

# Contributions of Incidental Teaching, Developmental Quotient, and Peer Interactions to Child Engagement

*Amy M. Casey, PhD; R. A. McWilliam, PhD;  
Jessica Sims, MEd*

The purpose of the analysis reported in this article was to determine to what extent child and classroom characteristics were associated with the amount of time children with disabilities spent displaying each of 5 categories of engagement. Predictors consisted of children's receipt of incidental teaching, developmental quotient, and quality of peer interactions. Data were compiled from repeated observations of 61 preschoolers with disabilities who attended 31 early childhood classrooms. All regression analyses showed noteworthy effects: Although the model accounted for the most variance when predicting the most extreme forms of engagement, time spent in each of the 5 categories of engagement could be successfully predicted using the variables of interest. Developmental quotient and the quality of children's peer interactions accounted for a large percentage of the unique variance across engagement categories; incidental teaching was, however, a particularly strong predictor of the time children spent displaying sophisticated engagement.

**Key words:** *engagement, early childhood, incidental teaching, peer interactions*

**E**NGAGEMENT is the amount of time children spend interacting with the environ-

*Author Affiliations:* The Center for Child and Family Research, Siskin Children's Institute, Chattanooga, Tennessee (Drs Casey and McWilliam); and Child Care Aware of Missouri, Eastern Region, St. Louis, Missouri (Ms Sims).

*The authors were at the Center for Child Development, Vanderbilt University Medical Center, Nashville, Tennessee, at the time of data collection.*

*The work reported in this article was supported by a grant from the U.S. Department of Education, Office of Special Education Programs (H324C040114). The manuscript preparation was partially supported by a grant from the National Institutes of Health (T32HD07226). No endorsement by the U.S. Department of Education or the National Institutes of Health should be assumed.*

*The authors declare no conflict of interest.*

**Correspondence:** Amy M. Casey, PhD, Center for Child and Family Research, Siskin Children's Institute, 1101 Carter St, Chattanooga, TN 37402 (amy.casey@siskin.org).

DOI: 10.1097/TYC.0b013e31824cbac4

ment (adults, peers, and materials) in a developmentally and contextually appropriate manner (McWilliam & Bailey, 1992). It was first studied by Risley and Cataldo (1973), who had an interest in describing group engagement (i.e., the percentage of children engaged in an activity). Soon after, researchers interested in young children with disabilities were using engagement to describe children's participation in classroom activities (Carta, Sainato, & Greenwood, 1988; Greenwood, 1991; McWilliam, Trivette, & Dunst, 1985; Odom, 1988). Because children with disabilities tend to spend more time displaying low levels of engagement than do their typically developing peers (McWilliam & Bailey, 1995), studying methods for increasing engagement became important to determine how best to help children with disabilities meet their individualized goals.

Studying engagement required that a system be in place for measuring the sophistication of a child's behavior. At first,

researchers classified versus nonengaged or active versus passive (Holbert, 1986). Dunst expanded behavior engagement, a system (1998) elaborated on engagement. Operational levels are provided in these levels can be categorized: nonengagement, focused engagement, and so on. The categories and levels of a developmental hierarchy to increase the amount of time children spend displaying sophisticated engagement appropriate for some behaviors may not be appropriate for all children. In this article, then, should be of time children spend increasing their opportunity in the environment.

The purpose of this article was to determine child and classroom characteristics associated with the amount of time children spent engaged in each of the five categories of engagement. The approach was simple: If we can predict high and low levels of engagement, we know what characteristics promote in the classroom of incidental teaching, the amount of time children spend engaged in each category of engagement, we should be able to increase their use of engagement. Perhaps, researchers should develop a validated intervention for training teachers in increasing engagement (strategy). We did, in this study, children's receipt of incidental teaching would play a role in increasing engagement. In addition, we hypothesized that developmental quotient and peer interactions would play a role in increasing the amount of time children spent engaged in each of the five categories

researchers classified behavior as engaged versus nonengaged (McWilliam et al., 1985) or active versus passive (Dunst, McWilliam, & Holbert, 1986). Dunst and McWilliam (1988) expanded behavior into five categories of engagement, a system McWilliam and de Kruif (1998) elaborated upon with nine levels of engagement. Operational definitions of each level are provided in Table 1. As can be seen, these levels can be classified into five categories: nonengagement, unsophisticated engagement, focused attention, differentiated engagement, and sophisticated engagement. The categories and levels of engagement form a developmental hierarchy. Although striving to increase the amount of time children spend displaying sophisticated engagement may be appropriate for some children, complex behaviors may not be developmentally appropriate for all children. The goal in most contexts, then, should be to decrease the amount of time children spend nonengaged, thereby increasing their opportunity to learn from the environment.

The purpose of the analysis reported in this article was to determine how much child and classroom characteristics accounted for the amount of time children with disabilities spent engaged in each of the five categories of engagement. The rationale for the analysis was simple: If we can determine the variables predicting high and low levels of engagement, we know what characteristics we should promote in the classroom. For instance, if the use of incidental teaching predicts the amount of time children spend displaying sophisticated engagement, we should encourage teachers to increase their use of the strategy (and, perhaps, researchers should ensure that empirically validated interventions exist for supporting teachers in increasing their use of the strategy). We did, in fact, hypothesize that children's receipt of incidental teaching would play a role in predicting engagement. In addition, we hypothesized that developmental quotient and the quality of peer interactions would play a role in predicting the amount of time children spent displaying each of the five categories of engagement. The re-

sults of previous studies (described later) provided empirical support for our hypotheses.

## INCIDENTAL TEACHING

Incidental teaching, one of several naturalistic strategies for embedding teaching and learning opportunities in daily activities, involves a teacher-child interaction—based on the child's existing engagement—that expands the child's participation or encourages the use of more sophisticated behavior (Hart & Risley, 1975, 1978, 1980; Vygotsky, 1978). For example, when a teacher sees a child approaching the table for a snack, he or she might decide to take advantage of the opportunity to address the child's goal of staying seated for 2 min to finish a task. Instead of letting the child take a piece of food and move on to a different activity, the teacher (a) gives a task direction based on the child's engagement (e.g., "Sit"); (b) uses the appropriate time delay for the child's skill level; (c) provides a prompt, if necessary (e.g., pushing the chair so it touches the back of the child's knees); and (d) ensures that reinforcement is available (e.g., the food).

