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Addressing Early Learning Standards for All Children Within Blended Preschool Classrooms

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Preschool teachers working in blended classrooms are faced with identifying which children need intensive instruction as well as being responsible for directly linking individualized learning outcomes with state or federal early learning standards. The series of studies presented were designed to illustrate how teachers working in blended preschool programs provided intensive instruction on individual skills that were related to a common early learning standard (i.e., prewriting). Results suggest that embedding intensive instruction during daily activities is not only *effective* but also *efficient* given the relatively short amount of time it took for children to acquire individualized skills. Future research should examine interventions that produce effective and efficient results given the constraints imposed by the schedule of publicly funded blended preschools.

Keywords: *accountability; evidence-based practices; inclusion; literacy intervention strategies; outcomes*

The passage of Good Start Grow Smart in 2002 prompted the development of early learning standards for preschool age children. Specifically, the early childhood component of No Child Left Behind encouraged states to develop standards in the areas of literacy and math for 4-year-old children. Since then, almost every state and the District of Columbia have developed language and literacy and mathematics standards (Scott-Little, Lesko, Martella, & Milburn, 2007). In addition, most states have developed standards in other areas including science, social studies, health and physical development, social-emotional development, and creative arts (Early Childhood Education Assessment, 2007). Grisham-Brown (2008) suggests there are a number of issues to consider when addressing standards in early childhood programs. First, although early learning standards form the basis for the preschool "general education curriculum," they are not, in and of themselves, a curriculum containing all of what should be taught (i.e., scope), nor do they provide guidance on how to teach (i.e., sequence and instructional strategies). Second, unlike K–12 programs in which there is a single set of state standards, early childhood programs often have to address multiple sets of standards including those developed for Head Start programs (i.e., the Head Start Outcomes Framework), literacy programs (e.g., Early Reading First), and programs for children with disabilities (e.g., Office of Special Education Programs [OSEP] child outcomes). Finally, in most states, programs for children with disabilities are blended. Blending extends the concept of inclusion in that children with disabilities are not merely included in the classroom activities but

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that individual learning needs are honored and the curriculum is purposefully blended across ability levels and learning opportunities, which sets the stage for effective teaching and learning for all students (Grisham-Brown, Hemmeter, & Pretti-Frontczak, 2005). Thus, early childhood team members serving children in blended programs are challenged to (a) identify a comprehensive and single curriculum, (b) reconcile standards from multiple sources, and (c) determine how to *teach* standards to children who function at various developmental levels.

A body of literature and set of recommendations has emerged designed to address such challenges. First, to ensure a comprehensive early childhood curriculum, Pretti-Frontczak, Jackson, McKeen, & Bricker (2008) have developed, articulated, and begun to research *curriculum frameworks*. A curriculum framework is the underlying support or foundation from which all practices related to promoting children's growth and development are identified, implemented, and evaluated. Although beyond the scope of this article, refer to the Division of Early Childhood's (2007) paper and Pretti-Frontczak et al.'s (2007) monograph for more information on curriculum frameworks. Second, Grisham-Brown et al. (2005; Grisham-Brown, 2008) have suggested that standards from various sources (e.g., Head Start Outcomes Framework, OSEP child outcomes) be aligned with one another as a strategy for addressing and being accountable for multiple sets of standards. The focus of this article is on the third challenge of addressing common standards for all children in blended classrooms. Specifically, a three-tiered model of sorting and prioritizing children's needs is proposed. The end result is a guide for early childhood teams to address a common set of early learning standards with children of varying abilities (Grisham-Brown, 2008).

Tiered Instruction

Tiering is a common instructional model for conceptualizing intervention and/or therapeutic efforts (Sandall & Schwartz, 2002; VanDerHeyden & Snyder, 2006). Each tier represents different ways team members can address and children can evidence their accomplishments. At the bottom tier (i.e., Tier 1), teams address the *essence* of a standard or outcome identified for all children of a particular group or age. In other words, Tier 1 is composed of concepts and skills that all children are intended to perform in order to evidence the standard (e.g., child uses language for a variety of purposes). Within Tier 2, instruction regarding the *components* or parts of the standards is addressed, typically on a need-by-need basis for children requiring more practice or support (e.g., child requests assistance when needed). Within Tier 3, the *function* of the standard is addressed. At Tier 3, children may demonstrate competency toward the standard by using an alternative form or by showing progress on prerequisite or foundational behaviors (e.g., child uses pictures to communicate basic needs, where the child is working on the function of the standard of "uses language for a variety of purposes").

When children are working on the *essence* of the standard, universal instruction is embedded across the daily routine and environment. Tier 1 instruction means all children receive the same type, frequency, and intensity of instruction (Pretti-Frontczak et al., 2008). For example, all children receive instruction on matching, labeling, sorting, answering questions, and following directions related to quality concepts (e.g., shapes and colors). The instruction is built into daily activities such as reading stories such as *Brown Bear, Brown Bear, What Do You See?* (Martin & Carle, 1996) and playing with manipulatives that are of various shapes and colors. As children's needs increase, so do the frequency and the intensity of instruction. Therefore, at Tier 2, some children may need *targeted instruction* when they are learning the *components* of the standard. For example, if a child is having difficulty *matching* shapes or colored objects, he or she may need focused attention to that component of quality concepts for a period of time (e.g., focused modeling, additional practice). Finally, for children who are working toward the *function* of the standard, *intensive, individualized, and intentional* instruction may be required. Such instruction necessitates a specific plan for how to set the occasion for and respond to children's attempts to demonstrate the targeted skill. For example, if a child needs to learn to answer questions (including questions about the shape or color of an object or person), an instructional plan might be developed in which specific occasions are established for teaching the individual skills and plans for responding to the child's correct and incorrect responses.

