLAC? Results indicate the CLAC measured an aspect of classroom quality—as seen through its construction and descriptive statistics, high levels of internal consistency, correlations to other indicators of classroom quality, and ability to predict children's learning. Below the significance of each research question is presented, along with implications for practice, study limitations, and future research.

Dimensionality

Research Question One focused on the CLAC's construct validity and dimensionality. Overview of its development, observation and training process, tool descriptive statistics (including items and subscales), and data reduction using factor analysis were presented. The tool construction, via the incorporation of existing literature and extensive piloting, supported the CLAC's construct validity evidence. Further, extensive training procedures, observer calibration, and item and subscale correlation coefficients indicate the CLAC procedures ensured consistent and reliable estimates.

Results indicate individual CLAC items were highly correlated with one another, which was expected given they were all designed to capture theoretical aspects of task orientation. While there was variability across the items, subscales, and factors, the lack of variability in the individual items may necessitate further review. Ideally, I would have liked to see a broader range of values represented given our diverse and moderately large sample. Future research should investigate these scoring trends via examination of training process, scoring rubric, and value of a 5-point scale.

Also, a 2-factor model emerged as a succinct interpretation of the CLAC data, as determined by Eigenvalues, Scree plot, the number of items loading on each factor, and cumulative variance. While the first factor captured 41% of the shared variance across items, the second factor accounted for only 10% of the cumulative variance of the factor model.

In review of the items associated with both factors, two sub-constructs emerged: items that reflect classroom supports (Instructional Responsiveness, associated with factor 1) and observed reception to classroom activities (Student Engagement, associated with factor 2). The two CLAC factors reinforce existing literature that indicates different kinds of interactions (e.g., individualized attention and child engaging strategies) promote learning for young children (e.g., Burchinal et al., 2008; NICHD ECCRN, 2002). Specifically, responsive instruction with individualized support for children with low levels of self-regulation is associated with greater self-regulation gains (Connor et al., 2010). Student engagement, as previously examined in the literature review has also been linked to self-regulation (Fantuzzo et al., 2004; Williford et al., 2013). Additionally, these independent yet correlated CLAC factors support the bidirectional relation students have with their teachers and environments. An ecological systems perspective highlights the need to view students in the contexts from which they learn.

Reliability

The Classroom Learning Activity Checklist's (CLAC) scoring consistency was examined in the second research question. Using Cronbach's alpha, the tool's items had high levels of interrelatedness indicating the CLAC items measured a single construct (Cronbach, 1951). Because a 2-factor model emerged as an effective means of analyzing the CLAC items, the reliability of the two factors was also included. Instructional Responsiveness and Student Engagement demonstrated high internal consistency. The two factors were also moderately related to one another using Cohen's benchmarks (Cohen, 1951).

Inter-rater reliability (IRR) estimates were provided to assess measurement agreement across the trained observers. Intra-class correlation (ICC) was used as the primary IRR statistic because it accounts for multiple observers and incorporates the magnitude of agreement/disagreement. This measure was collected during observer training and both videos demonstrated strong agreement among observers. Similarly, Cohen's kappa and Cohen's weighed kappa values ranged from "fair" to "excellent" for both videos (Landis & Koch, 1977). The CLAC demonstrated several indicators of high reliability across the relevant and applicable indicators of reliability: scoring consistency and inter-rater agreement.

Concurrent Validity Evidence

The third research question evaluated the degree to which the Classroom Learning Activities Checklist (CLAC) corresponds to other measures of classroom quality. While understanding the identified tools measure inherently different aspects of classroom quality (i.e., global indicators, balanced instructional practices, teacher components), I anticipated finding relations to support the CLAC.

Using the three concurrent measures, evidence for Research Question Three was mixed. Across nine correlations of CLAC and CLASS domain scores, one significant correlation emerged. Instructional Responsiveness was associated with the Emotional Support domain of the CLASS. While this relation was expected, I was surprised to see a lack of other significant associations. This absence in connections between the tools could be possibly explained by the distribution of the CLASS. The CLASS domain mean scores appeared particularly large when compared to national averages (LaParo et al., 2004). Additionally, while the CLASS is a well-documented classroom observation tool with an abundance of validity evidence (e.g., Curby et al., 2009; Mashburn et al., 2008), none of the CLASS domain scores predicted any of the child-level outcome measures, suggesting its predictive ability was compromised using our data. Moreover, this may be further indication of the issues of the CLASS or any observation quality scale's ability to effectively and consistently measure and define quality as they emerge in larger-scale and higher-stakes evaluation (Gordon et al., 2013).

Because of evidence suggesting classrooms that emphasize a balanced instructional approach of teacher-directed and child-initiated activities support young children's learning (Graue et al., 2004), a second measure of concurrent validity evidence (Monthly Classroom Activities Report, MCAR) was explored. Teacher-reports of the balance of teacher-directed and child-initiated activities in language/literacy, math, and science were used to construct three sets of variables: a continuous measure of child-initiated learning (percentage), a dichotomous variable of a balanced instructional model (1 = balanced; 0 = unbalanced), and ratio variable (teacher-directed/child initiated; child-initiated/teacher-directed).