Research has shown a link between engagement and incidental teaching. For example, Dunst et al. (1986) found a positive correlation between the extent to which incidental teaching was used in 20 preschool programs and children's active engagement. Likewise, Malmkog and McDonnell (1999) demonstrated that using incidental teaching could result in significant improvements in the amount of time children spend actively engaged with materials and people. Finally, Mahoney and Wheeden (1999) found positive correlations between child engagement and the behavior of responsive and supportive teachers, whereas they found a negative correlation between child engagement and the behavior of more directive teachers. Regression analyses showed that teachers' interactive style accounted for a large percentage of the variance in the quality and frequency of children's engagement. These studies provide only a few examples of the potential

ent child and abilities spent receipt of in- were compiled uly childhood lel accounted spent in each es of interest. or a large per- vas, however, engagement.

terials) in a de- ally appropriate , 1992). It was Cataldo (1973), ibing group en- e of children en- ter, researchers with disabilities scribe children's ctivities (Carta, 8; Greenwood, & Dunst, 1985; en with disabil- : displaying low > their typically & Bailey, 1995), ng engagement ne how best to meet their indi-

ired that a sys- suring the so- avior. At first,

Table 1. Operational Definitions of Levels of Engagement

Category	Level of Complexity	Operational Definition	Examples
Sophisticated engagement	Persistence	Involves challenge and problem solving, often indicated by a failed first attempt. Involves either changing strategies or using the same strategy again to reach a goal	Child uses different words to explain After trying to stick her hand in one of the shape sorter holes, the child turns the toy upside down to get the blocks out
	Symbolic behavior	The use of conventional forms of behavior (language, pretend play, sign language, drawings, etc.) that allow the child to reflect on the past, talk about the future, and construct new forms of expression	Child requests a drink in the absence of reference-giving cues Child puts a peg to a doll's mouth, as though he is feeding the baby (object substitution)
	Encoded behavior	The use of conventional forms of behavior when context bound and dependent on referents or perceptually present stimuli	Continuing a conversation about something that is physically present (e.g., picture in a storybook)
Differentiated engagement	Constructive play	Manipulation of objects to create, make, or build something. Putting objects together in some type of spatial form, not just handling objects	Putting puzzle pieces together Using clay to make cookies
	Differentiated behavior	Active interaction with the environment, involving coordinating and regulating behavior. Provides the child with a set of behaviors that permits adaptation to environmental demands and expectations, especially social standards	Drawing or painting definitive objects Use of nonverbal gestures (point, shake head, give) Imitating motor actions made by other children Using objects to initiate play with a caregiver
Focused attention	Focused attention	Selectively and intensely watching or listening to a feature in the environment. Must be sustained for at least 3 s	Laughing in response to an interesting event Watching another child build something
Unsophisticated engagement	Undifferentiated behavior	The child interacts with the environment without differentiating his or her behavior (i.e., in a repetitive manner), using simple low-level behaviors	Vocalizing "Ba-ba-ba-ba-ba" Banging a block over and over Making a mobile move
Nonengagement	Casual attention	Relaxed and wide-ranging attention. The child attends to a range of things within 3 s as opposed to maintaining interest in one object or person	Looking around the room to see where to go next or to find another child or teacher
	Nonengaged behavior	The child is unoccupied; none of the other behaviors are occurring. Includes needless waiting, staring blankly, wandering aimlessly, crying, throwing toys, and so on	Evading a teacher's request by whining and protesting Crying after the teacher or a peer has taken a toy away

Note. Adapted with permission from *E-QUAL III: Children's Engagement Codes* by R. A. McWilliam and R. E. L. de Kruif, 1998, Chapel Hill, NC: University of North Carolina, Frank Porter Graham Child Development Center.

impact that incidentally children's engagement that incidentally used to predict time spent engaged.

## DEVELOPMENTAL

Developmental to summarize a tus, as measured c ized, norm-referen 100 as the centra tribution) is anot dict the amount c gaged. Blasco, Bai found that develc dren (those with classrooms and th both same-age and played greater an social play than c children. The devel dren tended to spe terials in an unso wise, Malone, Stone demonstrated that (e.g., constructive positively correlated; tudent whereas unsoq exploratory play, fi atively correlated tudent.

Developmental linked to peer inte form of engagemer (1995) found that tended to spend grea acting with peers as tudent increased. Hig tients also protecte ties from spending nonengaged. Finally, (1999) found a posi developmental quoti ipation in classroom correlations between and (a) unsophistica nonengagement. Fur

Casual attention	Relaxed and wide-ranging attention. The child attends to a range of things within 3 s as opposed to maintaining interest in one object or person	Looking around the room to see where to go next or to find another child or teacher
Nonengaged behavior	The child is unoccupied; none of the other behaviors are occurring. Includes needless waiting, staring blankly, wandering aimlessly, crying, throwing toys, and so on	Evading a teacher's request by whining and protesting Crying after the teacher or a peer has taken a toy away
Nonengagement		

Note. Adapted with permission from *E-QUAL III: Children's Engagement Codes* by R. A. McWilliam and R. E. L. de Kruif, 1998, Chapel Hill, NC: University of North Carolina, Frank Porter Graham Child Development Center.

impact that incidental teaching can have on children's engagement and justify our hypothesis that incidental teaching could possibly be used to predict the amount of time children spend engaged.

### DEVELOPMENTAL QUOTIENT

Developmental quotient (the score used to summarize a child's developmental status, as measured on a multidomain, standardized, norm-referenced test with a score of 100 as the central point of the normal distribution) is another variable likely to predict the amount of time children spend engaged. Blasco, Bailey, and Burchinal (1993) found that developmentally advanced children (those with disabilities in mixed-age classrooms and those without disabilities in both same-age and mixed-age classrooms) displayed greater amounts of purposeful and social play than developmentally immature children. The developmentally immature children tended to spend time manipulating materials in an unsophisticated fashion. Likewise, Malone, Stoneman, and Langone (1994) demonstrated that sophisticated behaviors (e.g., constructive play, pretend play) were positively correlated with developmental quotient whereas unsophisticated behaviors (e.g., exploratory play, functional play) were negatively correlated with developmental quotient.

Developmental quotient has also been linked to peer interactions, a sophisticated form of engagement. McWilliam and Bailey (1995) found that children with disabilities tended to spend greater amounts of time interacting with peers as their developmental quotient increased. Higher developmental quotients also protected children with disabilities from spending large quantities of time nonengaged. Finally, de Kruif and McWilliam (1999) found a positive correlation between developmental quotient and children's participation in classroom activities and negative correlations between developmental quotient and (a) unsophisticated engagement and (b) nonengagement. Furthermore, they demon-

strated that children with high developmental quotients (relative to their peers) who spent the majority of their time displaying sophisticated behaviors (according to their teachers) were observed by researchers to display high levels of sophisticated engagement and low levels of unsophisticated engagement. This sample of research findings demonstrates that there is, indeed, a reason to hypothesize that developmental quotient can be used to predict children's engagement.