Embedded Learning Opportunities

Creating embedded learning opportunities is a systematic teaching strategy where intensive, individualized, and intentional instruction is incorporated into the context of ongoing classroom activities and routines (Pretti-Frontczak & Bricker, 2004). Embedding intensive instructional opportunities means team members follow children's lead, create multiple and varied practice opportunities, and ensure timely and logical feedback regarding their performance on a targeted skills. Embedding intensive instructional opportunities does

not mean that the children receive massed trials or prompts to respond to contrived questions or demands outside the context of where they would use the skill on a day-to-day basis. Generally speaking, intensive instruction involves (a) the identification of specific antecedents that will set the occasion for the target behavior to occur (i.e., environmental arrangement, placement of materials, teacher directions), (b) definitions of what constitutes correct and incorrect responses, and (c) the identification of consequences for all likely child responses (e.g., praise or access to material for correct responses or teacher prompting to assist child in performing the skill for incorrect responses). Across numerous studies, the efficacy of embedding instruction into daily activities has been documented for a variety of individually selected skills including math skills (Daugherty, Grisham-Brown, & Hemmeter, 2001), literacy skills (Grisham-Brown, Ridgley, Pretti-Frontczak, Litt, & Nielson, 2006), social communication skills (Craig-Unkefer & Kaiser, 2002; Garfinkle & Schwartz, 2002; Grisham-Brown, Schuster, Hemmeter, & Collins, 2000; Kohler, Anthony, Steighner, & Hoyson, 2001; McBride & Schwartz, 2003), cognitive skills (Venn et al., 1993), and self-care skills (Sewell, Collins, Hemmeter, & Schuster, 1998). The majority of these studies were conducted with homogeneous groups of children, particularly children with developmental delays (e.g., Garfinkle & Schwartz, 2002; Kohler et al., 2001; Wolery, Anthony, Caldwell, Snyder, & Morgante, 2002). In addition, most studies on embedding have focused on skills from traditional developmental domains, whereas early learning standards are established around content domains (i.e., language arts, math, science).

Despite the success of creating embedded learning opportunities for young children with disabilities on skills from a variety of domains, as stated previously, preschool programs are increasingly blended (Grisham-Brown et al., 2005). In blended preschool classrooms, teachers are faced with identifying which children require intensive instruction and then must directly link or align the individualized need with early learning standards (i.e., required to show how individual goals and objectives lead to access and participation in the general curriculum/daily activities and progress toward standards). The series of studies presented were designed to illustrate how teachers working in blended programs could provide intensive instruction on individual skills related back to the same common early learning standard (i.e., prewriting). In other words, all participating children required Tier 3 intensive instruction as a means of making progress toward the prewriting standard, a Tier 1 outcome. The reason children required Tier 3 intensive instruction varied. In some cases, children were nearing transition to kindergarten, and yet they were unable to perform important prewriting skills (e.g., writing first three letters of their names). In other cases, children were still learning basic skills that lead to more sophisticated prewriting skills (e.g., making simple shapes on paper). Finally, teachers had determined that all children needed intensive instruction to learn the common outcome (i.e., prewriting skill).

Research Questions

The specific research questions were as follows: (a) Will preschoolers with varying abilities make progress toward a common prewriting standard when provided intensive instruction embedded into ongoing classroom activities and routines? and (b) Can preschool teachers implement intensive instruction that is embedded into ongoing classroom activities and routines to teach prewriting standards to children with varying abilities?

Method

The effects of intensive instruction embedded into classroom activities and routines on the acquisition and maintenance of prewriting skills for children with varying abilities across blended preschool classrooms were examined across three studies. Specifically, Study 1 and Study 2 employed a multiple-probe design, and Study 3 used a multiple-baseline design. A description of common procedures is provided first, followed by an explanation of specific methods including setting, participants, target skills, and embedded learning opportunity procedures.

General Procedures

Skill selection. To begin, classroom teachers completed the *Assessment, Evaluation, and Programming System* (AEPS; Bricker, 2002). The AEPS is a curriculum-based assessment that is primarily used for determining a child's development status and selecting instructional priorities (Bricker, 2002). Teachers used data from the AEPS to determine the broad areas in which all children needed instruction. The AEPS results showed that children had a need to strengthen fine motor skills, particularly in the area of prewriting. Furthermore, based on the age of the children and the fact that Kentucky and Ohio (states in which the research was conducted) have prewriting state standards, this set of skills was selected as an outcome for all children.