Instructional Responsiveness was significantly associated with higher levels of child-initiated science instruction and the math CI/TD ratio variable. The second factor, Student Engagement was positively correlated with child-initiated learning in all learning domains and in classrooms with a balanced approach for science instruction. Finally, classrooms with higher levels of Student Engagement were linked to the ratio CI/TD variable in math learning. Overall task orientation scores, using CLAC26, were negatively associated with science TD/CI ratio scores and positively associated with higher percentages of child-initiated learning in science. Finally, math CI/TD ratios were correlated with overall levels of task orientation.

First, it appeared science variables are more closely associated with CLAC variables than language/literacy and math averages. This could be for a small number of reasons. As seen in Table 14, the mean percentage of child-initiated science instruction was higher than math or language/literacy learning. This could indicate higher levels of child-initiated learning, regardless of content area, is connected to higher CLAC outcomes. Another consideration is early childhood classrooms generally spend more time in language/literacy learning proportionate to math or science instruction. It may be easier for teachers to accurately identify TD/CI instruction during shorter and more defined learning times for science and math. Conversely, due to science and math's somewhat limited presence in early childhood, Pre-K teachers may not accurately code math/science instruction. For example, math learning may include a cash register/pretend money in a dramatic play area (child-initiated activity) vs. the use of math workbooks or counting activities during group time (teacher-directed activities).

Finally, discrepancies among content areas may be due to the content itself: math and science instruction is relatively more nascent to early childhood programming than language/literacy instruction, and accordingly, the strategies and activities may be simply boiled down, typically teacher-directed learning in higher grades. Teachers who reported higher levels of child-initiated math and science learning may have received more support and in turn, were more effective in implementing child-focused math/science learning in classrooms.

As mentioned, the MCAR is a teacher-reported measure of instructional time across domains: it is unknown if the reported percentages mapped onto classroom practices or rather, teachers' ideologies of early childhood programming. Particularly with language/literacy instruction where more actual time is spent in this domain, teachers' ability to accurately report their practices may garner more error. Future review into the MCAR, including a more independent measure such as time sampling, is needed.

Secondly, nearly all of the significant associations among CLAC and MCAR variables (90%) indicated higher levels of child-initiated learning were connected to higher levels of task orientation, Instructional Responsiveness and Student Engagement. This partially diverges from existing evidence that a balanced approach of teacher-directed and child-initiated learning best supports student learning. Further examination into the MCAR's psychometric properties and criterion validity evidence is warranted.

A final set of measures was used to assess the CLAC's concurrent validity evidence: teachers' education, experience, and professional development activities. Using correlations, t-tests, ANOVAs, and ANCOVAs, no significant relations were detected. Considering conflicting evidence in the field regarding the impact of teachers' education and experience on classroom environments and student learning (e.g., Early et al., 2007; Howes et al., 2008), the results are not surprising. Additionally, because Child-Parent Center program participation requires education requirements, a lack of variation in education attainment might have prevented us from seeing underlying relations among teacher characteristics to the CLAC variables.

Overall, there were several indicators that support the ongoing validation development of the CLAC. Both the CLASS and MCAR provided evidence of concurrently validity; further examination into the CLAC's relation to both tools with more data and analysis of the concurrent measures is needed.

Predictive Validity Evidence

The final research question examined the Classroom Learning Activities Checklist's (CLAC) ability to predict the optimal outcome of interest: children's learning at the end of the pre-kindergarten year. Without evidence of the measure's ability to connect to child-level outcomes, our ability to further explore its potential refinement, scalability, and broader dissemination is limited.

In addition of continuous measures of children's learning using Teaching Strategies GOLD, I included dichotomized proficiency scores to assess whether or not a minimum threshold (i.e., national averages) were met. An overall achievement score (summed TS GOLD domain scores) as well as the following learning domains were included as dependent variables: language, literacy, math, and socio-emotional learning. After controlling for covariates (see Table 3 for a complete list), two of the three predictors, overall task orientation (CLAC26) and factor 1 (Instructional Responsiveness) significantly predicted year-end learning.

Task orientation predicted both literacy measures: higher classroom levels of task orientation predict both students' literacy scores and the likelihood of being proficient in literacy. Both overall task orientation and the Instructional Responsiveness factor significantly predicted math learning, i.e., classrooms with higher scores on either measure were associated with increased math achievement and math proficiency.

Overall task orientation CLAC variable appeared to be the best predictor of children's learning: four of the nine models with task orientation were statistically significant. Both the continuous and dichotomized measures of literacy and math were significant. Instructional Responsiveness significantly predicted both math measures but failed to yield significant results in any of the other four domains. Finally, there were no significant findings on any student outcome using the second factor, Student Engagement, as the predictor in the model.

Further, these relations remained significant after adding CLASS measures into the models, suggesting the CLAC variables uniquely capture an important component of learning and perhaps are stronger predictors of student achievement than the other well-established classroom observation tool. As seen in Tables 22-25, both overall task orientation (in 92% of the models) and Instructional Responsiveness (100% of the models) positively predicted children's learning. Only two of the 12 CLASS domain scores were significant predictors in these models: Emotional Support predicted math proficiency; Classroom Organization negatively predicted math proficiency.