### PEER INTERACTIONS

The final variable hypothesized to predict the amount of time children spent displaying each of five categories of engagement was the quality of peer interactions. A child's interactions with his or her peers can be measured in many ways, such as assessing affect (how positive or negative the interaction was), frequency, who initiated the interaction, and whether it was reciprocated (Wolery, Pauca, Brashers, & Grant, 2000). The frequency and quality of peer interactions are important because *social relationships* is one of three functional domains used in early intervention/early childhood special education (McWilliam, 2006).

The results of a study conducted by Coolahan, Fantuzzo, Mendez, and McDermott (2000) suggest that children who participate in higher quality peer interactions are more likely to be actively engaged in classroom activities and display high levels of attention and persistence than children who participate in lower quality peer interactions. In addition, children who refuse to participate in peer interactions are more likely to be passively nonengaged in the classroom (e.g., wandering aimlessly) and children who disrupt peer interactions are more likely to be actively nonengaged (e.g., aggressive). Peer interactions have also been compared with other types of classroom interactions (e.g., teacher-child interactions, whole-group instruction). Powell, Burchinal, File, and Kontos (2008) found that children were more likely to be actively engaged when they were

interacting with a small group of peers rather than participating in class-wide activities. Specifically, preschool children were 1.7 times more likely to be actively engaged in play activities and 20.0 times more likely to be actively engaged in academic activities when interacting with a small group of peers versus the whole class. These studies suggest that peer interactions might be important for promoting engagement in play and academic activities and higher quality interactions might be important for promoting more sophisticated forms of engagement. Peer interactions, therefore, might predict the amount of time children spend displaying each of five categories of engagement.

As stated previously, the purpose of the analysis reported in this article was to determine the extent to which child and classroom characteristics were associated with the amount of time children spent displaying each of five categories of engagement. The specific child and classroom characteristics included in the analysis were incidental teaching, developmental quotient, and quality of peer interactions. The participants of interest were young children with disabilities.

## METHODS

The context for this analysis was an observational study carried out in 31 toddler and preschool inclusive classrooms in and around a medium-large Southeastern city in the United States. About half the classrooms had received information on how to improve engagement, but preliminary analyses suggested that the variability across classrooms was greater than the variability between classrooms exposed to the information and those not exposed to the information.

### Participants

Recruitment involved contacting the directors of area early childhood programs known to include children with disabilities. An effort was made to sample from each of the three main program types in the area: public school

districts, private community programs, and Head Start programs. Research assistants met with directors to explain the study and provided information to teachers of children with disabilities. All classrooms with children with disabilities were eligible to participate in the study. Once teachers gave consent to participate, they contacted the families of children with disabilities to see whether they were interested in participating. In each classroom, two children with disabilities were the focus of observations (except one classroom, which had one participating child). If more than two families were interested in participating in the study, two children's names were randomly selected. To be included in the study, children had to be younger than 6 years, spend at least 20 hr per week in the classroom, and have a documented disability (i.e., an individualized family service plan or individualized educational program). All classrooms with consent forms from teachers and the family of at least one child with a disability participated in the study; researchers did not withdraw any classrooms.

The 31 participating classrooms were staffed by 76 female teachers and 1 male teacher. Demographic information was collected from the lead teachers, 4 of whom were African American and 27 of whom were Caucasian. On average, the teachers were 33.9 years of age ( $SD = 12.0$ ) and had been teaching for 7.0 years ( $SD = 7.9$ ). Fourteen of them had a master's degree in early childhood education or early childhood special education; nine had a bachelor's degree in education, special education, early childhood education, or communication disorders; one had an associate's degree in early childhood; five had a bachelor's degree in sociology, psychology, or art; one had a master's degree in counseling psychology; and one had a master's degree in health care administration. Information about the number of children in these teachers' classrooms with and without disabilities is shown in Table 2. Observations were focused on 44 boys and 17 girls. Demographic information about the focus children is also shown in Table 2. Most had diagnoses of

Table 2. Classroom Information and Child Demographics

Program	Site	Room	Total Children	Children With Disabilities	Focal Child 1			Focal Child 2		
					Gender	Age (Months)	ABILITIES Index Mean	Gender	Age (Months)	ABILITIES Index Mean
School District 1	A	1	13	6	M	47	1.95	M	39	2.42
		2	7	3	M	62	1.32	M	49	2.47
	B	3	12	6	M	54	1.89	M	51	1.22

Table 2. Classroom Information and Child Demographics

Program	Site	Room	Total Children	Children With Disabilities	Focal Child 1			Focal Child 2		
					Gender	Age (Months)	ABILITIES Index Mean	Gender	Age (Months)	ABILITIES Index Mean
School District 1	A	1	13	6	M	47	1.95	M	39	2.42
		2	7	3	M	62	1.32	M	49	2.47
	B	3	12	6	M	54	1.89	M	51	1.32
		4	9	4	F	50	3.42	M	40	1.78
	C	5	14	6	F	53	3.00	M	51	1.89
School District 2	D	6	8	4	M	55	1.16	F	54	2.78
		7	9	5	M	65	-	M	50	1.18
	E	8	20	8	M	59	1.63	F	51	2.68
		9	9	4	F	61	4.74	M	42	2.00
		10	10	5	M	61	2.16	M	45	1.11
Head Start	A	11	10	5	F	51	1.42	M	50	2.42
		12	13	5	M	47	1.37	NA <sup>b</sup>	NA	NA
	B	13	7	7	M	49	1.74	M	46	1.53
	C	14	10	10	M	58	3.33	F	40	1.79
	D	15	20	2	M	60	1.00	M	53	1.00
Community Program 1	A	16	- <sup>a</sup>	6	M	47	1.05	M	42	1.16
		17	20	2	M	65	1.21	M	52	1.53
	B	18	7	2	F	12	1.53	F	10	2.11
		19	13	5	M	26	2.05	M	24	1.11
		20	-	-	M	44	1.68	F	35	2.00
Community Program 2	A	21	9	5	M	55	2.37	M	49	1.63
		22	11	6	M	35	2.53	M	28	1.58
	B	23	13	6	F	36	3.63	F	34	1.58
		24	18	2	M	18	1.21	M	16	1.16
		25	12	6	F	29	2.22	M	19	2.59
Community Program 3	A	26	15	6	F	33	2.53	M	28	1.00
		27	10	-	M	28	1.37	F	27	1.58
	B	28	10	5	M	35	3.12	M	31	1.00
		29	7	4	F	18	2.42	M	10	1.32
		30	9	5	M	28	1.00	M	25	1.32
Community Program 4	A	31	8	4	F	23	2.11	M	15	1.42

<sup>a</sup>Missing information is indicated with "-."<sup>b</sup>Only one child was observed in Classroom 12.

developmental delay, an autism spectrum disorder, or language impairment.

