

**Literacy Objects as Cultural Tools: Effects on Children's Literacy Behaviors
in Play**



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Literacy objects as cultural tools: Effects on children's literacy behaviors in play

While a great deal of attention has been drawn to the pedagogical, psychological, and social factors involved in learning to read, the organizational dimensions that might influence children's opportunities to actively engage in literacy learning have remained relatively unexplored. Rarely has the impact of the ways in which the literacy environment is structured been considered, though evidence suggests that such considerations may be critically important (Atwell, 1987; Graves, 1983; Morrow & Weinstein, 1986). Weinstein's (1979) integrative review of the impact of classroom environments, for example, reveals a limited body of knowledge regarding how the physical features of classrooms and settings may be constructed to enhance learning.

Acknowledging the importance of the environment-behavior relationship, recent research on early childhood has taken a more "ecological" perspective, attempting to describe how particular environments, communities as well as classrooms, might impact children's behavior as it naturally occurs (Fennie, 1985; Gump, 1989). This approach is based on the work of ecological psychologists who posit that individuals and environments are interdependent: Human behavior not only influences the surrounding environment but is influenced by it (Barker, 1978; Barker & Wright, 1951). Human ecologists, as well (Bronfenbrenner, 1977; Day, 1983), conceive of environments as interrelated at

many different contextual levels, from microsystems (e.g., schools) to macrosystems (e.g., culture). Each level of context and its participants transact, affecting and being affected by each other.

In particular, ecologists have examined early childhood classroom indoor play environments to explore those features of architecture and settings that may enhance the value of play in children's development. Their research suggests that variables of materials and setting exert a strong pull on the nature and quality of children's learning through play (Fein, 1975; Quilitch & Risley, 1973; Vandenberg, 1981). For example, in a study by Fein (1975), when abstract blocks were replaced with realistic replicas of objects, the quality of young children's pretend play was enhanced.

That the physical environment may "coerce" behavior (Gump, 1989) has important implications for literacy learning in early childhood as well. With physical design changes in play environments, we may be able to extend the range of literacy opportunities for young children and thereby encourage developmentally appropriate literacy activities. For example, in a preliminary study examining the impact of literacy-enriched play areas on children's literacy behaviors, we found that preschool children spontaneously used almost twice as much print in their play than prior to the environmental intervention (Neuman & Roskos, 1990b). Given the potential of environmental factors for learn-

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THIS STUDY examined the effects of literacy-enriched play settings on preschoolers' literacy behaviors in spontaneous free play. 91 children, ages 3-5, from two urban day-care centers participated in the study. Prior to and following the intervention, the frequency of each child's handling, reading, and writing behaviors in play was assessed through direct observation. Videotaped samples of play areas examined the nature of children's play themes and their uses of literacy objects in play. Following baseline observations, the physical environment of one of the day-care centers was enriched with literacy objects in three distinct play centers: kitchen, office, and library. Significant differences were recorded for the intervention group in the frequency, duration, and complexity of literacy demonstrations in play. Further, children in the intervention group incorporated literacy objects in more diverse and functional ways in their play, using more explicit language than the nonintervention group.

Les objets pour lire et écrire en tant qu'outils culturels: Effets sur les comportements de lecture-écriture d'enfants en situation de jeu

CETTE ETUDE a porté sur les effets de situations de jeu comportant des objets pour lire et écrire sur les comportements relatifs à la lecture-écriture d'enfants d'âge préscolaire en situation de jeu spontané et sans contrainte. 91 enfants, de 3 à 5 ans, provenant de deux centres d'une ville, ont participé à la recherche. On a évalué par observation directe la fréquence des comportements de saisie, de lecture et d'écriture de chaque enfant, avant et après intervention. Des échantillons vidéo des domaines de jeu portent sur les thèmes de jeu et sur l'utilisation objets pour lire et écrire. Conformément aux observations de départ, l'environnement physique de l'un des centres comporte des objets pour lire et écrire, appartenant à trois domaines différents: la Cuisine, le Bureau, et la Bibliothèque. On a relevé des différences significatives pour le groupe d'intervention en fréquence, durée et complexité des manifestations de lecture-écriture. En outre, les enfants du groupe d'intervention ont introduit les objets de lecture-écriture. En outre, les enfants du groupe d'intervention ont introduit dans leurs jeux les objets de lecture-écriture de façon plus diversifiée et plus fonctionnelle, tout en utilisant un langage plus explicite que ceux du groupe sans intervention.

Objetos alfabetizadores utilizados como herramientas culturales: Efectos sobre el comportamiento alfabetizante en los niños durante el juego

ESTE ESTUDIO examinó los efectos de medio ambientes de juegos de alfabetización enriquecidos en las conductas alfabetizadoras de niños en edad pre-escolar durante juegos espontáneos. Participaron 91 niños entre 3-5 años, de dos centros urbanos pre-escolares. Mediante la observación directa antes y durante la intervención, se verificó la frecuencia de cada niño en el comportamiento y manejo de la lectura y la escritura durante el juego. Se grabaron videos de las areas de juego que examinaron la naturaleza de los temas y los usos de objetos de alfabetización. Continuando las observaciones básicas, el entorno físico de uno de los centros urbanos pre-escolares fue enriquecido con objetos alfabetizantes de tres centros de juegos distintos: la Cocina, La Oficina, y la Biblioteca. Se registraron diferencias significativas en el grupo intervenido en lo que hace a la frecuencia, duración y complejidad de las demostraciones alfabetizantes del juego. Más aún, los niños del grupo intervenido incorporaron objetos de alfabetización durante sus juegos de formas más diversas y funcionales utilizando lenguaje más explícito que el grupo no intervenido.

Schriftsprachliche Objekte als kulturelle Mittel: Auswirkungen auf das Lese-Rechtschreib-Verhalten von Kindern im Spiel

DIE VORLIEGENDE Studie untersucht Auswirkungen von schriftsprachlich angereicherten Spielumgebungen auf das Lese-Rechtschreib-Verhalten von Vorschulkindern im spontanen freien Spiel. 91 Kinder im Alter zwischen 3 und 5 Jahren aus zwei städtischen Kindertagesstätten nahmen an der Studie teil. Vor und nach der Intervention wurde für jedes Kind die Häufigkeiten der Objekthandhabung, des Lesens und Schreibens durch direkte Beobachtung erfasst. Die Spielthemen der Kinder wurden anhand stichprobenartiger Videoaufzeichnungen der Spielzonen erhoben. In einer der Tagesstätten wurde nach der baseline-Beobachtung die Umgebung von drei Spielzentren (Küche, Büro und Bibliothek) mit schriftsprachlichen Objekten angereichert. In der Interventionsgruppe zeigten sich signifikante Unterschiede hinsichtlich der Häufigkeit, Dauer und Komplexität von schriftsprachlichem Verhalten im Spiel. Weiterhin bezogen die Kinder der Interventionsgruppe Leseobjekte in vielfältigerer und stärker funktionaler Weise in ihr Spiel ein und verwendeten explizitere Sprache als die Kinder der Kontrollgruppe.

ing, then, changes in the structural features of the play environment that are literacy based may have important consequences for children's emerging conceptions of literacy.