While it was encouraging to see evidence of the CLAC's relation to aspects of student's math and literacy learning, it was unexpected to *not* see differential impacts of the different CLAC predictor variables to outcome measures. A potential explanation is a significant amount of TS GOLD data is missing, thus limiting reliability estimates and overall power. Additionally, the construct validity evidence of the math and literacy variables may be better; the literacy subscale had 12 items where several of the other items had less than five. Further predictive validity research is warranted: these analyses included data from one large district (Chicago, IL) using a single assessment, TS GOLD. The validity evidence of these findings would be bolstered by examining differing subpopulations, and more importantly, using additional standardized assessment tools (with demonstrated validity evidence).

Limitations

While there was variability across the items, subscales, and factors, of concern is the consistent restricted response range of the individual CLAC items. After this observation round was conducted in the Pre-K year and its data analyzed, a number of measures were taken to address the lack of variability. First, a 7-point scale was piloted both independently and in conjunction with the 5-point scale. Observers reported anecdotally that the 7-point measure provided more variation in ratings. The scoring rubric was also revisited and clarifying text was added where inconsistencies existed. More importantly, the entire rubric was shifted down to attempt to mean-center prior reported values. For example, a score of "4" was often provided across the items (with a range of 3-5). In these instances, the language from the "4" cell in the rubric was moved to the new mean value on the 7-point scale (i.e., "4"). These measures were taken to better distinguish values while maintaining the same scoring schema and subsequent score interpretations across tool versions. While the data from the revised tool have yet to be analyzed, I expect the values to be comparable to the original dataset. Since the overarching items and scoring rubric have not changed, the only anticipated difference would be greater variation in the response ranges. There were no changes to the CLAC items, the coding direction, or broad interpretation. Rather, the changes were designed to better detect true differences that inherently lie within classrooms that the first CLAC tool was potentially unable to measure.

Finally, the CLAC training process has been continually improved. Annual training is provided for observers where extra time is set aside for in-depth conversations on the operationalized definitions, scoring consistencies and observing scenarios. Another revision employed is the randomization of the observers. Due to the logistics of collecting classroom observation data within a large-scale, multi-state intervention, on-site support staff often conducted the CLAC observations. While fully trained on the CLAC, we cannot know if the observers were unbiased and rule out a “halo effect” in their scoring.

Future Directions

Further review of the CLAC’s items and structure, especially if the measure moves beyond its current use, is warranted. First, more scrutiny into each item’s value is needed. The factor analysis indicated two items, 18a (Time lost due to lack of teacher preparation) and 18c (Time lost due to routines) did not load on either factor, suggesting they may not support the overarching construct (task orientation) or its underlying factors. Moreover, item-rest correlations (the correlations between item and scale formed by other items) were small for 18a and 18c, r = .215 and r = .082, respectively. The items' Cronbach alpha coefficients were higher than the total scale's Cronbach alpha, indicating overall reliability increased when the individual item were excluded from analysis. Together these suggest the items are not measuring the same construct as the other items.

Further, the internal consistency of the CLAC items, α = .92, was quite high (above the recommended level of .9), suggesting items may be duplicating one another. Similarly, no other CLAC items apart from 18a and 18c had item-test correlation coefficients below .3, suggesting the others contributed to the internal consistency. Future research should also examine the usefulness in using one overall measure of task orientation (CLAC26) versus two factor scores or other constructed variables that may have higher reliability. Notably, in the analyses, the overall item predicted more child outcomes (math and literacy scores) than the factor variables.

Future research should examine the circumstances in which scores change across times of day, content focuses, and groupings and relatedly, the generalizability of the scores. The CLAC observations were scheduled in advance with directions that any instructional activity was observable. Most classrooms (77%) included whole group instruction and only 3% of CLAC observations included routines. Connecting to other research, children often spend much less time in whole group instruction (23%) and substantially more time in routines (35%) (Early et al., 2010).

Moderator analyses should also be investigated. It is plausible and even likely instructional groupings (whole group, free play, small group) affect student task-oriented learning. Higher levels of children's engagement are associated with activity settings that allow a greater degree of choice, such as free choice (Vitiello, Booren, Downer, & Williford, 2012). Similarly, certain content areas may more readily lend themselves to behaviors and instructional supports that foster engaged and active participation. The proportion of teacher-directed and child-initiated instruction may also moderate the relation between classroom task orientation and children's learning. Finally, further review into the length of observation is recommended. While there is some evidence via test-retest reliability scores to suggest CLAC scores generalize to the overall classroom experience, the stability of scoring over time (including content areas, groupings) needs to be further reviewed.