## Setting

Table 2 includes information about the program and site in which each classroom was located. Sites within school districts were housed in elementary schools. Although inclusive, the community programs catered to families of children with disabilities. Each community program had received a three-star quality rating from the state child care licensing office. Three stars was the highest possible rating and indicated that the program was licensed and had scored high in seven areas of evaluation: director's qualifications, education, and training; education, training, and experience of the teaching staff; compliance history; family involvement; ratios and group sizes; pay and benefit plans for teaching staff; and program assessments (i.e., direct observations). The public school programs were not rated.

## Measures

### *Individual child engagement*

Researchers used the electronic version of the Engagement Quality and Incidental Teaching for Improved Education (E-Qual-ITIE; McWilliam & Casey, 2004) coding system to collect data on individual child engagement. The E-Qual-ITIE has the same nine levels of engagement used in the Engagement Quality Measurement System III (McWilliam & de Kruif, 1998) and listed in Table 1; in addition, it allows observers to record the type of teaching interactions observed. The teaching interaction component was used to measure the use of incidental teaching and is described later.

Each participating child was observed four times using the E-Equal-ITIE (McWilliam & Casey, 2004). During each observation, researchers used momentary time sampling to collect data about child engagement for two 15-min periods. During each observation period, researchers coded the level of engagement being displayed at the end of each 15-s interval, as well as recording who or what

was the focus of engagement (i.e., engagement directed at a teacher, peer, or object). At least 40 intervals (10 min) of child engagement data had to be collected during each observation period for the session to be considered complete. (Although observations consistently occurred during child-directed activities in the classroom [e.g., free play or center time], some observations were cut short when the classroom was not following the regular schedule of activities.) Frequencies of each code were summed and divided into the total session time to derive a percentage-of-time estimate.

Interobserver agreement was assessed for 29.07% of the observations. The mean agreement (occurrence and nonoccurrence) for child engagement is reported in Table 3. The low kappa values for some codes are to be expected because of their low occurrence (Bruckner & Yoder, 2006); therefore, the low kappa values reported here do not detract from the reliability of the data presented.

### *Receipt of incidental teaching*

Researchers collected data on children's receipt of incidental teaching by using the electronic version of the E-Qual-ITIE (McWilliam & Casey, 2004) coding system. The E-Qual-ITIE provides descriptions of three types of teacher interactions: incidental teaching, nonelaborative responses (i.e., answering a question or giving praise without expanding on child engagement), and nonresponsive directives (i.e., telling the child to do something unrelated to the current activity). *Incidental teaching* was operationally defined as an interaction, consisting of either an initiation or response, by an adult, related to the previous or existing engagement of the child, when the interaction included a verbal or nonverbal attempt at elicitation of more elaborate behavior. A turn or "incidental teaching episode" was an interaction as defined earlier, with a pause of no more than 5 s. After 5 s, it counted as a new turn.

The main difference between types of teacher interaction is the degree to which the interaction was based on the child's

**Table 3.** Descriptive Statistics for Each Variable

Variable
Percentage of tir
Percentage of tir engagement
Percentage of tin
Percentage of tin
Percentage of tin
Number of interv
Developmental q
Child-Child scor

*Note.* The mean perce  
interval (e.g., a shelf bl  
<sup>a</sup>Interobserver agreem  
<sup>b</sup>Percent agreement w

existing engagement using crayons to so a number of differentiations are possible. In coloring," the interaction is a nonlaborative response. "Go wash your hands before your snack," the interaction is nonresponsive direction. If the teacher says, "Draw triangles," the desired behavior would be coloring. By asking the child to create something (e.g., a triangle shape), the teacher would increase the child's engagement level.

Researchers used  
lect data about teach  
During an interval, i  
action to be recorde  
of interactions were  
level to be recorded  
was always recorde  
orative response wa  
and incidental teach  
the occurrence of n  
Once an interaction  
recorded again in th  
now often it occur

**Table 3.** Descriptive Information (Mean, Standard Deviation, Interobserver Agreement) for Each Variable

Variable	<i>M</i>	<i>SD</i>	% Agreement	<i>K</i>
Percentage of time displaying nonengagement	13.65	11.51	88.39	0.47
Percentage of time displaying unsophisticated engagement	3.91	2.49	94.26	0.61
Percentage of time displaying focused attention	12.72	8.11	85.17	0.39
Percentage of time displaying differentiated engagement	60.25	16.19	79.98	0.52
Percentage of time displaying sophisticated engagement	1.39	1.49	98.49	0.90
Number of intervals of incidental teaching	3.96	3.20	95.58	0.71
Developmental quotient <sup>a</sup>	72.93	19.16	-	-
Child-Child score <sup>b</sup>	15.59	5.31	83.70	-

*Note.* The mean percentage of time engaged does not equal 100 because children were not observable during every interval (e.g., a shelf blocked the researcher's view of a child).

<sup>a</sup>Interobserver agreement was not assessed for developmental quotient scores.

<sup>b</sup>Percent agreement within one rating is reported; kappa was not calculated for Child-Child scores.

existing engagement. If a child is at the table using crayons to scribble on a piece of paper, a number of different types of teacher interaction are possible. If a teacher says, "Good job coloring," the interaction would be coded as a nonlaborative response. If a teacher says, "Go wash your hands so you're ready for snack," the interaction would be coded as a nonresponsive directive. Finally, if a teacher says, "Draw triangle" and, if needed, models the desired behavior for the child, the interaction would be coded as incidental teaching. By asking the child to switch from scribbling to creating something (i.e., drawing a specific shape), the teacher is seeking to expand the child's engagement to a more sophisticated level.