Of course, play as a process in and of itself provides a particularly rich medium for children's exploration of literacy: its cultural roles, routines, scripts, and tools (Roskos, 1987). As a medium for exploration, play has been described as providing a "courage all its own" (Bruner, 1983). Liberated from situational constraints, children in play are free to construct microworlds in which actions and objects need not conform to reality or convention. For example, in the play context a toy block may become a telephone or a car or whatever meaning is instrumental to the play sequence.

In their transforming of one thing into another, children are thought to begin to separate meaning from objects, providing the foundation for understanding other representational systems, like written language (Piaget, 1962; Vygotsky, 1962). To anchor the transformation, the process appears to require initially a relatively familiar context with common objects, that is, good exemplars of a general category (Fein, 1975). Once children's mental representations are well established, objects and contexts may be replaced by more abstract forms.

Experimental studies in free play settings generally confirm the use of objects as substitutes or "meaning-markers" (Vygotsky, 1962). Young children tend to show richer and more elaborated sequences of play with highly prototypical objects (Fein & Robertson, 1975; McLoyd, 1983). Correspondingly, there is some evidence that the relationship of pretend behavior to object prototypicality may change between the ages of 4 and 8 when children's language becomes explicit enough to convey the meaning of objects without their physical presence (Pulaski, 1973).

Although much of the research on play transformations has concentrated on the quality of pretend play (Chaille, 1978; El'Konin, 1966), a number of recent studies have focused on how the uses of objects and symbolic transformation in play contexts may influence children's emerging conceptions of literacy (see reviews by Christie & Johnsen, 1983; Pellegrini, 1985). One type of analysis, for example, looks at the transformational process *per se*, and examines the predictive relations between symbolic play and early literacy. This research is based on the theoretically demonstrated parallels between the use of symbols in play and the use of signs in emergent reading processes (Pellegrini, 1980, 1985). In recent longitudinal studies, however, Pellegrini and his associates (Galda, Pellegrini, & Cox, *in press*; Pellegrini, Galda, Dresden, & Cox, 1990) found

that although symbolic transformations predict emergent writing status, they do not predict emergent reading status or oral language related to reading. This finding led the authors to suggest that reading and writing may have different ontological roots.

A second type of analysis has been more ecological in orientation, examining the influence of literacy objects within the play environment on children's playful literacy behaviors. This research is based on the premise that by using literacy-related objects in play environments, young children will engage in "run-ups" to literacy (Bruner, 1984) in their early attempts to understand it as a "pattern of discourse" (Goelman, 1984). Research of this type was initiated on the basis of observational studies documenting children's natural engagement in literacy-like tasks in play (Jacob, 1984; Neuman, 1991; Roskos, 1987).

Most surveys, however, indicate that there is a paucity of literacy objects and materials in child care settings which have been purposely designed to facilitate natural interactions with written language (Morrow, 1990a; Robinson, 1990; Schickedanz, 1986). Consequently, to examine the influence of objects on children's emerging concepts of literacy, several studies have attempted to enrich particular play centers with literacy materials (Neuman & Roskos, 1990a; Morrow, 1990a; Vukelich, 1989). Vukelich (1989), for example, transformed two play centers into a flower shop with sales forms and receipts and a bank with literacy materials including withdrawal slips, instructions on how to use a cash machine, and loan application forms. Similarly, Morrow (1990b) created a veterinary corner, with forms and books to accompany the play. Although these enriched environments produced more literacy-related play, it is not clear whether the settings and related objects in these studies represent prototypical contexts and objects of meaning to young children. Thus, the utility of these objects in building up stores of represented meanings to be used at some later time in more abstract forms of literacy use may be limited.

In contrast, the research reported here was designed to analyze the influence of physical design changes in the play environment through the insertion of common literacy-related objects in prototypical contexts on preschoolers' literacy behaviors in spontaneous free play. The settings and literacy objects were designed to serve as pivots for children to develop an array of new strategies, associations, and behavioral prototypes that might later be used in other contexts. Further, we questioned whether the inclusion of typical literacy objects in play settings might produce more sustained and elaborated sequences of literacy in play, as reported in our previous research (Neuman &