Moving forward, the Classroom Learning Activities Checklist (CLAC) has the potential to effectively guide and shape the classroom strategies and practices that promote student task orientation. While more evidence is needed to support the CLAC as a single measure of classroom task orientation, evidence presented here suggests the CLAC connects to aspects of classroom quality, specifically the role of teachers in implementing effective practices. Supporting task-oriented learning relies heavily if not almost exclusively on what classroom teachers believe, know, and ultimately do. Individual CLAC items that loaded onto the first factor, Instructional Responsiveness, often were observed measures of teachers' direct and indirect teaching interactions and methods. Similarly, Student Engagement (Factor 2) could be interpreted as the result of strategies teachers have employed that promote positive behavior management and classroom engagement. Professional development interventions that target specific teacher-interactions have been effective at changing teacher behavior. While evidence of PD interventions' impact on task orientation is unknown, changes to specific teacher interactions have been observe across different learning domains, including language and literacy strategies (McCollum, Hemmeter, & Hsieh, 2013; Piasta et al., 2012; Powell, Diamond, Burchinal, & Koehler, 2010) and social-emotional interactions (Hamre et al., 2012; Hemmeter et al., 2011; Raver et al., 2008).

Further, the CLAC may be a valuable tool in providing data to inform a variety of classroom and programming interests. As mentioned before, the observation tool was developed as a fidelity measure for the Midwest Child-Parent Center project yet may serve to inform broader program quality via progress monitoring or more summative evaluation. Additionally, the CLAC could potentially be used to assess the impact of specific interventions (e.g., those that target student engagement). Regardless of its application, it is imperative data from CLAC observations directly inform the very practices it measures.

This dissertation has presented evidence the Classroom Learning Activities Checklist (CLAC) measures classroom behaviors and practices that promote task-oriented learning in young students yet additional data collection and analysis are required to replicate these findings across different samples, contexts, and age ranges. These findings create a better understanding of how effective classroom strategies and environments affect student learning via the development of self-regulation. Facilitating students' early self-control and self-directed learning, the key ingredients of task orientation, through the provision of engaging learning environments and instructionally-responsive interactions promotes a critical foundation for later learning (Fitzpatrick and Pagani, 2013). Applying these results onto the ecological systems theory provides a logical and comprehensive framework for supporting and boosting children's learning: A classroom's most proximal resources to a child include child-teacher, child-child, and child-environment interactions.

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Appendix A

Classroom Learning Activities Checklist (CLAC)

Site:______________________ **Date**:_____ **Name of teacher**:___________ **# of Assistants/ Aides/Other Adults**:_______ **Room Number:**_______
Observer Name: ___________________________ **Observation Start Time**: __________ **Observation End Time**: __________ **Number of children present**: ______ **Describe activity (ies)** *(e.g., calendar time, clay work)*:____
Content focus *(circle primary)*: □ Art □Fine motor □ Language/ literacy □ Math/number concepts □ Science □ Social & emotional
Group organization *(check all that apply, circle primary)*: □ Whole group □ Small group □ Individual time □ Free Choice □ Routines *(e.g. breakfast)*

<u>Questions prior to visit/ observation:</u>
Ages: 3 year olds □ 4 year olds □ Mix □ **Number of children enrolled**:____ **Program Length** Full day____ ½ Day _____
What curriculum do you use?____________ Lang/ Literacy __________ Math ____________ Science ______________ Social/Emotional ____________

	Strongly Disagree/ Never/ None	**Disagree/ Rarely/ Few**	**Neutral/ Sometimes/ Some**	**Agree/Most of the Time/ Many**	**Strongly Agree/ Always/ Nearly All**
Focus Area and Activity					
A. Child Task Orientation/Engagement					
1.Children appear fully engaged in activities. *Notes:*	1	2	3	4	5
2.Children are active participants in their learning. *Notes:*	1	2	3	4	5
3. Children appear to be working/oriented towards a goal/learning objective. *Notes:*	1	2	3	4	5
4. Children are engaged with peers and/or materials. *Notes:*	1	2	3	4	5
5. Children's attention to the lesson is evident. *Notes:*	1	2	3	4	5
6. Child sharing of answers and thoughts is frequently observed. *Notes:*	1	2	3	4	5

	Strongly Disagree/ Never/ None	Disagree/ Rarely/ Few	Neutral/ Sometimes/ Some	Agree/Most of the Time/ Many	Strongly Agree/ Always/ Nearly All
B. Support in Learning Activities					
7. Organization of lesson and materials are conducive to task orientation. *Notes:*	1	2	3	4	5
8. Teaching methods promote engagement. *Notes:*	1	2	3	4	5
9. Teaching methods facilitate active participation. *Notes:*	1	2	3	4	5
10. Teacher shows openness/responsiveness to active participation and student engagement. *Notes:*	1	2	3	4	5
11. Individual attention to children is evident. *Notes:*	1	2	3	4	5
12. Extra help is provided to children when needed. *Notes:*	1	2	3	4	5
13. Responsiveness to children's work and behavior is frequent. *Notes:*	1	2	3	4	5
14. Activities provided consistently engage children. *Notes:*	1	2	3	4	5
15. Activities support active participation. *Notes:*	1	2	3	4	5
16. A variety of activities are provided. *Notes:*	1	2	3	4	5
17. There is a blend of teacher- directed and child- initiated activities. *Notes:*	1	2	3	4	5