To determine for which specific prewriting skills children needed intensive instruction, the classroom teacher

Table 1
Developmental Writing Rubric

Novice	Apprentice	Intermediate	Proficient	Mastery
• Simultaneously brings hands to midline • Brings two objects together at or near midline • Grasps hand-size object with either hand using ends of thumb, index, and second fingers • Grasps fat crayon, marker, or other tool and scribbles on paper	• Holds object with one hand while the other hand manipulates • Child holds crayon, marker, pencil, or other writing implement using the thumb and first two fingers. Child may move whole arm across writing surface to write or draw • Uses scribble writing or letter-like forms to represent words or ideas—assigns meaning to scribbles • Copies simple written shapes after demonstration (e.g., circle, cross, "T"); shape should resemble the demonstrated model; any writing implement is acceptable (e.g., chalk, crayon, marker, paintbrush)	• Uses three-finger grasp to hold writing implement (experiments with grasp when using a variety of writing tools) • Produces simple texts using letter-like forms (writing includes lines and circles) • Draws using representational figures (i.e., drawings to represent people, places, events, and objects. Recognizable to others or child is able to describe or label features of the drawings) • Prints psuedoletters (i.e., produce characters that resemble letters and words, starting at the top of the page and moving downward from left to right on each line; do not need to be actual letters or words) • Produces simple texts using scribble writing (e.g., tries to write name at top of paper with lines)	• Adjusts body position when writing • Adjusts paper position when writing • Child draws or writes with crayon, marker, pencil, or other writing implement using three-finger grasp—fingers near point of implement, moving the implement primarily with finger movements rather than whole arm movements. Child is able to position writing implement with one hand by moving fingers of the writing hand rather than using two hands • Copies complex shapes (e.g., rectangle, square, triangle) from a drawn model (e.g., drawn on cards, paper, the sidewalk) • Copies three letters (i.e., upper- or lowercase letter from model; printing errors okay; letters recognizable) • Copies first name (i.e., from model; letters in correct order; printing errors okay; name is recognizable) • Prints three letters (i.e., upper- or lowercase without model; printing errors okay; recognizable) • Copies familiar words (e.g., own name, mom, dog)	• Uses two hands to manipulate objects, each hand performing different movements • Writes common words using three-finger grasp (i.e., moving implement with fingers while wrist and forearm remain stable on writing surface) • Consistently shows evidence of directionality (top to bottom, left to write) • Prints first name or familiar words without a model. Letters must be in correct order; errors are permissible, but words are recognizable • Uses nvented spellings (i.e., uses phonemic-based spelling where letters match how the word sounds vs. conventional spelling rules)

used a developmental writing rubric (see Table 1). The writing rubric was created by the coauthors and is designed to articulate the developmental progression of prewriting in early childhood. Specifically, the writing rubric breaks prewriting skills into the categories of novice, apprentice, intermediate, proficient, and mastery. Items or skills under each category were selected after a review of prewriting tests and several resources on how prewriting develops and how to teach prewriting skills to young children (e.g., Baghban, 2007; Bodrova & Leong, 1998; Bodrova, Leong, Paynter, & Semenov, 2000; Bricker, 2002; Temple, Nathan, Temple, & Burris, 1993). Once the category that best described the child's current prewriting abilities was determined (e.g., apprentice), the teacher selected the developmentally appropriate writing skill within that category for each child. Regardless of target skill, the assessment information showed that *all* children needed Tier 3 instruction (i.e., intensive).

Planning instruction. An intervention plan was developed after target skills were identified. Intervention plans are a teaching tool used to systematically guide intensive instruction (Pretti-Frontczak & Bricker, 2004).

Intervention plans provide teams with guidelines on how to systematically address targeted skills by creating multiple and varied embedded learning opportunities. The intervention plans consisted of three pieces of information or components including antecedent(s), the target child behavior, and associated consequence(s) (Grisham-Brown et al., 2005):

A: Antecedent—An antecedent is how the teacher sets the occasion to elicit the target skill (i.e., what the teacher says or does to elicit the target prewriting skill).

B: Behavior—A behavior is the actual target skill, which is observable and measurable.

C: Consequence—A consequence is what happens immediately after the child correctly responds, incorrectly responds, or does not respond (e.g., provision of verbal praise or an additional prompt).

Intervention plans also included a section that specified the wait time the teacher used after the antecedent and before providing the consequence (e.g., teachers would present the antecedent, wait 5 seconds for the child's attempt to demonstrate the target skill, and then provide the consequence). Modifications and/or adaptations to materials (e.g., chubby chalk) and environmental arrangement strategies (e.g., a slanted tabletop easel) were also described on the intervention plan.

Data collection. After the intervention plan was developed, each targeted prewriting skill was task analyzed into 10 actions the child needed to take to reach the targeted prewriting skill. From that, a 10-point rating scale was designed to assist in data collection. Each step of the task analysis represented a component of the target skill with 1 being the easiest component of the skill that the child might perform and 10 being the most difficult skill in the sequence. As each embedded learning opportunity occurred, the teacher rated the child's writing response using a numerical score (between 1 and 10) that matched the criteria for each score. For example, a child working on making a cross might get a score of 1 for making a random mark on the paper and a score of 10 for making two lines that intersected in the middle. See Figure 1 for an example of a data collection sheet.