Figure 1 Classroom A: Nonintervention classroom

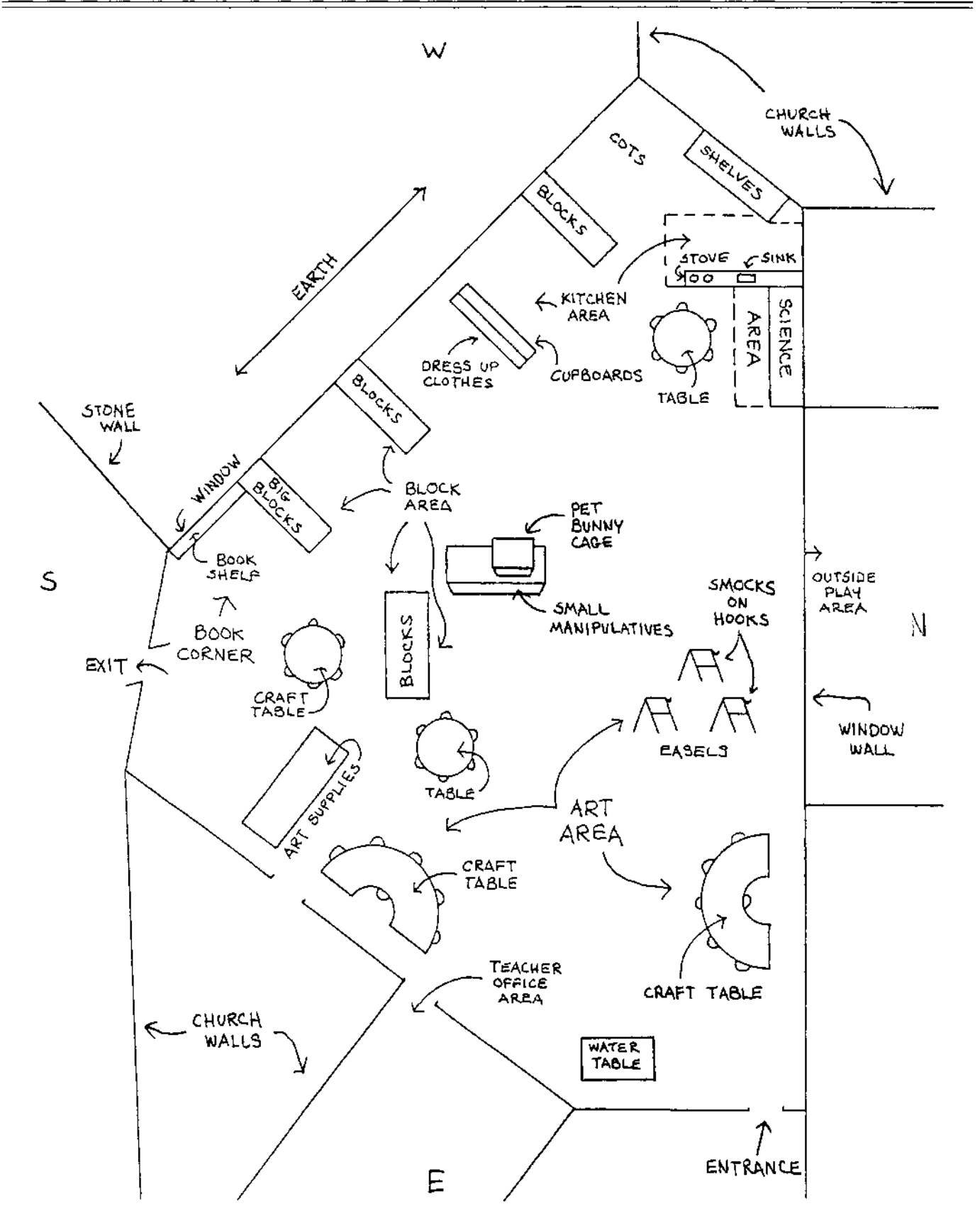
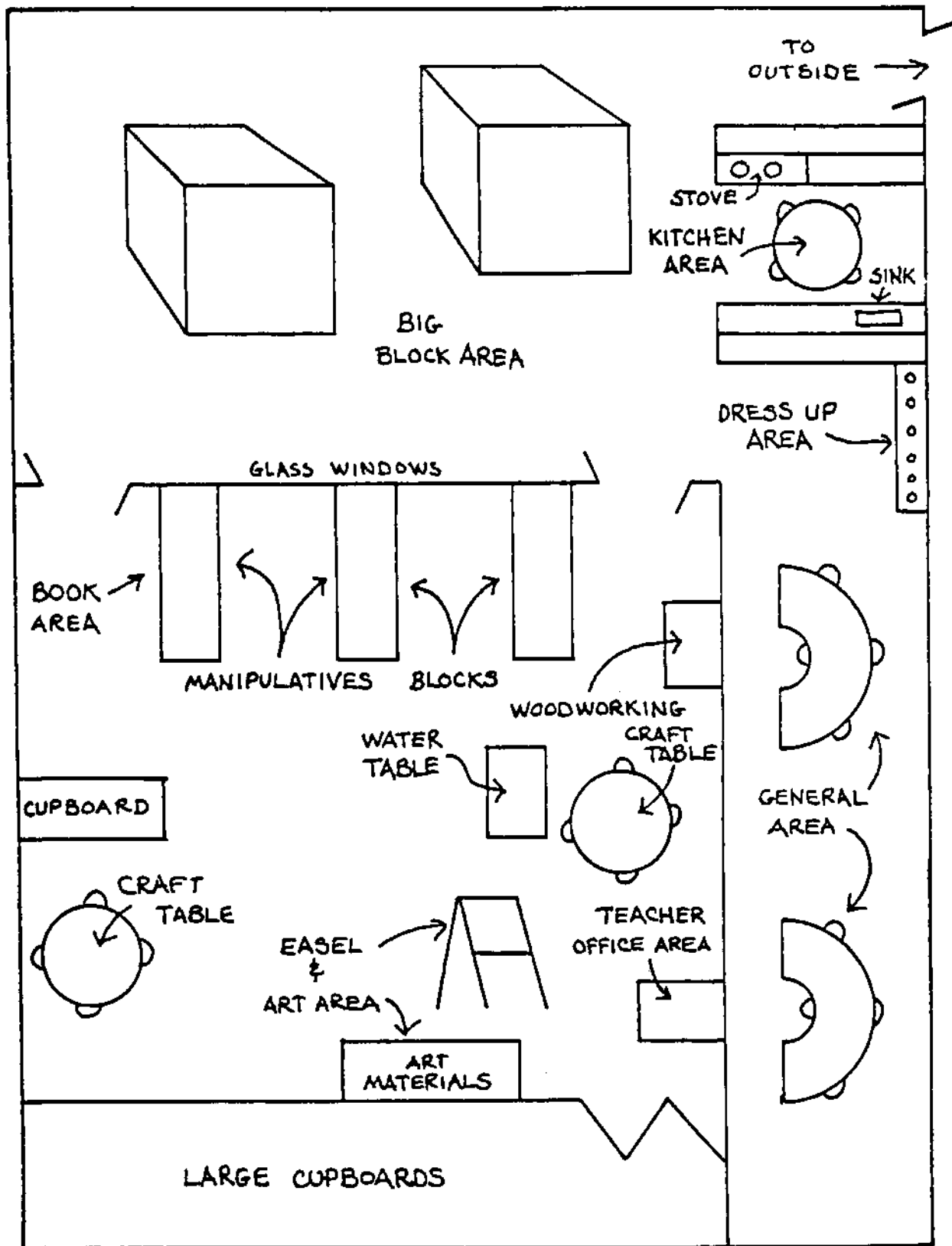


Figure 2 Classroom B: Intervention classroom prior to enrichment



Roskos, 1990a, 1990b). Specifically then, the study was designed to answer the following questions:

1. Do play settings enriched with literacy objects influence the frequency of literacy demonstrations in the spontaneous play of preschoolers?
2. Does the inclusion of literacy objects in play environments influence the duration and complexity of literacy-related free play?
3. How are literacy objects used in children's spontaneous play?

Studies of ecological influences in children's play have noted the important distinction between play and exploration with objects (Berlyne, 1960; Hutt, 1979). Reflecting a locus-of-control factor, in exploration the child asks, "What can this object do?", whereas in play the question becomes "What can I do with this object?" Over time, exploration, which is dominated by children's actions, is thought to decrease while the amount of time spent playing with an object, using more explicit language, is said to increase (Hutt & Bhavnani, 1976). Consequently, this research was conducted over a 7-month period to allow sufficient time for the novelty of objects to wear off.

Method

Subjects and setting

Ninety-one preschoolers, 3–5 years old, from two day-care centers in an urban metropolitan area participated in the study. Each center served families from diverse ethnic backgrounds; the sample included 62% Caucasian, 31% Black, 5% Southeast Asian, and 2% Hispanic children.

Ms. K., the Program Director, administered both day-care centers, which were located in close proximity to each other. Programs were similar in philosophical orientation: Children were encouraged to select many of their own activities from a variety of learning areas, to be physically and mentally active, and to learn through active exploration and interaction with adults, other children, and materials. Both programs were state licensed and met the accreditation standards of the National Academy of Early Childhood Programs. Each program included a teacher-to-child ratio of 1:10, a planned curriculum incorporating science, social studies, language, art, and motor coordination activities integrated throughout the day, and approximately 180 minutes per day for indoor and outdoor free play.

The sites were similar in their physical organization of play areas. Book corners, housekeeping areas, blocks, small manipulatives, and art centers were placed around the perimeter of each classroom with an open

space in the middle of the room. Although typical play objects were plentiful in both sites, few literacy-related objects, aside from books in the book corner and paper at the arts and crafts table, were readily accessible to children. Both centers, however, did include some print displays such as the alphabet, chart stories, and lists of children's names. Figures 1 and 2 illustrate these classroom settings.