	Strongly Disagree/ Never/ None	**Disagree/ Rarely/ Few**	**Neutral/ Sometimes/ Some**	**Agree/Most of the Time/ Many**	**Strongly Agree/ Always/ Nearly All**
C. Effective Use of Time					
18. Learning time (opportunities to learn/play) is **lost** because of….					
6. Lack of teacher preparedness *Notes:*	1	2	3	4	5
7. Student misbehavior *Notes:*	1	2	3	4	5
8. Non-instruction time (e.g., announcements)/Transitions *Notes:*	1	2	3	4	5
19. The pace of activities matches children's interests and attention. *Notes:*	1	2	3	4	5
20. The amount of time in the lessons/activities matches children's interests and attention. *Notes:*	1	2	3	4	5
D. Classroom Behavior					
21. Child misbehavior is a problem in this class. *Notes:*	1	2	3	4	5
22. Children follow rules and directions. *Notes:*	1	2	3	4	5
23. Children demonstrate positive peer relations *Notes:*	1	2	3	4	5

24. Please approximate the percentage of Teacher-Directed/Child-Initiated **activities** during the **observation**.

100% Teacher-Directed; 0% Child-Initiated	75% Teacher-Directed; 25% Child-Initiated	50% Teacher-Directed; 50% Child-Initiated	25% Teacher-Directed; 75% Child-Initiated	0% Teacher-Directed; 100% Child-Initiated

	Strongly Disagree/ Never/ None	Disagree/ Rarely/ Few	Neutral/ Sometimes/ Some	Agree/Most of the Time/ Many	Strongly Agree/ Always/ Nearly All
25. Please circle the overall description of the **Instructional Practices** utilized during the **observation**.					

Low Teacher-Directed, Low Child-Initiated	High Teacher-Directed, Low-Child Initiated
Low Teacher-Directed, High Child-Initiated	High Teacher-Directed, High Child-Initiated

26. Overall Task Orientation.
Please rate the overall level of children's task orientation in the classroom.

1 Very Low	2 Moderately Low	3 Somewhat	4 Moderately High	5 Very High

General Observation Criteria:

- Observe a minimum of 25-35 minutes, take notes, and score at end of the observation.
- Acceptable observed activities: group time, small groups, individual time, free choice. Avoid: routines, transitions, gross motor play
- Other criteria: lead teacher must be present, no special activities are planned (e.g., parent volunteer leads lesson).

Appendix B

CLAC 1-23 Factor Analysis Varimax Rotated Component Matrix

	Component 1	Component 2
15. Activities support active participation.	.86	
16. A variety of activities are provided.	.8	
8. Teaching methods promote engagement.	.79	
9. Teaching methods facilitate active participation.	.76	
20. The amount of time in the lessons/activities matches children's interests an	.71	
10. Teacher shows openness/responsiveness to active part & student engagement.	.68	.30
6. Child sharing of answers and thoughts is frequently observed.	.66	
17. There is a blend of teacher- directed and child- initiated activities.	.65	
14. Activities provided consistently engage children.	.64	.45
13. Responsiveness to children's work and behavior is frequent.	.62	
19. The pace of activities matches children's interests and attention.	.61	.38
12. Extra help is provided to children when needed.	.59	
11. Individual attention to children is evident.	.59	
2.Children are active participants in their learning	.56	.45
4. Children are engaged with peers and/or materials.	.55	.38
7. Organization of lesson and materials are conducive to task orientation.	.48	.44
18aR. Time is lost to lack of teacher preparation. *(reversed)*		
5. Children's attention to the lesson is evident.		.81
1.Children appear fully engaged in activities.	.32	.78
3. Children appear to be working/oriented towards a goal/learning objective.		.76
23. Children demonstrate positive peer relations		.75
22. Children follow rules and directions.		.74
21R. Misbehavior is a problem in this class. *(reversed)*		.68
18bR. Time is lost due to child misbehavior. *(reversed)*	.34	.61
18cR. Time is lost due to routines. *(reversed)*		

Note. Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Appendix C

Linear and Probit Regression Models Predicting Student Outcomes with Overall Task Orientation Using a Non-Imputed Dataset

	Language		Literacy		Math		Socio-emotional		Total	
	Model 1 Continuous	Model 2 Proficient	Model 3 Continuous	Model 4 Proficient	Model 5 Continuous	Model 6 Proficient	Model 7 Continuous	Model 8 Proficient	Model 9 Continuous	Model 10 Proficient
CLAC26	1.28	0.08	3.81*	0.10	1.27	-0.07	0.10	0.10	9.49	0.05
Baseline	0.63***	0.17***	0.62***	0.08***	0.56***	.014***	0.51	0.06***	0.52	0.02***
Baseline date	3.32***	0.68*	3.22	0.49	2.52	0.46	3.46	0.41	19.59	0.52
Gender	0.14	0.20	0.15**	-0.13	-0.44	-0.33*	0.68	0.23	0.97	-0.16
Race	1.59**	-0.07	-0.49	-0.54	-0.79	0.37	-3.77	-0.23	0.24	-0.77
Hispanic	-0.57	-0.51	-3.45	-1.07*	-1.02	-0.09	-6.10	-1.04*	-10.66	-0.63
Special education	-0.94	-0.18	-4.71*	-0.63*	-4.01**	-0.97**	-3.56	0.25	-15.05	-0.37
Age (months)	0.11*	-0.05	0.44*	-0.05	0.30*	-0.08**	0.38	0.0003	1.89	-0.04
Free lunch eligible	-0.053	-0.58*	2.80**	-0.04	1.72	-0.49*	2.61	0.002	9.82	-0.23
Observations	433	433	382	382	383	383	394	394	331	331
R^2/ Pseudo R^2	.740	.431	.621	.343	.626	.394	.636	.153	.699	.393