Baseline procedures. Baseline data sessions were conducted by the classroom teacher and teaching assistant prior to intervention. A data session occurred across an entire preschool day. Within each baseline session, three trials were delivered across a classroom activity (six total trials per session). In Studies 1 and 2, baseline data were collected for 3 consecutive days at the beginning of the study and for 3 consecutive days just prior to the beginning of intervention for each child. In Study 3, baseline data were collected continuously each day until intervention began. In all cases, when a child reached a minimum of 20% over baseline data for 1 day, intervention was allowed to begin for the next child.

During baseline sessions, the teacher provided an antecedent (e.g., verbal direction and presentation of materials) to prompt the initiation of the targeted behavior and waited the set numbers of seconds for the child's response. Using the 10-point rating scale, the teacher scored the child's response. All child responses were followed with a target consequence (e.g., general verbal praise such as, "Good job, you wrote your name," or "I love how you wrote your name with your pencil, it looks so nice!"). At the end of the day, the child's responses (total of 6) were averaged to achieve a score for the day (i.e., for a single session). Children's average score for the day were then converted to percentage correct.

Intervention procedures. Three instructional trials were embedded into two classroom activities (e.g., arrival time and small group) resulting in a total of six embedded learning opportunities per session (i.e., a session occurred across the preschool day and consisted of 3 per activity resulting in a total of 6 trials across the day). Each time the child was engaged in a classroom activity that set the occasion for the target response, the teacher delivered the antecedent (e.g., "Write your name"). Teachers waited a specified period of time for the child to respond. Following the child's first attempt to write, the teacher scored the response using the writing rubric. If the child scored a 10, the classroom teacher provided the child with descriptive verbal praise, and the child continued with the activity. If the child did not respond within a designated period of time (e.g., 5 seconds) or scored less than a 10, the teacher corrected the child's response using increasing levels of support (e.g., model then hand-over-hand prompting). A criterion was individually set for each child to determine when intervention ended. Individual criterion was established based on the developmental abilities of each child. The Target Skills section on the intervention plan provided a description of each child's criterion.

Maintenance phase. Maintenance data were collected as each child met their individual criterion. Baseline procedures were used during maintenance sessions in

Figure 1
Sample Data Collection Form

Intervention Data Sheet
Teacher Data Recording Form

Child's Name: Walker Observer: _____ Date _____

Target Skill: *Copies a written cross shape*

Directions:

1. Observe Reagan during arrival **and** during center time (CT).
2. Provide three trials (i.e., present 3 antecedents as outlined on the intervention plan).
3. Once a designated antecedent is provided, watch for the child's response.
4. Rate the child's response that occurred immediately after the initial antecedent using the 10-point scale provided below.
5. Provide consequences as outlined on the intervention plan.
6. Average the child's responses across trials and the session.

	Trial 1	Trial 2	Trial 3	
Arrival				
Center Time				**Session Average**
Trial Average				

1	2	3	4	5	6	7	8	9	10
No response; Refuse	Holds/uses writing implement and looks at model but does nothing	Holds/uses writing implement and looks at model of cross, but does not copy the cross	Makes random horizontal lines	Makes random vertical lines	Makes the horizontal line only of the cross	Makes the vertical line only of the cross	Makes non-intersecting lines only	Makes intersecting lines but not a cross	Makes a cross that is 45 degrees

that the teacher delivered the antecedent three times during one classroom activity and three times during a second classroom activity. Furthermore, teachers waited the specified length of time before delivering the target consequence.

Teacher training. The lead authors worked with teachers to develop intervention plans and trained them in procedures. All teachers participated in a 1-day training on embedding instruction into classroom activities. This training was part of a larger project on linking assessment and instruction in inclusive early childhood settings. In preparation for the research, the authors provided one-on-one training with teachers by providing written materials on the procedures, role modeling, and feedback. The one-on-one training consisted of information on how to (a) select target skills from assessment information, (b) develop an intervention plan, (c) implement instructional procedures, and (d) collect data using the writing rubric.

Reliability

Both child response reliability (dependent variable) and procedural reliability regarding teachers' instructional behaviors (independent variable) were documented at least once per condition or a minimum of 20% during each condition. Dependent variable reliability data were calculated using the point-by-point method, which is the number of agreements divided by the number of agreements plus the number of disagreements multiplied by 100 (Tawney & Gast, 1984). Independent variable reliability data were calculated by dividing the number of actual teacher behaviors observed by the number of planned teacher behaviors then multiplying by 100 (Billingsley, White, & Munson, 1980). Planned teacher behaviors consisted of (a) presenting the antecedent, (b) waiting the correct response interval, and (c) providing the correct consequence based on the child's response (i.e., correct, incorrect, no response). The researchers (all authors) collected procedural and interrater reliability data.

Design

A single-subject, multiple-probe design (Tawney & Gast, 1984) replicated across three preschool children was used in Studies 1 and 2 to examine the effects of teachers' embedding learning opportunities into daily activities on children's prewriting skills. Three days of baseline data were collected at the beginning of the study and again just prior to the initiation of intervention for each child. A multiple-baseline design (Tawney & Gast, 1984) replicated across two preschool children was used in Study 3 to examine the effects of the intervention on children's prewriting skills. Continuous baseline data were collected on children's responses until the intervention began. With both designs, the initial child's intervention began after 3 days of baseline. Intervention began for subsequent children when the preceding child performed at least 20% above baseline performance for 1 day.