Centers were randomly selected into nonintervention (Site A) and intervention (Site B) classrooms. Forty-five children (25 boys, 20 girls), with a mean age of 4.17, were in Site A, and 46 children (24 boys, 22 girls), mean age 3.68, were in Site B.

To obtain some measure of prior knowledge in literacy and comparability across the two sites, the Test of Early Reading Ability (TERA) (1981) was individually administered to each child in the sample. Designed to assess reading behaviors that emerge during the preschool years, the 5-to-10-minute test measures children's ability to attribute meaning to printed symbols and the functions of print, their knowledge of the alphabet, and their understanding of the conventions of print. A *t* test indicated no statistically significant differences between intervention and nonintervention groups ($t = 1.23$, $df = 83$, *ns*). Descriptive statistics for participant children in the two sites are presented in Table 1.

Table 1 Description of the sample

Center	Site	
	Nonintervention (Site A)	Intervention (Site B)
Number of children		
Ethnicity		
Caucasian	27	29
Black	14	14
Hispanic	1	1
Asian	3	2
Gender		
Male	25	24
Female	20	22
Means (and SDs)		
Age		
Male	4.34 (0.59)	3.72 (0.70)
Female	3.98 (0.77)	3.63 (0.51)
Percentile scores (and SDs)		
Test of Early Reading Ability (TERA)	41.25 (29.90)	35.22 (24.87)

Table 2 Time line of study

Tasks	Months										
	1	2	3	4	5	6	7	8	9		
Gathering baseline data											
Administration of TERA	●										
Observations of individual children's play behavior.	●										
Videotape observations of 4 play areas	●										
Intervention		●	●	●	●	●	●	●	●	●	
		(1.5 weeks)		(7.5 Months)							
Mid-enrichment phase											
Videotape samples of play activities in centers			●	●							
			(Month 3 + 4)								
Late-enrichment phase											
Videotape samples of play activities					●	●	●	●	●	●	
Observations of individual children's play behavior.					(Month 5.5 - 6.5)		(7.5 Months)				
Analysis of data											
ANCOVA pre/post observations									●		
Identification and analysis of play frames (216)								●	●		
Identification of literacy-related play frames (74)									●		
Sampling and transcription of 5 literacy-related play frames from baseline, mid-enrichment, and late-enrichment.									●	●	
Coding of frames into behavioral units									(Month 8.5 - 9)		
										●	
										(Month 9)	

Procedures

Table 2 details the time-sampling schedule and specific tasks of the study. Prior to the intervention phase of the study, two measures of literacy behavior in play were obtained to examine the frequency of literacy demonstrations in preschoolers' spontaneous play and the uses of literacy-related objects in four play settings: housekeeping, book corner, small manipulatives, and arts/crafts table.

Four graduate students in early childhood education and reading were trained over three 1-hour sessions to observe and record the number of literacy demonstrations each child engaged in during free play. Literacy demonstrations (Neuman & Roskos, 1990b; Roskos, 1990) were defined as instances of handling (focusing on the physical exploration of a literacy object), reading (attributing meaning to printed marks or symbols), and writing (attempting to use printed marks as a form of communication). Using videotapes from earlier research (Neuman & Roskos, 1990b), observers practiced identifying and tallying observable demonstrations in each category. Intercoder reliability indicated .97 agreement between observers following the training period.

Over a 2-week period, each child's play was observed and the number of literacy demonstrations was tallied during four 15-minute segments of spontaneous play, for a total of 60 minutes of play observed per child.

To examine the uses of literacy-related objects, children's spontaneous play activity was videotaped for 30 minutes, four different times, in four different areas (housekeeping, book corner, small manipulatives, and arts/crafts table) for a total of 2 hours per play area. Rather than focusing on an individual child, the goal of the videotaping was to obtain samples of children's play themes and their uses of objects in play.

Videotaping was conducted by two graduate students in communications who had previous experience in videotaping play behavior in early childhood settings. Both had been trained to identify play themes, using videotapes and transcripts from earlier research (Roskos, 1987). Prior to the data collection period, both familiarized themselves with the sites, noting play tendencies and potential technical problems, such as light levels, traffic patterns during play time, and acoustics. On the basis of this information, a strategy was developed for videotaping play themes as they naturally

occurred in both intervention and nonintervention sites.

Using a camcorder and a microphone system,¹ the two worked in tandem, skirting a preselected play area for a 30-minute time period. If the children began a play topic, but then abandoned it in less than 30 minutes, the two remained in the area to fulfill the time period. If the children initiated a play theme, then left the area to pursue it, the pair would follow the children in an effort to capture the play action and language. Thus, it was possible for the video recorders to successfully video children's play actions and language as they naturally occurred, without confining children's play to predetermined areas or requiring them to wear individual microphones.

Intervention design

Investigations of play activity reveal that children create play contexts, situations, and plans based on what they already know, using objects to support this endeavor (Bruner, 1983; Fein, 1975; Garvey, 1977). Studies indicate that spatial organization, the functional complexity of play materials, and classroom organization influence the quality of play in an environment (Emmerich, 1977; Hutt, 1979; McLoyd, 1983; Proshansky & Wolfe, 1975). Specifically, the more familiar the children are with play contexts and their corresponding objects, the more they tend to play in increasingly complex ways, using elaborated language in the process.

Considering the importance of familiarity, informal discussions were held with day-care teachers and with parents to determine what literacy contexts and objects were already known to the children. In addition, baseline videotapes were scanned to note children's play preferences, interests, and instances of literacy behaviors. Such information provided clues as to potential play settings, literacy objects, and spatial arrangements that might be particularly appealing and familiar from the child's point of view.

On the basis of existing research and specific site-based information, three principles of design were established in planning the literacy enrichment in the intervention site.

Principle #1: For literacy enrichment purposes, the play space should be arranged so as to encourage sustained play interactions, yet allow for adequate adult presence and supervision.

Research on the characteristics of play environmental design has demonstrated that small, intimate play areas encourage more interactive and sustained play activity (Neill, 1982; Zifferblatt, 1972). Day-care

teachers in our study, however, expressed concern that if play spaces were too private, teachers could not adequately monitor children's play activities. To accommodate these concerns yet allow for more intimacy in various play areas, the play space was more sharply defined, using semifixed features such as cupboards, screens, tables, directional signs, and hanging mobiles.

In addition, items in the children's play environment were inventoried and labelled in ways that resembled real-world print displays. For example, storage bins for small manipulatives were identified by print and picture much like hardware store items. Art materials were identified by means of a large chart that contained printed names of items and their corresponding pictures. Teachers were also encouraged to display the children's drawings and writing attempts throughout the play environment. Directional signs (words + pictures + arrows) were strategically placed about the environment to serve as reference points for locations. In these ways, the environment was spatially organized using print and picture.

Principle #2: The literacy enrichment should include play settings that reflect authentic literacy contexts in the children's real-world environment and are natural adaptations of existing play areas.