Researchers used interval recording to collect data about teacher interactions every 15 s. During an interval, it was possible for no interaction to be recorded or, when multiple types of interactions were observed, for the highest level to be recorded (i.e., incidental teaching was always recorded if it occurred; nonlaborative response was recorded if it occurred and incidental teaching did not, regardless of the occurrence of nonresponsive directives). Once an interaction was recorded, it was not recorded again in that interval, regardless of how often it occurred. At the new interval,

recording recommenced. Interactions could be initiated by the lead teacher or assistant teachers. Interactions addressed to the entire class were not recorded. At least 40 intervals (10 min) of teacher interaction data had to be collected during each observation period for the session to be considered complete. Interobserver agreement for incidental teaching was assessed for 29.07% of the observations and is reported in Table 3.

#### **Developmental quotient**

The Battelle Developmental Inventory, 2nd edition (BDI-2; Newborg, 2005), was used to assess the developmental level of the participating children. The BDI-2 is an individually administered, standardized instrument that assesses children's development in five domains: personal-social, adaptive, motor, communication, and cognition. Researchers assessed each participating child's developmental level within the first 2 weeks and last 2 weeks of the study. Children's mean developmental quotient was used in the current analysis.

#### **Peer interactions**

The Child-Child Contacts and Interactions subscale of the Quality of Inclusive Experiences Measure (QUIEM; Wolery et al., 2000)

ment (i.e., engagement; peer, or object). min) of child engagement collected during the session to be enough observations during child-directed (e.g., free play or variations were cut 1 was not follow-of activities.) Fre-re summed and di-n time to derive a e.

t was assessed for s. The mean agree-onoccurrence) for ted in Table 3. The ie codes are to be r low occurrence therefore, the low re do not detract lata presented.

#### **aching**

ita on children's re-g by using the elec-al-FITE (McWilliam ystem. The E-Qual-ns of three types incidental teaching, (i.e., answering a without expanding 1 nonresponsive di-ild to do something ctivity). *Incidental* ly defined as an in-her an initiation or ated to the previous the child, when the bal or nonverbal at-re elaborate behav- teaching episode" ined earlier, with a After 5 s, it counted

between types of e degree to which ed on the child's



was used to assess social relationships between the two participating children in each classroom and their peers. After a 2- to 3-hr observation, researchers rated the nature of interactions in terms of affect, the frequency of interactions, the initiator of interactions, the reciprocator of interactions, and the reciprocity of interactions. Although the instrument was created to be specific to interactions between a child with disabilities and his or her peers without disabilities, we rated all interactions between the participating children with disabilities and their peers, regardless of whether the peers had disabilities or not. Researchers completed the Child-Child Contacts and Interactions twice during the study; the mean score (i.e., mean rating across affect, frequency, initiator, reciprocator, and reciprocity) was used in the current analysis. Interobserver agreement was assessed for 32.26% of the observations and is reported in Table 3.

### Descriptive information

Teachers were asked to complete a brief demographic questionnaire, from which the demographic data reported earlier were compiled. Parents were asked to complete a brief demographic questionnaire and the ABILITIES Index (Simeonsson & Bailey, 1988). The ABILITIES Index is a measure of children's functioning in nine key areas: audition, behavior and social skills, intellectual functioning, limbs, intentional communication, tonicity, integrity of health, eyes, and structural status. Mean scores range from 1 (*normal functioning*) to 6 (*profound disability*), with 4 representing a moderate disability.

### Procedure

Researchers visited each classroom within the first 2 weeks of the study to complete the Battelle Developmental Inventory, 2nd Edition, with each participating child. The Battelle items were assessed as children participated in classroom routines and by interviewing teachers and parents. As soon as the Battelle was completed, the researchers began visiting each classroom weekly. Dur-

ing each visit, one of the following was assessed: (a) the engagement level of the participating children and their receipt of incidental teaching, (b) class-wide engagement levels (not reported in this article), (c) social interactions involving the participating children, or (d) the teachers' use of the classroom-based model to increase children's engagement (not reported in this article). In the final 2 weeks of the study, researchers completed the Battelle again to determine the rate of development of the participating children. Each classroom participated in the study for approximately 6 months.

### Data Analysis

Variables in the data set used for the current analysis consisted of the following: (a) percentages of time spent in each of the five categories of engagement (nonengagement, unsophisticated engagement, focused attention, differentiated engagement, and sophisticated engagement), (b) the number of observation intervals in which children received incidental teaching, (c) children's developmental quotient, and (d) children's mean score on the Child-Child Contacts and Interactions subscale of the QUIEM (Wolery et al., 2000). Correlations among the independent and dependent variables were calculated. Standard regression analyses were performed to determine to what extent incidental teaching, developmental quotient, and peer interactions predicted children's engagement.

### RESULTS

Means and standard deviations for each variable in the data set are reported in Table 3. Correlations among the independent and dependent variables are reported in Table 4. Correlations of .30 or higher were considered noteworthy and were statistically significant at  $p < .05$ . As can be seen, multicollinearity did not exist among the variables.

Results of the standard regression analyses are reported in Table 5. The model predicted each of the five engagement outcomes, from a

Table 4. Corre

Outcomes
1. Nonengag
2. Unsophisti
3. Focused at
4. Differentia
5. Sophisticat
Predictors
6. Incidental
7. Developme
8. Child-Child

small extent (dif  
moderate extent  
Not all outcomes  
of the five standa  
the null hypothe  
Explanations of t  
category are prov

Table 5. Results

Variables
Nonengagement
Incidental teach
Developmental
Child-Child sco
Unsophisticated e
Incidental teachi
Developmental
Child-Child sco
Focused attention
Incidental teachi
Developmental
Child-Child sco
Differentiated eng
Incidental teach
Developmental
Child-Child sco
Sophisticated eng
Incidental teach
Developmental
Child-Child sco

Table 4. Correlations Among Predictors and Outcomes

	1	2	3	4	5	6	7
<b>Outcomes</b>							
1. Nonengagement	1.00						
2. Unsophisticated engagement	.32	1.00					
3. Focused attention	.01	.15	1.00				
4. Differentiated engagement	-.68	-.57	-.57	1.00			
5. Sophisticated engagement	-.35	-.06	.06	-.15	1.00		
<b>Predictors</b>							
6. Incidental teaching	-.25	-.09	-.27	.17	.42	1.00	
7. Developmental quotient	-.48	.21	.29	-.03	.43	-.01	1.00
8. Child-Child score	-.55	-.29	.04	.29	.45	.12	.46

small extent (differentiated engagement) to a moderate extent (sophisticated engagement). Not all outcomes were noteworthy, but each of the five standard regression analyses passed the null hypothesis statistical test ( $p < .05$ ). Explanations of the results obtained for each category are provided next.