Study 1

Participants and Setting

Three preschool children**,** two males and one female, participated in Study 1. The children attended inclusive public preschool classrooms in three suburban cities 4 days a week for approximately 4 hours each day. The children's ages ranged from 4 to 5 years. Cindy had developmental delays and received special education and speech therapy services. Billy was diagnosed with autism and received special educational, speech therapy, and occupational therapy services. Adam was diagnosed as a preschooler with a developmental delay and received special education services.

Target Skills

The selected target prewriting skills for Study 1 participants were as follows:

1. During small group and center activities, Cindy will print the first three letters of her first name without a model. She will write the first letter in uppercase and the other two letters in lowercase. The letters will be in the correct sequence, from left to right, and in a location on a paper/product/surface designed by the teacher with 80% accuracy across a minimum of 2 days.
2. During small group and center activities, Billy will draw two shapes (i.e., square and cross) without a model and with 80% accuracy across a minimum of 2 days.
3. During small group and center activities and when given a model, Adam will copy two shapes (i.e., square and cross) with 80% accuracy across a minimum of 2 days.

Embedded Learning Opportunities

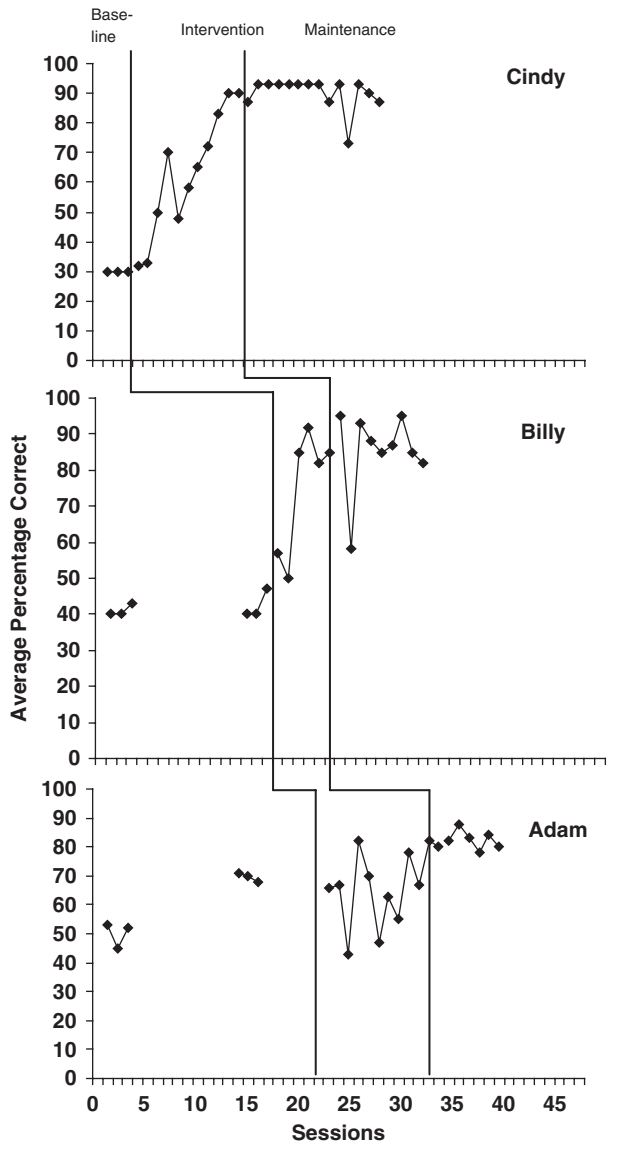
Cindy's prewriting skill was embedded during large group activities (e.g., name writing, painting, crafts, etc.) and during center activities (e.g., dramatic play, writing center, etc.). Billy's prewriting skill was embedded during small group activities (e.g., art) and during center activities (e.g., writing center, block area, etc.). Instruction regarding Adam's targeted prewriting skill was embedded during small group activities (e.g., art) and during center activities (e.g., sand table, blocks, etc.). The classroom teacher supplied each center or activity with the appropriate materials to elicit the targeted prewriting skill.

Results

Acquisition. Data for each child during baseline, intervention, and maintenance phases are provided in Figure 2. The average percentage correct on the writing rubric across trials is shown on the ordinate, and the number of data collection sessions is shown on the abscissa. Cindy and Billy reached criterion for their target skills after 11 and 6 intervention sessions, respectively. Adam reached criterion for his target skill after 11 intervention sessions. The mean number of embedded learning opportunities to criterion was 56 (range = 36–66). Prompting (e.g., verbal, model, hand-over-hand assistance) was needed during the 10-second response interval sessions for the children to reach their target goals.