Since young children seem to play best about what they know, literacy-enriched play settings were created that reflected real-life literacy situations for these children. For instance, parents and teachers reported that the children had considerable background about libraries and offices, having frequently visited these settings as a part of their day-care and real-world experiences. Many of them, however, had much less experience with post offices or banks, since they spent most of their day in the day-care setting.

Further, concerned that abrupt changes in play areas might prove overwhelming to the children, day-care teachers suggested that rather than create a totally new environment, we modify or enhance existing centers to include more literacy. On the basis of these considerations, three play settings were developed: the kitchen/house setting, the cozy corner library, and the office. These centers resembled contexts where children might have witnessed or experienced literacy activities, according to their parents and day-care teachers. Thus the centers were designed to capitalize on print contexts already known to the children.

Principle #3: The literacy enrichment should include a network of common literacy objects in appropriate contexts that are safe for children to use.

Table 3 Nonliteracy and literacy objects in targeted play areas by site before and after enrichment

Play area	Before enrichment				After enrichment			
	Site A		Site B		Site A		Site B	
	Nonliteracy objects	Literacy objects	Nonliteracy objects	Literacy objects	Nonliteracy objects	Literacy objects	Nonliteracy objects	Literacy objects
Housekeeping	kitchen setup pots/pans plastic fruit tableware	none	kitchen setup pots/pans plastic fruit tableware	none	same	same	same + tree telephone	books (10 est.) telephone book cookbooks (5) recipe cards small plaques stationery coupons store ads play money grocery packages message board calendars notepads pens, pencils markers decals
Book corner	bean bag chair small chairs	books (12 est.) ABC chart	bean bag chair child's rocker book rack	books (8 est.) wall poster	same	same	couch area rug tree telephone table	return cards library stamps books (70 est.) bookmarks magazines pens, pencils markers paper signs calendars telephone book wall posters file folders stickers
Manipulatives	Legos lock-blocks beads plastic animals straws small blocks	none	Legos lock-blocks beads plastic animals straws small blocks	none	same	same	same + buttons	labelled bins magazines maps paper pencils

(continued)

Since object familiarity appears to be instrumental in the early phases of symbolization and meaning-making (Vygotsky, 1962), an essential criterion in choosing literacy objects was that they be prototypical of children's experiences in similar contexts in their daily lives. For example, items in the kitchen/house center included cookbooks, coupons, recipe cards,

actual grocery packages, children's books, and materials for list-making, such as pencils and notepads. In short, we attempted to insert familiar literacy objects into equally familiar print-based contexts for these children, with the idea that these ecological factors might assist children's meaning-making with literacy in their play.

Three additional criteria drawn from our earlier

Table 3 Nonliteracy and literacy objects in targeted play areas by site before and after enrichment (continued)

Play area	Before enrichment				After enrichment			
	Site A		Site B		Site A		Site B	
	Nonliteracy objects	Literacy objects	Nonliteracy objects	Literacy objects	Nonliteracy objects	Literacy objects	Nonliteracy objects	Literacy objects
Arts/crafts	easel paints brushes paper aprons	none	easel paints brushes paper aprons	none	same	same	same	inventory art posters pencils labelled supplies
Office	—	—	—	—	—	—	table chairs telephone computer keyboard file racks in/out trays clipboards plastic clips small bins	calendars appointment book message pads (10 est.) signs books pamphlets magazines file folders business cards forms ledger sheets paper pencils, pens markers small notebooks stencils

work also guided the insertion of literacy objects into each play center: appropriateness (item naturally and safely used by young children), authenticity (a real item in the child's general environment), and utility (item useful to children in their imitative literacy attempts) (Neuman & Roskos, 1990a). Table 3 gives a comparison of the nonliteracy and literacy-related objects and settings in Site A and Site B before and after intervention.

No changes in the play environment were made at the nonintervention site; teachers were encouraged to organize play areas "as usual." Floor plans illustrating the design differences in the play environment of Site B after enrichment are shown in Figure 3. Changes in the structural configuration of the classroom remained stable throughout the study.

During free play periods, teachers and aides in both sites were encouraged not to restrict any play areas, but to allow children to move about freely in all the play settings. The role of the adult in these sites was to set the stage and observe children's play; rarely did adults directly intervene in the play activity.

Over the next 6 months, videotaped samples of children's spontaneous free play in the newly established kitchen/house, library, and office settings at Site B and the housekeeping, book corner, small manipulatives and arts/crafts table settings at Site A were collected weekly, using procedures similar to those in the preintervention phase. This was done throughout the study for a total of 18 hours of videotaped play per site (see Table 4).

During the final 2-week period of the study, each child's spontaneous play activity was systematically observed, once again using the same preintervention procedure. Eighty-five children comprised the final number of subjects in the study, representing a loss of 7% of the sample due to child absences and family relocations.

Data analysis

Frequencies of children's handling, reading, and writing behaviors were tallied prior to and following the intervention to determine the influence of these

Table 4 Comparisons of sites by play area and amount of videotaping before and after enrichment

Play areas	Before enrichment				After enrichment			
	Site A	Videotaping time	Site B	Videotaping time	Site A	Videotaping time	Site B	Videotaping time
Housekeeping	✓	1 hour	✓	1 hour	✓	5 hours	Kitchen	5 hours
Book corner	✓	1 hour	✓	1 hour	✓	5 hours	Library	5 hours
Small manipulatives	✓	1 hour	✓	1 hour	✓	4 hours	✓	1 hour
Arts/crafts	✓	1 hour	✓	1 hour	✓	4 hours	✓	1 hour
Office	0	—	0	—	—	✓		6 hours
Blocks								
Large	✓	—	✓	—	✓	—	✓	—
Small	✓	—	✓	—	✓	—	✓	—
Sand/water table	✓	—	✓	—	✓	—	✓	—
Large muscle	✓	—	✓	—	✓	—	✓	—
Outdoor play	✓	—	✓	—	✓	—	✓	—

Table 5 Literacy-related play frames in each of the play settings by site

Site	Number of play frames			Total
	Baseline phase	Mid-enrichment phase	Late-enrichment phase	
Nonintervention (Site A)				
Housekeeping	1	0	2	3
Book corner	2	2	2	6
Small manipulatives	2	2	1	6
Arts/crafts	0	1	0	1
Total	5	5	5	15
Intervention (Site B)				
Housekeeping [kitchen/house]	1	3	6	10
Book corner [library]	5	14	11	30
Small manipulatives [office]	0	6	13	19
Arts/crafts	0			
Total	6	23	30	59
				74

physical design changes on the number of literacy demonstrations in children's spontaneous free play. A one-way analysis of covariance was conducted, with the corresponding baseline score serving as covariate, for each category of response.