#### Nonengagement

The model accounted for a noteworthy 40.8% of the total variance in time spent nonengaged. Children's developmental quotient and Child-Child Contacts and Interactions score accounted for 7.3% and 11.4% of the unique variance, respectively. Children

Table 5. Results of Standard Regression Analyses ( $n = 61$ )

Variables	$R^2$	$B$	$SE\ B$	$\beta$	$sr^2$	$p$
Nonengagement	.408					
Incidental teaching		-.0736	0.370	-.204	.041	.001
Developmental quotient		-.0183	0.069	-.306	.073	.010
Child-Child score		-.0832	0.251	-.384	.114	.002
Unsophisticated engagement	.234					
Incidental teaching		-.0020	0.091	-.025	.001	.831
Developmental quotient		0.056	0.017	.435	.148	.002
Child-Child score		-.0227	0.062	-.486	.182	.001
Focused attention	.159					
Incidental teaching		-.0647	0.311	-.255	.064	.042
Developmental quotient		0.138	0.058	.325	.083	.021
Child-Child score		-.0127	0.211	-.083	.005	.551
Differentiated engagement	.133					
Incidental teaching		0.628	0.630	.124	.015	.323
Developmental quotient		-.0163	0.118	-.193	.029	.171
Child-Child score		1.119	0.427	.367	.104	.011
Sophisticated engagement	.416					
Incidental teaching		0.181	0.048	.388	.148	.001
Developmental quotient		0.025	0.009	.316	.078	.008
Child-Child score		0.073	0.032	.261	.053	.027

with high developmental quotients were less likely to be nonengaged than children with low developmental quotients. Likewise, children with high-quality peer interactions were less likely to be nonengaged than children with low-quality peer interactions.

## Unsophisticated engagement

The model successfully predicted the percentage of time children spent displaying unsophisticated engagement, accounting for 23.4% of the total variance. Again, developmental quotient and the Child-Child Contacts and Interactions score predicted time spent displaying unsophisticated engagement, the former accounting for 14.8% of the unique variance and the latter accounting for 18.2%. Surprisingly, children with high developmental quotients were more likely to display unsophisticated engagement than children with low developmental quotients. Children with high-quality peer interactions were less likely to display unsophisticated engagement than children with low-quality peer interactions.

### Focused attention

The model accounted for 15.9% of the total variance in time spent displaying focused attention. Developmental quotient accounted for 8.3% of the unique variance, and incidental teaching accounted for 6.4% of the unique variance. Children with high developmental quotients were more likely to display focused attention than children with low developmental quotients. Children who received less incidental teaching were more likely to display focused attention than children who received more incidental teaching.

### Differentiated engagement

The model accounted for 13.3% of the total variance in time spent displaying differentiated engagement. The strongest predictor of differentiated engagement was the Child-Child Contacts and Interactions score, which accounted for 10.4% of the unique variance. Children with high-quality peer interactions were more likely to display differentiated en-

agement than children with low-quality peer interactions.

## Sophisticated engagement

The model accounted for a noteworthy 41.6% of the total variance in time spent displaying sophisticated engagement. All three independent variables were useful for predicting the amount of time spent displaying sophisticated engagement. Developmental quotient and children's Child-Child Contacts and Interactions score accounted for 7.8% and 5.3% of the unique variance, respectively. Children with high developmental quotients and high-quality peer interactions were more likely to display sophisticated engagement. Incidental teaching accounted for a noteworthy 14.8% of the unique variance. Children who received more incidental teaching were more likely to display sophisticated engagement than children who received less incidental teaching.

## DISCUSSION

Our analyses suggested that each of the five categories of engagement is influenced by the combination of incidental teaching, developmental quotient, and quality of peer interactions. The model accounted for the most variance when predicting the most extreme forms of engagement—nonengagement and sophisticated engagement. Developmental quotient and the quality of children's peer interactions accounted for a large percentage of the unique variance for most engagement categories; incidental teaching was, however, a particularly strong predictor of the time children spent displaying sophisticated engagement. In summary, then, all three independent variables make unique contributions to the way children participate in their classroom environments.

We reported that children with high developmental quotients were more likely to display unsophisticated engagement than children with low developmental quotients. Our hypothesis, of course, was that children with low developmental quotients would spend

more time displayed a significant effect on the level of engagement. In addition, the contribution of the interaction term to the variance in the dependent variable was significant in a bivariate model. However, there was no direct linear relationship between the two variables. Therefore, the interaction term appeared to be more complex than a simple relationship with unsophisticated models. The results of a three-predictor model are shown in Table 2.

We also reported that children who received less incidental teaching were less likely to display sophisticated engagement behaviors. The implication is that children who receive more incidental teaching spend more time displaying sophisticated engagement behaviors. We expect that as incidental teaching moves away from a focused attention to a more distributed engagement, such as the sophisticated engagement behaviors we observed, children will increase, therefore, their levels of incidental teaching. This suggests that children who receive more time displaying sophisticated engagement behaviors will spend more time displaying sophisticated engagement behaviors. This suggests that children who receive more time displaying sophisticated engagement behaviors will spend more time displaying sophisticated engagement behaviors.

It is surprising that it did not contribute a large amount to differentiate between the two groups. As previously, incidence of injury related with active work was just as sophisticated in 1986; Malmkog & Lundberg's research needs to determine whether this finding

with low-quality peer

ent

for a noteworthy  
e in time spent dis-  
engagement. All three  
e useful for predict-  
pent displaying so-  
developmental quo-  
-Child Contacts and  
nted for 7.8% and  
ance, respectively.  
opmental quotients  
ractions were more  
ted engagement. In-  
ted for a notewor-  
variance. Children  
ental teaching were  
phisticated engage-  
received less inci-

that each of the five  
is influenced by the  
l teaching, develop-  
lity of peer interac-  
ed for the most vari-  
most extreme forms  
gement and sophis-  
developmental quotient  
ren's peer interac-  
percentage of the  
it engagement cate-  
g was, however, a  
tor of the time chil-  
phisticated engage-  
, all three indepen-  
ue contributions to  
ipate in their class-

ren with high devel-  
e more likely to dis-  
engagement than chil-  
ental quotients. Our  
as that children with  
tients would spend

more time displaying unsophisticated levels of engagement. It is important not to interpret the contribution of developmental quotient to the variance in unsophisticated engagement in a bivariate manner. As Table 4 shows, there was no direct linear correlation between the two variables. Developmental quotient, therefore, appeared to have a positive association with unsophisticated engagement when part of a three-predictor model.