Maintenance. Maintenance sessions for Cindy were conducted after she reached 80% criterion. She maintained the acquired skill at 80% accuracy (or higher) for 13 of the 14 sessions. The average percentage during the maintenance phase was 90% of criterion. Maintenance sessions for Billy were conducted after he reached 80% criterion. He maintained the acquired skill at 80% accuracy (or higher) for 8 of the 9 sessions. The average percentage during the maintenance phase was 85% of criterion. Maintenance sessions for Adam were conducted after he reached 80% criterion. He maintained the acquired skill at 80% accuracy (or higher) for 5 of the 6 sessions. The average percentage during the maintenance phase was 83% of criterion.

Figure 2
Study 1 Results



Interobserver agreement. Dependent variable reliability averaged 98% (range = 78%–100%) during baseline sessions and 99% (range = 83%–100%) during intervention sessions. Procedural reliability during baseline sessions was 100%. During intervention sessions, procedural reliability averaged 98% (range = 87%–100%).

Study 2

Participants and Setting

Three preschool children, all male, participated in Study 2. The children attended a rural inclusive public preschool program 4 days a week for approximately 4 hours each day. Walker, Brad, and Zach's ages ranged from 4 years to 5 years. Walker had a diagnosis of orthopedic impairment and received special educational services and services from a physical and occupational therapist. Brad had developmental delays and received special education and speech therapy services. Zach was typically developing but did attend the public preschool program and received educational services.

Target Skills

The selected target prewriting skills for Study 2 participants were as follows:

1. During small group and center activities and when given a model, Walker will copy the simple cross shape with 80% accuracy across a minimum of 2 days.
2. During small group and center activities, Brad will print his entire name with 80% accuracy across a minimum of 2 days.
3. During small group and center activities, Zach will print first the first three letters of his name with 80% accuracy across a minimum of 2 days.

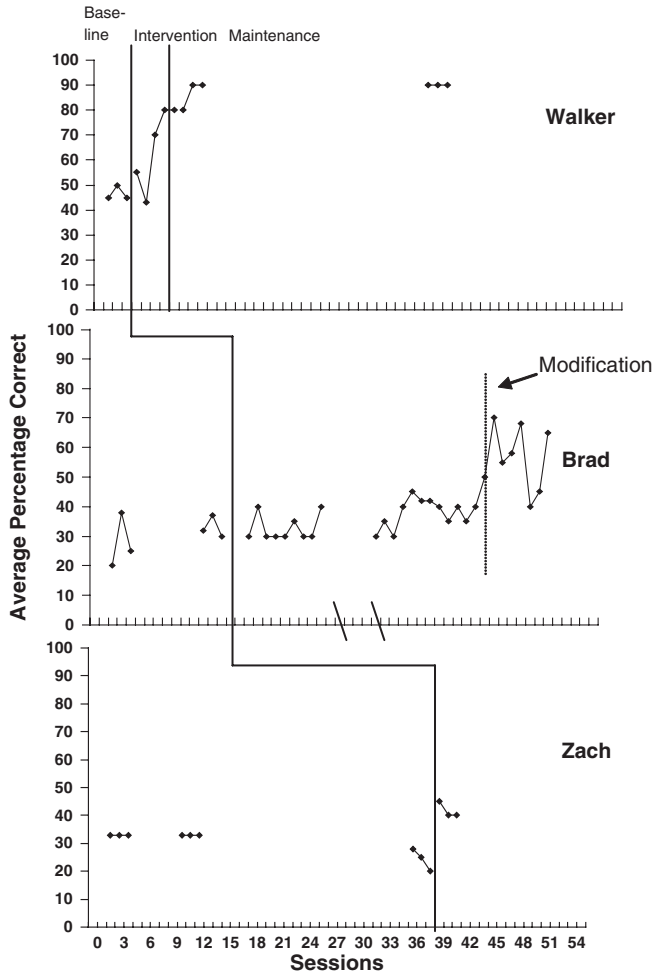
Embedded Learning Opportunities

Instruction regarding Walker's targeted prewriting skill was embedded during small group activities (e.g., art) and during center activities (e.g., dramatic play, blocks, etc.). Brad's prewriting skill was embedded during small group activities (e.g., art) and during center activities (e.g., writing center, dramatic play, post office, etc.). Zach's prewriting skill was embedded during large group activities (e.g., art, book making, etc.) and during center activities (e.g., dramatic play, writing center, etc.). The classroom teacher supplied each center or activity with the appropriate materials to elicit the target prewriting skill.

Results

Acquisition. Data for each child during baseline, intervention, and maintenance phases are provided in Figure 3. Walker reached criterion for his prewriting target skill after four intervention sessions. The number of embedded learning opportunities for Walker was 24 opportunities. Brad and Zach did not reach criterion due to the end of the school year; however, they both maintained stable baseline data and made progress toward their prewriting skill during intervention. Beginning in Session 23, Brad participated in his intervention sessions in a 1-1 format with the classroom teacher. Although instruction did not change, this modification

Figure 3
Study 2 Results



was deemed necessary due to distractibility while working with peers.

Maintenance. Maintenance sessions for Walker were conducted after he reached 80% criterion. He maintained the acquired skill at 80% accuracy for the first session and at 90% accuracy for the following five sessions. The average percentage during the maintenance phase was 88.3% of criterion.