Videotaped play activity was qualitatively analyzed to examine the duration and complexity of children's

play sequences with print, and the function of literacy objects in these settings. Through repeated viewings and discussion, 44 hours of videotaped play (8 hours baseline; 36 hours throughout study) were scanned, and play frames—defined by Sutton-Smith (1971) as play that is bound by a location and a particular focus or interaction—were established. This analysis yielded a

Table 6 Segment of a coded transcript analyzing complexity and duration of literacy demonstrations in a play frame, office play area

Literacy demonstration	Speaker	
Writing	Claire [to Carol]:	Betcha can't make this Carol (shows her a big letter M on paper).
Writing	Carol [to Claire]:	I know how [writes a letter M].
Writing	Claire [to Gwen]:	I can make something better than you [makes a C].
Reading	Gwen [to Claire]:	See I made a C.
Writing	Claire [to Gwen]:	Yeah, but I bet you can't make this [refers to some marks on her paper].
Writing	Gwen [to Claire]:	Wow. Do you know how to write? [attempts to scribble like Claire]
Writing	Claire [to Gwen]:	Yup! [tries to write a letter]
Writing	Shameika [to Claire]:	You can't make this [writing on paper].
Handling	Claire [to Shameika]:	Bet you can't make this [holds up her paper].
Writing	Shameika [to the others]:	I'm making letters [writes the letter e on her paper].
Handling	Claire [to Shameika]:	We don't care. [to others] Right? We don't care about your picture. Who cares? Nobody cares about your picture. Look at mine! [holds up her paper for everyone]
Writing	Shameika:	[Making more lines on paper]
Writing	Claire:	I can make that [attempts to write what Shameika is writing].
Writing	Gwen:	I can make that too-o-o [writes on paper].
Writing	Shameika [to the others]:	When you write, you just hafta make lines [demonstrates by writing].
Writing	Claire [to the others]:	We know how to make lines...lines is very easy. We don't need no help to make lines [writes on her paper].
End of sequence	Supraja [coming into office area]:	Guess what! I saw <i>Batman</i> at the movies.

Note. Total number of literacy demonstrations = 16. Total duration: 450 seconds.

total of 216 play frames.

These play frames were examined for evidence of literacy behaviors—handling, reading, or writing activities. Of the 216 frames, 74 or 34% were literacy-related. Each was numbered by date, and the play frames were grouped by site into three time periods: baseline, mid-enrichment, and late-enrichment. Table 5 illustrates the number of literacy-related play frames in each of the play settings by site.

Five play frames from each time period in the intervention and nonintervention groups were selected for subsequent analysis to examine the influence of literacy enrichment on the duration and complexity of the literacy-related play (see Appendix C for additional information on these play frames).² Duration was calculated by determining the amount of time children spent on

literacy-related play in each play frame. Complexity was analyzed by counting the number of contingent sequences of literacy demonstrations: consecutive instances of handling, reading, or writing within play frames. Contingent sequences of play behavior are regarded by play researchers (Sylva, Roy, & Painter, 1980) as providing the best empirical evidence of complexity. As reported in our previous research, these sequences of literacy demonstrations indicated more complex literacy-related play (Neuman & Roskos, 1990b). Table 6 illustrates the coding procedures.

Differences between groups on duration and complexity were analyzed using one-way repeated measures analysis of variance (ANOVA) across the three time periods.

Finally, the 30 play frames were transcribed verba-

Table 7 Coding system for children's speech acts and nonverbal actions

Category	Code
Requestive: Solicits information or action	S
Question: Seeks either judgment or information. "Wanna write a valentine?"	
Action request: Seeks the performance of an action by hearer. "Give me that book!"	
Suggestion: Recommends the performance of an action by hearer or speaker. "Let's play librarian"	
Responsive: Supplies solicited information	R
Answer: Provides solicited judgment of proposition. "A little boy from China dranked your milk."	
Explanation: States justifications and predictions. "Cause I readed that Chinese book!"	
Performative: Accomplishes acts and establishes facts by being said	P
Claim: Establishes rights of speaker. "That's my letter."	
Declarative: Announces facts or rights of speaker. "I know how to write my name."	
Qualification: Provides unsolicited information to requestives. "That is not an <i>a</i> ."	
Nonverbal: Expresses meaning through actions or gestures	N

tim, including children's talk, gesture, physical action, and object use, to examine how literacy objects functioned in the play frame. Since researchers have shown that specific changes in context result in specific changes in language used (Halliday, 1975), the frames were coded according to the type of speech acts and actions the preschoolers used and their purpose in relation to literacy objects.

Each play frame was divided into behavioral units, defined as individual segments of speech or specific action (Barker, 1978). Units were classified as serving one of the following roles in a play exchange: requestives, responsives, performatives, and nonverbal actions. This typology was derived from Dore's (1978) extensive observations of young children's speech acts in preschool classrooms; it is used to describe the ways in which children learn to use the pragmatic aspects of language. Actions were included because interactions

Table 8 Coding system for reference to object

Category	Code
Labelling: A literacy object is identified.	l
Pretending to read: A child attempts to read.	b
Pronouncing words or letters: Specific words or letters are pronounced.	w
Exploring objects: A literacy object is manipulated or handled.	e
Writing: Writing is used to communicate with others.	wr
Transforming: Child assigns new meaning to a literacy object.	t
No reference to object: Child makes a statement that makes no reference to literacy object.	n
Off-task: An object is used inappropriately.	o

between children are thought to be first through gesture and action, and then through symbol. Language is seen as very much predicated on gesture (Lock, 1978).

Using this system, we classified each behavioral unit as a requestive, responsive, performative, or a nonverbal action. We then examined how the literacy objects were used through children's language and actions. Through repeated readings of transcripts, we were able to divide the uses of literacy objects into eight categories: labeling, pretending to read, pronouncing words or letters, exploring objects, writing, transforming, no reference to object, and off-task behavior. For example, the behavioral unit, "Watch, Claire, how I can write," was coded as a performative speech act (P), in which the child made reference to writing (w). By cross-referencing speech acts and action behavioral units with reference to how the objects were used, then, it was possible to analyze in what ways literacy-related play was extended through the uses of objects. Further, this procedure allowed us to examine the extent to which the objects might influence a variety of linguistic repertoires (see Tables 7 and 8 for coding system).

Each segment was coded holistically for gist, which, according to Corsaro (1979), yields an accurate measure of a behavioral unit for preschool children. Transcripts were coded by one of the authors, then reviewed by the other to ensure consistency of coded categories. Disagreements were resolved through dis-

Table 9 Sample of a coded transcript analyzing the use of literacy objects through speech acts and actions

Code	Speaker	Behavioral units
Swr	Elisha	Claire, I know how to write my Mom's name, wouldya like to watch me?
Rwr	Claire	Yeah.
Nwr Rw	Elisha	[She holds the pencil and starts to write.] Want me to make an A?
Rwr, Nwr Pw	Claire	Yeah. [She watches as Elisha begins to make a mark.] I'm gonna make an A.
Sw	Elisha	What's that?
Rw Pw Ne Swr	Claire	That's the A. It's not very good [She scratches furiously on her paper as Elisha looks on.] I did it wrong again, right? [She begins to scribble on her paper very hard.]
Ne	Elisha	[She begins to scribble on her paper.]
Pe, Pe Pe	Claire	Let me see. Oh yuck! We're making yucky ones.
Pe, Ne Pw	Elisha	Oh yuck! [She continues to scribble.] Now lemme make a better A.

Note. See Tables 7 and 8 for explanations of codes.

discussion. A sample of a coded transcript is shown in Table 9.