Note. Standard error adjusted for 30-37 classroom-level clusters.
* $p < .05$, ** $p < .01$, *** $p < .001$

Appendix D

Linear and Probit Regression Models Predicting Student Outcomes With CLAC Factor 1 Using a Non-Imputed Dataset

	Language		Literacy		Math		Socio-emotional		Total	
	Model 1 Continuous	Model 2 Proficient	Model 3 Continuous	Model 4 Proficient	Model 5 Continuous	Model 6 Proficient	Model 7 Continuous	Model 8 Proficient	Model 9 Continuous	Model 10 Proficient
Factor 1	0.11	-0.003	0.37	-0.02	0.33*	-0.02	-0.05	-0.01	1.44	-0.01
Baseline	0.61***	0.17***	0.59***	0.07***	0.54***	0.13***	0.46***	0.06***	0.54***	0.02***
Baseline date	3.16***	0.63*	4.53	0.53	3.04*	0.28	3.53*	0.43	21.23*	0.53
Gender	0.32	0.23	0.41	-0.04	-0.39	-0.30	0.81	0.23*	0.73	-0.13
Race	1.90***	-0.01	0.30	-0.53	-0.17	0.54	-3.71	-0.27	0.53	-0.76
Hispanic	-1.07	-0.59	-5.36	-1.13*	-2.50	-0.21	-7.63	-1.20**	-15.44	-0.66
Special education	-0.49	-0.19	-4.93	-0.64*	-4.02**	-1.07**	-2.12	0.30	-14.71	-0.35
Age (months)	0.16*	-0.04	0.52*	-0.04*	0.33**	-0.04	0.49***	0.01	1.94*	-0.03
Free lunch eligible	-0.13	-0.53	2.83	0.06	1.86	-0.50**	2.44	0.04	9.27	-0.15
Observations	402	402	348	348	349	349	362	362	309	309
R^2/ Pseudo R^2	.744	.441	.633	.348	.651	.395	.641	.289	.715	.407

Note. Standard error adjusted for 27-33 classroom-level clusters.
* $p < .05$, ** $p < .01$, *** $p < .001$

Appendix E

Linear and Probit Regression Models Predicting Student Outcomes with CLAC Factor 2 Using a Non-Imputed Dataset

	Language		Literacy		Math		Socio-emotional		Total	
	Model 1 Continuous	Model 2 Proficient	Model 3 Continuous	Model 4 Proficient	Model 5 Continuous	Model 6 Proficient	Model 7 Continuous	Model 8 Proficient	Model 9 Continuous	Model 10 Proficient
Factor 2	0.21	0.02	0.41	0.004	-0.02	-0.02	0.003	0.04	0.96	0.08
Baseline	0.59***	0.18***	0.61***	0.08***	0.57***	0.14***	0.48***	0.06***	0.53***	0.02***
Baseline date	3.03***	0.58*	3.44	0.47	2.62	0.47	3.45*	0.27	19.02*	0.42
Gender	0.40**	0.28*	0.31	-0.14	-0.34	-0.33*	0.78	0.21*	1.17	-0.18
Race	1.86	0.03	0.04	-0.52	-0.75	0.31	-3.75	-0.23	-0.41	-0.72
Hispanic	-0.66	-0.52	-3.62	-1.11*	-1.15	-0.10	-0.62	-1.05*	-10.07	-0.62
Special education	-0.92	-0.36	0.43	-0.75**	-4.08**	-0.97**	-3.44	0.21	-15.08	-0.33
Age (months)	0.14	-0.05	3.35*	-0.05**	0.29*	-0.08*	0.40**	0.004	1.90*	-0.04
Free lunch eligible	0.10	-0.52	0.41	0.02	1.91	-0.50*	2.50	0.08	10.97	-0.19
Observations	407	407	365	365	368	368	368	368	317	317
R^2/ Pseudo R^2	.748	.449	.617	.350	.619	.389	.641	.282	.705	.416

Note. Standard error adjusted for 28-34 classroom-level clusters.
* $p < .05$, ** $p < .01$, *** $p < .001$

Appendix F

Linear and Probit Regression Models Predicting Student Outcomes with Overall Task Orientation Using a Fully-Imputed Dataset