Interobserver agreement. Reliability measures were identical to Study 1. Dependent variable reliability averaged 95% (range = 67%–100%) during baseline sessions and 83% (range = 33%–100%) during intervention sessions. Procedural reliability during baseline sessions averaged 94% (range = 77%–100%). During intervention sessions, procedural reliability averaged 74% (range = 44%–100%).

Study 3

Participants and Setting

Two preschool children, one male and one female, participated in Study 3. The children attended a rural inclusive public preschool program 4 days a week for approximately 4 hours each day. Maddy and Don's ages ranged from 3 years to 4 years. Maddy had a diagnosis of cerebral palsy and developmental delays. She received special educational services and additional services from a speech-language pathologist, physical therapist, occupational therapist, and vision specialist. Don had developmental delays and received special educational services and services from a speech-language pathologist.

Target Skills

The selected target prewriting skills for Study 3 participants were as follows:

1. During arrival and small group activities and when given a model, Maddy will copy the simple cross shape with 70% accuracy across a minimum of 2 days.
2. During large group and center activities, Don will print the first 2 letters of his name with 80% accuracy across a minimum of 2 days.

Embedded Learning Opportunities

Instruction regarding Maddy's targeted prewriting skill was embedded during arrival activities and during center activities (e.g., dramatic play, etc.). Don's prewriting skill was embedded during large group activities (e.g., art activities, book making, etc.) and during center activities (e.g., writing center, dramatic play, etc.). Maddy's criterion was set at 70% accuracy across a minimum of 2 nonconsecutive days due to the severity of her disability, and Don's criterion was set at 80% accuracy across a minimum of 2 nonconsecutive days.

Results

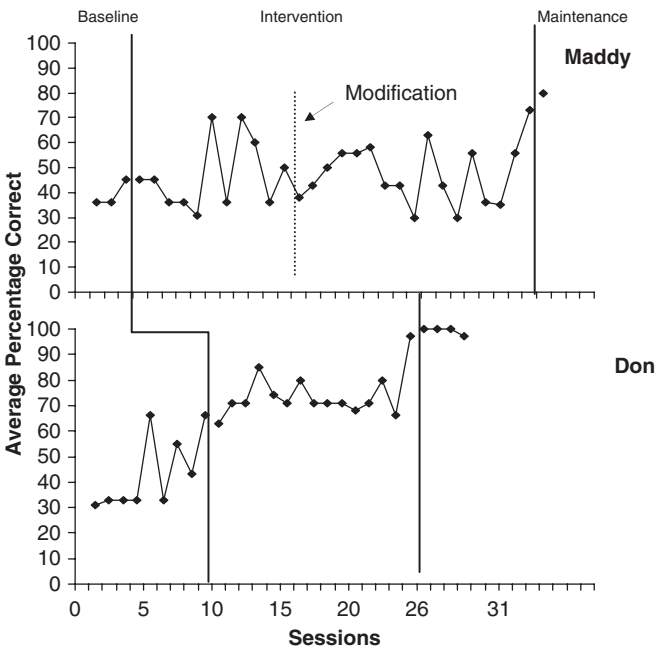
Acquisition. Data for each child during baseline, intervention, and maintenance phases are provided in Figure 4. Maddy reached criterion on her prewriting skill after 28 intervention sessions and 168 learning opportunities. Beginning on the 15th intervention session, instead of receiving instruction during a center activity format (e.g., in the block area, etc.), Maddy began receiving embedded instruction in a 1-1 format with her classroom

teacher at either a classroom table or a free-standing easel. Although instruction did not change, the modification was deemed necessary due to Maddie's poor vision and the severity of her physical disability. Don reached criterion for his prewriting target skill after 15 intervention sessions. The number of embedded learning opportunities for Don was 90 opportunities.

Maintenance. Maddy participated in one maintenance session where she maintained the prewriting skill with 80% accuracy. Maintenance sessions for Don were conducted after he reached criterion. He maintained the acquired skill at 100% accuracy for the first 3 sessions and at 97% accuracy for the last session.

Interobserver agreement. Dependent variable reliability averaged 100% during baseline sessions and averaged 99% (range = 86%–100%) during intervention sessions. Procedural reliability during baseline sessions averaged 87% (range = 78%–100%). During intervention sessions, procedural reliability averaged 93% (range = 44%–100%).

Figure 4
Study 3 Results



Discussion

The effects of embedding intensive instruction into daily activities on the acquisition of a common outcome were examined. In all, eight children participated. Six of the children reached criterion in an average of 22.5 sessions (range = 4–28). Six children maintained their target skill at intervention levels. Two children did not reach criterion, although both were showing progress toward criterion when data collected ended due to the end of the school year. Two children required further modifications to their instructional program.

The children's classroom teachers delivered the intensive embedded learning opportunities. Reliability rates were generally high. Interrater reliability ranged from 95% to 100% during baseline conditions and 83% to 99% during intervention conditions. Procedural reliability rates were slightly lower ranging from 87% to 100% during baseline conditions and 74% to 98% during intervention conditions.