In total, 325 behavioral units were reported for the intervention group, 111 for the nonintervention group. In order to examine potential differences in the uses of literacy objects, these frequencies were converted to percentages. Due to the relatively limited number of literacy-related behavioral units from the nonintervention group, data were collapsed across all three time periods. Following a procedure developed by Alvermann and Hayes (1989), we constructed graphs displaying the uses of literacy objects as revealed through language and action during play.

Results

Frequency of literacy demonstrations

Our first analysis was designed to measure differences between groups in the number of literacy demon-

strations in children's spontaneous free play. Table 10 presents the mean scores for the preenrichment frequencies and the adjusted means for the postenrichment scores on the number of handling, reading, and writing literacy demonstrations.

Significant differences were reported in each category of response. Children in Site B engaged in significantly more handling ($F(1,82) = 29.99, p < .001$), reading ($F(1,82) = 13.43, p < .001$), and writing ($F(1,82) = 26.89, p < .001$) demonstrations in play than children in Site A. These data indicated that the infusion of literacy objects along with physical design changes in play settings significantly influenced the nature of children's literacy behaviors.

Duration and complexity of literacy-related play themes

Table 11 presents mean scores for intervention and nonintervention groups for the duration and complexity of literacy-related play themes across baseline, mid-enrichment and late-enrichment periods.

One-way repeated measures ANOVAS of literacy-related play frames in the representative sample indicated statistically significant differences between the two groups across the three time periods, with the intervention group engaging in lengthier ($F(1,8) = 109.13, p < .001$) and more complex literacy-related play ($F(1,8) = 26.78, p < .001$), than those children in the nonintervention group.

Figures 4 and 5 display these differences between groups in the average duration and complexity of literacy-related play themes across the three time periods.

As expected, only slight differences in duration and complexity of literacy-related play themes were reported for the two groups prior to literacy enrichment. However, following the infusion of literacy-related objects, there were striking differences in both variables. Children in the intervention group engaged in over 10 times the amount of literacy-related play. Related to this finding, there was a marked change in the complexity of play frames, with the intervention group engaging in more contingent sequences of literacy behavior. Further, these effects were maintained and even extended in the late-enrichment period, demonstrating the impact of settings and literacy objects on play even after the effects of novelty wore off.

In summary, children in the intervention group spent more time engaging in handling, reading, and writing activities in play than the nonintervention group. These demonstrations became more sustained and more interconnected as literacy was increasingly integrated in children's ongoing play themes over the 7-month period of the study.

Table 10 Means (and standard deviations) for number of literacy demonstrations by site before and after intervention

Type of demonstration	Site			
	Nonintervention		Intervention	
	(Site A)		(Site B)	
	Pre (Month 1)	Post (Month 7)	Pre (Month 1)	Post (Month 7)
Handling	1.36 (2.90)	1.53 (2.16)	1.70 (3.80)	7.30 (6.54)
Reading	1.17 (2.67)	0.67 (0.82)	0.56 (1.22)	2.09 (2.32)
Writing	0.05 (0.22)	0.31 (0.75)	0.30 (0.86)	2.60 (2.89)

Note. Duration of each videotape from which literacy demonstrations were determined = 30 minutes.

Table 11 Means (and standard deviations) for duration and complexity of play themes

Period and group	Average duration ^a			Complexity ^b		
	<i>M</i>	<i>SD</i>	<i>R</i>	<i>M</i>	<i>SD</i>	<i>R</i>
Baseline phase						
Intervention	101.00	117.44	9-300	1.80	1.30	1-4
Nonintervention	90.60	73.89	18-200	2.00	0.00	0
Mid-enrichment phase						
Intervention	604.00	310.03	200-1037	13.00	3.46	10-18
Nonintervention	57.00	25.87	38-102	1.80	0.84	1-3
Late-enrichment phase						
Intervention	683.20	291.60	358-1032	20.00	9.92	10-33
Nonintervention	52.00	29.50	30-100	1.60	0.89	1-3

^a In seconds.

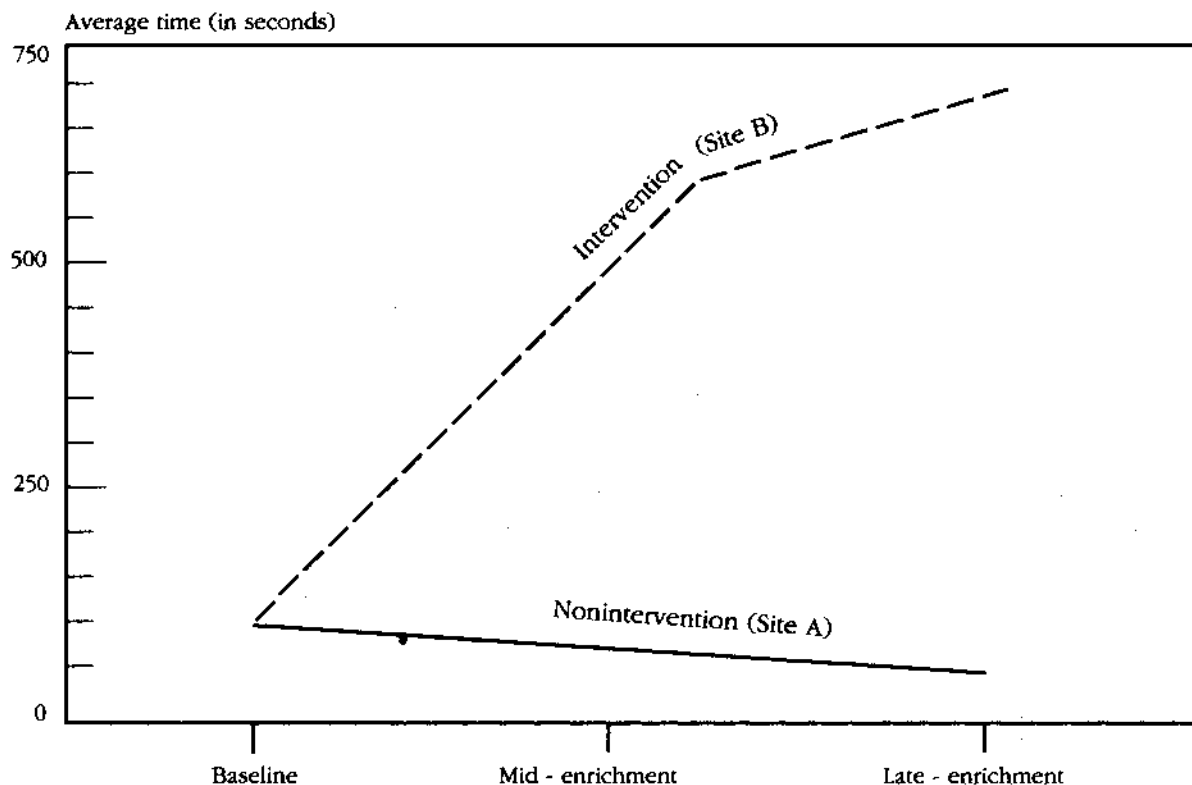
^b Number of demonstrations in each play frame

Children's uses of literacy objects in play

Figures 6 and 7 describe how literacy objects were used in play as communicated by the preschoolers' speech acts and actions. Speech acts in each category were aggregated to examine differences between nonintervention and intervention groups. (See Appendices B and C for percentages of behavioral units in each category and reference to the literacy object for intervention and nonintervention groups.)