We also reported that children who received less incidental teaching were more likely to display focused attention than children who received more incidental teaching. The implication is that children who receive more incidental teaching display less passivity. We expect that receipt of incidental teaching will move a child from a passive state of focused attention into a more active form of engagement, such as differentiated or sophisticated engagement. We would not hypothesize, therefore, that children who receive high levels of incidental teaching will spend more time displaying focused attention than children who receive low levels of incidental teaching. This same reasoning might explain why incidental teaching accounted for such a small amount of unique variance in nonengagement and unsophisticated engagement. We would expect that receipt of incidental teaching would move a nonengaged child to an engaged state; therefore, high levels of incidental teaching would not be expected to predict time spent nonengaged. Likewise, using high levels of incidental teaching with preschoolers would be expected to increase the sophistication of their engagement, making receipt of incidental teaching a poor predictor of time spent displaying unsophisticated behavior.

It is surprising that incidental teaching did not contribute a larger amount of unique variance to differentiated engagement. As stated previously, incidental teaching has been correlated with active forms of engagement (not just sophisticated engagement; Dunst et al., 1986; Malmkog & McDonnell, 1999). Additional research needs to be done to determine whether this finding is idiosyncratic to this

study or replicable. It could be that teachers in our sample were quite competent at using incidental teaching to encourage the most sophisticated behaviors from children, meaning that the strategy would be a better predictor of sophisticated engagement than differentiated (average) engagement. It is also possible that the children in our sample who displayed sophisticated engagement were better at encouraging adults to use incidental teaching than were the children who displayed differentiated engagement. In this case, incidental teaching would have a stronger correlation with sophisticated engagement than with differentiated engagement.

Additional research is also needed to address limitations in the current study and investigate variables that were not included in the present analysis. One limitation of this study is treating each regression as an independent analysis when, in fact, the outcomes were interdependent: They were percentages of time, using mutually exclusive measures. Also, our sample size did not support an analysis that included more than three predictors. A larger sample, however, would allow additional variables to be included in regression models. Including class-wide variables in the model might be interesting. For instance, would class-wide engagement predict individual engagement? Would time spent in child-directed activities versus teacher-directed activities predict individual engagement? What impact would structural variables, such as class size and teacher education, have on individual engagement? We do know that teachers' educational level and class-wide engagement are associated with each other (de Kruif, McWilliam, Ridley, & Wakely, 2000; Maxwell, McWilliam, Hemmeter, Ault, & Schuster, 2001). Among children in kindergarten, classroom quality, especially teachers' effectual classroom management, has predicted higher child engagement (Rimm-Kaufman, Curby, Grimm, Nathanson, & Brock, 2009). In a study in which the children were classified by their profiles of classroom engagement, those classified as *free play* showed fewer gains in

language/literacy and mathematics during the prekindergarten year than those classified as *individual instruction*, *group instruction*, and *scaffolded learning* (Chien et al., 2010). As mentioned earlier, during academic activities, children were more likely to be actively engaged when involved in a small group of other children and when teachers were affirming or monitoring and least likely to be actively engaged when involved in a large group and when teachers were providing directions (Powell et al., 2008). These recent studies have shown that engagement research, which has long been a staple of investigation in early childhood special education, has become a focus of the more general field of early childhood education.

The current study says that incidental teaching, developmental quotient, and peer interactions seem to play a role in predicting how children spend time in the classroom. This finding has implications that are immediately applicable in early childhood classrooms. Teachers need to be using incidental teaching and promoting high-quality peer interactions. Teacher-training programs and supervisors would be well advised to look carefully at incidental teaching. One study

suggests that the rate of incidental teaching that young children with disabilities receive is very low but it can be increased with feedback (Casey & McWilliam, 2008). The first step might be to ensure that teachers have a clear understanding of the meaning of incidental teaching: It is not a loose concept of following the child's lead. Instead, during an incidental-teaching episode, lasting just a moment to a longer interaction, the adult needs to (a) identify and possibly test, in vivo, the child's interest; (b) match the pace and the topography of the behavior so as not to interrupt the engagement; (c) use a variety of well-studied behavioral-instruction techniques (e.g., prompting procedures, alteration to antecedents, task directions) to elicit more sophisticated forms of the behavior; (d) recognize the various ways the behavior can be differentiated; and (e) ensure that the interaction was technically reinforcing (i.e., contingent and increasing the likelihood of the recurrence of the behavior). The combination of good teaching in natural environments with successful interactions with other children can be expected to raise the quality of early childhood special education, as measured by child engagement.

## REFERENCES

- Blasco, P. M., Bailey, D. B., & Burchinal, M. A. (1993). Dimensions of mastery in same-age and mixed-age integrated classrooms. *Early Childhood Research Quarterly*, 8, 193-206.
- Bruckner, C. T., & Yoder, P. (2006). Interpreting kappa in observational research: Base rate matters. *American Journal on Mental Retardation*, 111, 433-441.
- Carta, J. J., Sainato, D. M., & Greenwood, C. R. (1988). Advances in the ecological assessment of classroom instruction for young children with handicaps. In S. L. Odom & M. B. Karnes (Eds.), *Early intervention for infants and children with handicaps* (pp. 217-240). Baltimore, MD: Paul H. Brookes.
- Casey, A. M., & McWilliam, R. A. (2008). Graphical feedback to increase teachers' use of incidental teaching. *Journal of Early Intervention*, 30, 251-268.
- Chien, N. C., Howes, C., Burchinal, M., Pianta, R. C., Ritchie, S., Bryant, D. M., . . . Barbarin, O. A. (2010). Children's classroom engagement and school readiness gains in prekindergarten. *Child Development*, 81, 1534-1549.
- Coolahan, K., Fantuzzo, J., Mendez, J., & McDermott, P. (2000). Preschool peer interactions and readiness to learn: Relationships between classroom peer play and learning behaviors and conduct. *Journal of Educational Psychology*, 92, 458-465.
- de Kruif, R. E. L., & McWilliam, R. A. (1999). Multivariate relationships among developmental age, global engagement, and observed child engagement. *Early Childhood Research Quarterly*, 14, 515-536.
- de Kruif, R. E. L., McWilliam, R. A., Ridley, S. M., & Wakely, M. B. (2000). Classification of teachers' interaction behaviors in early childhood classrooms. *Early Childhood Research Quarterly*, 15, 247-268.
- Dunst, C. J., & McWilliam, R. A. (1988). Cognitive assessment of multiply handicapped young children. In T. Wachs & R. Sheehan (Eds.), *Assessment of young developmentally disabled children* (pp. 213-238). New York: Plenum Press.
- Dunst, C. J., McWilliam, R. A., & Holbert, K. (1986). Assessment of preschool classroom environments. *Diagnostic*, 11, 212-232.
- Greenwood, C. R. ( ). engagement, and risk students. *Es*
- Hart, B., & Risley, T. guage in the pre *Analysis* 8, 411.
- Hart, B., & Risley, T. guage through i *Urban Society*, .
- Hart, B., & Risley, T. vention: Unanth *Applied Behavior*
- Mahoney, G., & V fect of teacher : preschool-aged c *Early Childhood*
- Malmkog, S., & M mediated facilitat developmental d *in Early Childbo*
- Malone, D. M., Stone textual variation sures of play and children. *Journal* 215.
- Maxwell, K. L., McWi M. J., & Schuster, mentally appropri garten through t *search Quarterly*
- McWilliam, R. A. (2006 *ing for children l* sented at the Ass
- Precoce, V Congr coce, Aveiro, Port
- McWilliam, R. A., & B gagement and ma (Eds.), *Teaching t* ties (2nd ed., pp. : McWilliam, R. A., & B room social struct *Topics in Early C* 123-147.
- McWilliam, R. A., & C *quality & incident*