	Language		Literacy		Math		Socio-emotional		Total	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
	Continuous	Proficient	Continuous	Proficient	Continuous	Proficient	Continuous	Proficient	Continuous	Proficient
CLAC26	0.48	0.12	2.27	0.29*	1.31*	0.35*	-0.19	0.01	4.63	0.20
Baseline	0.70***	0.21***	0.71***	0.10***	0.71***	0.17***	0.64***	0.08***	0.71***	0.03***
Baseline date	2.03***	0.60**	2.28	0.39	1.34	0.31	2.25	0.28	12.36*	0.64**
Gender	0.33	0.09	0.92	-0.14	-0.40	-0.33**	-0.82**	0.25**	1.67	-0.08
Race	0.45	-0.004	-0.02	-0.27	-0.91	-0.02	0.94	-0.20	-1.58	-0.03
Hispanic	-0.71	-0.06	-2.77*	-0.43	-1.66*	-0.38	-1.77	-0.39	-9.02*	-0.30
Special education	-0.75	-0.74**	-4.93***	-0.91***	-3.73***	-1.23***	-2.54*	-0.39	-13.96	-1.01***
Age (months)	0.09	-0.07**	0.38*	-0.08***	0.23*	-0.09***	0.19	-0.02	1.06*	-0.09***
Free lunch eligible	-0.40	-0.48**	0.82	-0.36**	0.37	-0.75***	0.39	-0.24	2.24	-0.39*
R^2/ Pseudo R^2	.781	.479	.682	.404	.722	.433	.671	.281	.760	.443

Note. n = 851 observations Standard error adjusted for 51 classroom-level clusters.
* $p < .05$, ** $p < .01$, *** $p < .001$

Appendix G

Linear and Probit Regression Models Predicting Student Outcomes with CLAC Factor 1 Using a Fully-Imputed Dataset

	Language		Literacy		Math		Socio-emotional		Total	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
	Continuous	Proficient	Continuous	Proficient	Continuous	Proficient	Continuous	Proficient	Continuous	Proficient
Factor 1	0.04	0.01	0.23	0.02	0.17**	0.03*	-0.02	-0.004	0.50	0.01
Baseline	0.67***	0.20***	0.68***	0.10***	0.67***	0.16***	0.60***	0.08***	0.66***	0.03***
Baseline date	1.99***	0.59**	2.62	0.37	1.45	0.26	2.28	0.29	13.07*	0.63*
Gender	0.44	0.17	1.36	-0.03	-0.17	-0.23	1.02**	0.28***	2.89*	-0.02
Race	0.75	0.07	0.30	-0.20	-0.68	0.13	-0.58	-0.18	0.18	0.01
Hispanic	-1.02	-0.13	-3.86**	-0.46*	-2.60**	-0.46*	-2.07	-0.45	-12.36*	-0.38
Special education	-0.69	-0.77**	-4.89**	-0.84***	-3.95***	-1.30***	-2.10	-0.37	-13.56*	-0.99***
Age (months)	0.13*	-0.06**	0.43*	-0.08***	0.27**	-0.07***	0.23	-0.02	1.36	-0.08**
Free lunch eligible	-0.53	-0.49**	0.52	-0.32*	0.39	-0.79***	0.41	-0.18	1.62	-0.36*
R^2/ Pseudo R^2	.787	.487	.680	.382	.721	.409	.661	.289	.758	.428

Note. n = 765 observations. Standard error adjusted for 45 classroom-level clusters.
* $p < .05$, ** $p < .01$, ***$p < .001$

Appendix H

Linear and Probit Regression Models Predicting Student Outcomes with CLAC Factor 2 Using a Fully-Imputed Dataset

	Language		Literacy		Math		Socio-emotional		Total	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
	Continuous	Proficient	Continuous	Proficient	Continuous	Proficient	Continuous	Proficient	Continuous	Proficient
Factor 2	0.16	0.03	0.44	0.04	0.19	0.06	0.19	0.05	1.12	0.07
Baseline	0.67***	0.21***	0.67***	0.10***	0.68***	0.16***	0.60***	0.08***	0.67***	0.03***
Baseline date	1.84**	0.53*	2.00	0.30	1.15	0.29	2.03	0.19	11.39	0.60*
Gender	0.48*	0.17	1.05	-0.14	-0.26	-0.24*	0.91**	0.27***	2.29	-0.03
Race	0.58	0.09	0.19	-0.17	-0.93	0.08	-0.83	-0.15	-1.36	0.07
Hispanic	-0.90*	-0.07	-3.35**	-0.47*	-2.19**	-0.34	-2.09	-0.41	-11.22**	-0.31
Special education	-0.89	-0.90***	-5.43***	-0.96***	-3.84***	-1.20***	-2.53*	-0.36	-15.28	-1.15***
Age (months)	0.12	-0.07**	0.44**	-0.07***	0.26**	-0.08***	0.21	-0.02	1.28*	-0.08**
Free lunch eligible	-0.22	-0.41*	1.16	-0.29*	0.61	-0.70***	0.79	-0.10	3.56	-0.30
R^2/ Pseudo R^2	.788	.500	.676	.395	.708	.410	.664	.292	.759	.451

Note. *n* = 601 observations. Standard error adjusted for 46 classroom-level clusters.
* $p < .05$, ** $p < .01$, *** $p < .001$

Appendix I

Linear and Probit Regression Models Predicting Student Outcomes with Overall Task Orientation Clustering at School Level