Implications for Practice

Blended preschool classrooms will likely contain children with mild, severe, and no delays. Preschool teachers are now experiencing the pressures of accountability similar to that of their K–12 peers (Costello & Zarowin, 2002). For example, the Office of Special Education Programs is collecting assessment data on children's progress toward three identified outcomes (Early Childhood Outcomes Center, 2005). Some states also are collecting assessment information on *all* preschool children's progress toward statewide early learning standards. As a result of these accountability initiatives, preschool teachers need effective strategies for ensuring *all* children make progress toward important early learning standards or outcomes. This study offers promising findings for teachers who are working with children with varying abilities in inclusive preschool classrooms and experiencing pressures from accountability efforts. There has been concern that the onset of standards in preschool would compromise appropriate practices for teaching young children (Teachers College, Columbia University, 2004). Results of the present research show that young children can make progress toward early learning standards within the context of naturally occurring classroom activities and routines. Furthermore, the research shows that *intensive* instruction does not mean that children must be segregated from their peers and receive massed trial instruction in order to acquire and maintain important learning outcomes. Even when children required one-on-one instruction with their teachers, learning opportunities were embedded into highly motivating, interesting activities at moments when it was logical for the

child to use the target skill (e.g., child writing his or her name on the computer sign-up sheet).

A second important outcome is that classroom teachers were able to implement the procedures with a relatively high level of fidelity. Fidelity of intervention implementation is a topic that has been widely discussed in recent years (Gresham, 2007). As noted in the results, teachers in two of the three studies implemented the intervention within acceptable ranges (> 80%), and teachers in one study were slightly below that at an average of 74%. It is worth noting that only one of the three children in their classroom reached criterion. Although no direct correlation can be established between the fidelity with which the teachers performed the intervention and the outcomes, future research should examine the relationships between these variables.

Limitations

Although findings from this series suggest an impact on the dependent variables (i.e., a gradual improvement from baseline during intervention was noted), results cannot be interpreted within the confines of an experimental design. Thus, the series is perhaps better described as case illustrations. Although there is evidence of children's increased performance on writing skills, a functional relationship between the intervention and the increased performance cannot be established. To demonstrate a functional relationship between the intensive instructional techniques embedded into classroom activities and routines and preschool children's progress toward early learning standards, better experimental control is needed. Conducting well-controlled studies within preschool classrooms, however, presents several challenges.

There were three issues that we found to be problematic in conducting this series of case illustrations. First, the *preschool schedule* made establishing experimental control difficult. Preschool children generally attend school about 3 to 4 hours a day for 4 days a week. As well, the school year often ends earlier than a typical school year. These factors decreased the number of available teaching opportunities. As a result, in some situations, intervention was introduced before full baseline stability was established and/or before a preceding child reached 20% above baseline versus meeting full criterion on his or her target skill. For example, in Study 1, baseline data were not collected on Adam just prior to the initiation of intervention. His baseline performance increased between Baseline 1 and 2, although it was steady during Baseline 2. In an attempt to control for maturation and/or adaptation to frequent probing, Adam was put directly into intervention phase once Billy's performance, during intervention, improved more than 20% above baseline. Second, *children's lack of immediate response to intervention* compromised experimental effects. There were situations where children made little to no progress following baseline conditions for many sessions. In Study 3, Maddy made no apparent progress until Session 7, and thereafter, her data remained variable, at times dropping to or below baseline performance. Similar results were found for Adam who made no apparent gains in performance from the second baseline condition through intervention. Third, *implementation fidelity* may have adversely affected experimental control. Across cases, actual teachers as opposed to research assistants were implementing the intervention. Although this practice provides information on teacher fidelity and usability, the learning curve may have negatively influenced child performance outcomes. That is, the teachers had minimal experience creating intensive embedding learning opportunities prior to the study; thus, it is possible that the quality of implementation was increased over time, thereby questioning whether the children's performances were dependent on the quality of intervention implementation. In addition, once the study began, there was little time built in the procedures to train the teachers if problems arose during implementation.

Summary

Despite the limitations in terms of interpreting and generalizing findings, it remains that children in blended classrooms made progress on an important early learning standard, during the intervention phase, and maintained their performance. Furthermore, results show that embedding learning opportunities served as an efficient intervention, particularly when children are working on Tier 3 skills. In other words, results of the series suggest that embedding learning opportunities across daily activities may be *effective* but also may be efficient given the relatively short amount of time that it took for children to acquire their target skills; a little more than three 4-day weeks (i.e., $M = 13$ days). Finally, findings suggest that the procedures related to embedding learning opportunities were those that teachers were able to implement. Whereas other research on embedded instruction has been conducted in laboratory settings with trained researchers, the current work was conducted in actual blended classrooms with teachers who were balancing other instructional duties while implementing the studies.

Although tiered interventions are now recommended for use in preschool programs, research on what those interventions should look like and their effects does not

exist. The line of research described in this article should be explored further in an effort to identify, define, and determine the effectiveness of all levels of instruction. In addition, aspects of improving teacher preparation, practices, and implementation should be examined. The field needs to support and train teachers on how to use their data to inform instruction. To the extent possible, future research should continue to examine interventions that produce effective and efficient results given the constraints imposed by the schedule of publicly funded preschool programs.

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