cidental teaching isabilities receive reased with feed- 2008). The first at teachers have ie meaning of in- a loose concept d. Instead, during ode, lasting just a action, the adult possibly test, in o) match the pace e behavior so as gement; (c) use a avioral-instruction g procedures, al- ask directions) to rms of the behav- ous ways the be- d; and (e) ensure chnically reinforc- creasing the likeli- the behavior). The ring in natural en- l interactions with ected to raise the special education, gement.

dez, J., & McDermott, interactions and readi- between classroom peer and conduct. *Journal of*, 458-465.

R. A. (1999). Multivari- developmental age, global child engagement. *Early rly*, 14, 515-536.

R. A., Ridley, S. M., & ification of teachers' in- r childhood classrooms. *Quarterly* 15, 247-268.

(1988). Cognitive assess- ed young children. In T. ), *Assessment of young children* (pp. 213-238).

, & Holbert, K. (1986). lassroom environments.

- Greenwood, C. R. (1991). Longitudinal analysis of time, engagement, and achievement in at-risk versus non-risk students. *Exceptional Children*, 57, 521-535.
- Hart, B., & Risley, T. R. (1975). Incidental teaching of language in the preschool. *Journal of Applied Behavior Analysis* 8, 411-420.
- Hart, B., & Risley, T. R. (1978). Promoting productive language through incidental teaching. *Education and Urban Society*, 10, 407-429.
- Hart, B., & Risley, T. R. (1980). In vivo language intervention: Unanticipated general effects. *Journal of Applied Behavior Analysis*, 13, 407-432.
- Mahoney, G., & Wheeden, C. A. (1999). The effect of teacher style on interactive engagement of preschool-aged children with special learning needs. *Early Childhood Research Quarterly*, 14, 51-68.
- Malmkog, S., & McDonnell, A. P. (1999). Teacher-mediated facilitation of engagement by children with developmental delays in inclusive preschools. *Topics in Early Childhood Special Education*, 19, 203-216.
- Malone, D. M., Stoneman, Z., & Langone, J. (1994). Contextual variation of correspondences among measures of play and developmental level of preschool children. *Journal of Early Intervention*, 18, 199-215.
- Maxwell, K. L., McWilliam, R. A., Hemmeter, M. L., Ault, M. J., & Schuster, J. W. (2001). Predictors of developmentally appropriate classroom practices in kindergarten through third grade. *Early Childhood Research Quarterly*, 16, 431-452.
- McWilliam, R. A. (2006). *The three foundations for learning for children birth to 6 years of age*. Paper presented at the Associação Nacional de Intervenção Precoce, V Congresso Nacional de Intervenção Precoce, Aveiro, Portugal.
- McWilliam, R. A., & Bailey, D. B. (1992). Promoting engagement and mastery. In D. B. Bailey & M. Wolery (Eds.), *Teaching infants and toddlers with disabilities* (2nd ed., pp. 229-256). New York: Merrill.
- McWilliam, R. A., & Bailey, D. B. (1995). Effects of classroom social structure and disability on engagement. *Topics in Early Childhood Special Education*, 15, 123-147.
- McWilliam, R. A., & Casey, A. M. (2004). *Engagement quality & incidental teaching for improved education (E-Qual-ITIE)*. Nashville, TN: Center for Child Development, Vanderbilt University Medical Center.
- McWilliam, R. A., & de Kruif, R. E. L. (1998). *E-Qual III: Children's engagement codes*. Chapel Hill, NC: University of North Carolina, Frank Porter Graham Child Development Center.
- McWilliam, R. A., Trivette, C. M., & Dunst, C. J. (1985). Behavior engagement as a measure of the efficacy of early intervention. *Analysis and Intervention in Developmental Disabilities*, 5, 59-71.
- Newborg, J. (2005). *Battelle developmental inventory* (2nd ed.). Itasca, IL: Riverside Publishing.
- Odom, S. L. (1988). Research in early childhood special education: Methodologies and paradigms. In S. L. Odom & M. B. Karnes (Eds.), *Early intervention for infants and children with handicaps* (pp. 1-21). Baltimore, MD: Paul H. Brookes.
- Powell, D. R., Burchinal, M. R., File, N., & Kontos, S. (2008). An eco-behavioral analysis of children's engagement in urban public school preschool classrooms. *Early Childhood Research Quarterly*, 23, 108-123.
- Rimm-Kaufman, S. E., Curby, T. W., Grimm, K. J., Nathanson, L., & Brock, L. L. (2009). The contribution of children's self-regulation and classroom quality to children's adaptive behaviors in the kindergarten classroom. *Developmental Psychology*, 45, 958-972.
- Risley, R. R., & Cataldo, M. F. (1973). *Planned activity check: Materials for training observers*. Lawrence, KS: Center for Applied Behavior Analysis.
- Simeonsson, R. J., & Bailey, D. B. (1988). Essential elements of the assessment process. In T. D. Wachs & R. Sheehan (Eds.), *Assessment of developmentally disabled infants and preschool children* (pp. 25-41). New York: Plenum Press.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes* (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman, Eds.). Cambridge, MA: Harvard University Press.
- Wolery, M., Pauca, T., Brashers, M. S., & Grant, S. (2000). *Quality of inclusive experiences measure (QuiEM)*. Chapel Hill, NC: Frank Porter Graham Child Development Center, University of North Carolina.