	Language		Literacy		Math		Socio-emotional		Total	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
	Continuous	Proficient	Continuous	Proficient	Continuous	Proficient	Continuous	Proficient	Continuous	Proficient
CLAC 26	2.55	0.15	2.55	0.31*	1.48*	0.37*	-0.24	0.06	5.15	0.29
Baseline	0.70***	0.19***	0.70***	0.09***	0.71***	0.16***	0.62***	0.07***	0.70***	0.02***
Baseline date	2.40*	0.76**	2.40	0.51*	1.47	0.37	2.60	0.36	14.02	0.83*
Gender	1.04	0.08	1.04	-0.10	-0.48	-0.34**	0.93*	0.21**	1.48	0.06
Race	0.05	-0.02	0.05	-0.19	-0.78	0.10	-0.19	-0.24	0.55	0.01
Hispanic	-2.17	-0.03	-2.17	-0.23	-1.11	-0.15	-0.95	-0.36	-5.21	0.08
Special education	-5.18	-0.48	-5.18*	-0.85***	-4.04***	-1.11***	-2.92	-0.08	-15.40	-1.16***
Age (months)	0.32	-0.06**	0.32	-0.07***	0.20*	-0.09***	0.15	-0.03	0.86	-0.07**
Free lunch eligible	1.47	-0.20	1.47	-0.17	0.90	-0.55***	1.06	0.02	5.35	0.003
R^2/ Pseudo R^2	.763	.479	.650	.396	.699	.431	.644	.283	.738	.437

Note. n = 677 observations. Standard error adjusted for 21 school-level clusters.
* $p < .05$, ** $p < .01$, *** $p < .001$

Appendix J

Linear and Probit Regression Models Predicting Student Outcomes with CLAC Factor 1 Clustering at School Level

	Language		Literacy		Math		Socio-emotional		Total	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
	Continuous	Proficient	Continuous	Proficient	Continuous	Proficient	Continuous	Proficient	Continuous	Proficient
Factor 1	0.04	0.01	0.26 †	0.02	0.19*	0.04*	0.09	-0.002	0.55	0.02
Baseline	0.67***	0.19***	0.67***	0.09***	0.67***	0.15***	0.09***	0.07***	0.67***	0.022***
Baseline date	2.32**	0.77**	2.91	0.50*	1.69	0.34	1.57	0.39	15.09	0.83*
Gender	0.38*	0.14	1.55*	-0.003	-0.21	-0.26*	0.39*	0.23**	2.77*	0.15
Race	1.24	0.11	0.78	-0.11	-0.26	0.25	2.17	-0.18	3.60	0.18
Hispanic	-0.67	-0.13	-3.21	-0.32	-2.03	-0.29	2.13	-0.44	-8.91	-0.01
Special education	-0.65	-0.50	-5.32*	-0.85***	-4.38***	-1.30***	1.63	-0.08	-14.70	-1.18***
Age (months)	0.11	-0.06*	0.38	-0.07***	0.24*	-0.07***	0.19	-0.02	1.20	-0.05
Free lunch eligible	-0.12	-0.22	1.39	-0.13	1.12	-0.58***	0.91	0.07	5.92	0.02
R^2/ Pseudo R^2	.769	.494	.650	.379	.699	.410	.635	.299	.736	.427

Note. n = 612 observations. Standard error adjusted for 21 school-level clusters.
* $p < .05$, ** $p < .01$, *** $p < .001$, , † = .056

Appendix K

Linear and Probit Regression Models Predicting Student Outcomes with CLAC Factor 2 Clustering at School Level

	Language		Literacy		Math		Socio-emotional		Total	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
	Continuous	Proficient	Continuous	Proficient	Continuous	Proficient	Continuous	Proficient	Continuous	Proficient
CLAC 26	0.20	0.02	0.55	0.03	0.23	0.05	0.21	0.05	1.36	0.08
Baseline	0.66***	0.20***	0.66***	0.09***	0.67***	0.15***	0.59***	0.07***	0.66***	0.02***
Baseline date	2.11*	0.68*	2.07	0.40	1.26	0.35	2.37	0.26	12.90	0.74*
Gender	0.41*	0.16	1.19	-0.10	-0.31	-0.30*	0.88*	0.22**	2.16	0.10
Race	0.89	0.08	0.41	-0.10	-0.74	0.17	-0.40	-0.21	0.45	0.16
Hispanic	-0.55	-0.05	-2.74	-0.32	-1.70	-0.20	-1.50	-0.39	-8.13	0.06
Special education	-0.96	-0.69	-5.97***	-0.93***	-4.24***	-1.10***	-2.90	-0.03	-17.3*	-1.19***
Age (months)	0.09	-0.06*	0.37*	-0.06***	0.23*	-0.10***	0.17	-0.02	1.06	-0.06*
Free lunch eligible	0.08	-0.12	1.72	-0.11	1.14	-0.52***	1.51	0.12	6.80	0.10
R^2/ Pseudo R^2	.770	.494	.644	.381	.682	.405	.635	.294	.735	.435

Note. n = 625 observations. Standard error adjusted for 20 school-level clusters.
* $p < .05$, ** $p < .01$, *** $p < .001$