Children in Site B tended to rely more on language in communicating with others in literacy-related play

than the nonintervention group; only 14% of the play in the intervention group was dominated by nonverbal action, compared to 41% in Site A. In the nonintervention group, for example, meaning was often conveyed through actions, as in one play theme where we observed a little girl attempting to engage her friend in play by pointing to a paper as if it were a map. In contrast, children in the intervention group more often negotiated meaning through language, as in the following episode:

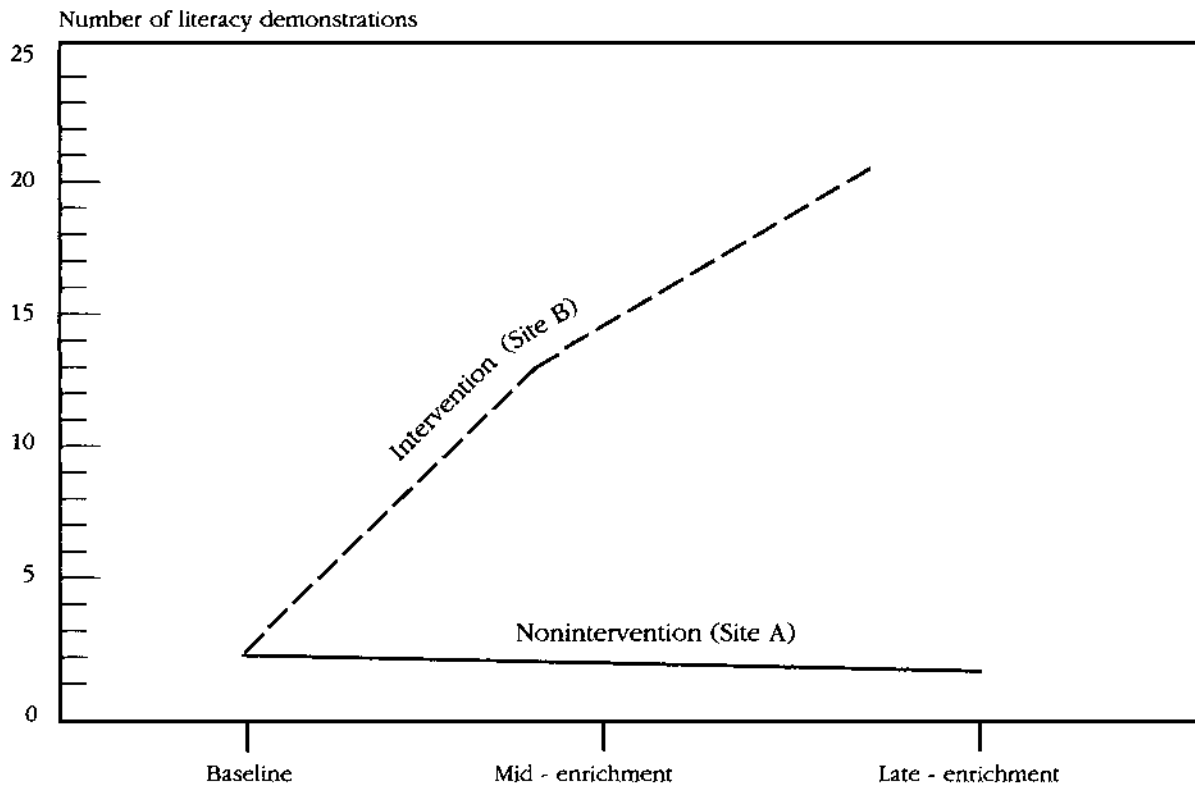
Figure 4 Duration of literacy-related play frames: Baseline, mid-, and late-enrichment phases

- Katie: [referring to her book]: Here's the name. Oh, no! (She flips through the book.)
- Supraja: [looking at the pages] This is a cooking book. This is a cooking book, Katie. That's OK.
- Katie: [sweeping her hand across the print] There's words. It's a word book.
- Supraja: A check book!
- Katie: [closing the book and smiling] Yeah, like a checkbook.

Closely associated with these trends, the nonintervention group's reliance on nonverbal actions was accompanied by more exploratory behavior, as in "what can this object do," in comparison with the intervention group, where literacy was situated in the context of pretend play. For example, children's use of writing instruments (markers, pencils, crayons) in the nonintervention group consisted largely of experimenting with the various colors or making marks on paper. On the other hand, children in the intervention group fre-

quently used writing instruments in more functional ways, such as to "write valentines," to record "library" rules, and to write down "directions." In this respect, the literacy behaviors demonstrated by the nonintervention group tended to be guided by the object, externally driven, with action subordinated to the object, whereas those demonstrated by the intervention group were more internally driven, with action subordinated to the children's intentions.

Children in the intervention group also used literacy objects to engage in a wide variety of literacy behaviors. They focused their interactions on the labeling of objects, reading, writing, and using literacy in their pretend play activities more frequently than the nonintervention group. For example, children in Site A most often engaged in identifying words and letters seen on the available print such as a calendar or a list of children's names in the classroom. In Site B, however, play settings provided a broad diversity of literacy activities, as in the office, where children spent time preparing

Figure 5 Complexity of literacy - related play frames: Baseline, mid-, and late enrichment periods

and sending mail, writing each other's names, reading messages, and assuming the roles of office workers.

Further, striking differences were reported between groups in the role of the literacy object in play. Even when a literacy object was physically present, a good deal of talk and action among preschoolers in the non-intervention group made no reference at all to it, indicating that the object was not the focus of learning and interaction. For example, in one episode, two boys were playing "sleep" in the library corner, holding books, yet making no mention of the content of the books. Children in the intervention group, however, frequently incorporated the literacy objects into their play themes, using them to further their play purposes. For example, the children's use of a "Trapper-Keeper" notebook became a central prop in a number of family play themes about "doing homework":

Sharonda: Good afternoon!
 Julia: [carrying the Trapper-Keeper]. Oh hello, mother. [Pointing to it] I gotta study for class, Mom.

Sharonda: Hurry up! We gotta go to Gramma's house.
 Julia: Guess what? I gotta show you something. [She opens the Trapper-Keeper.] I gotta bad test! [She shows her a folded piece of paper.] Look! I've been studying a lot.
 Sharonda: Don't study tomorrow a really lots. I don't need it.

Finally, contrary to some teachers' beliefs that play with real objects encourages more "real-life" play (Paley, 1990), children in the intervention group actually engaged in more object transformations with the literacy props than those in the nonintervention group. For example, the children changed cookbooks into "magic, genie books" and pieces of paper into detailed directions for "ballet lessons." These children used literacy objects in creative ways as they pretended to be magicians, mail carriers, or librarians, indicating that object prototypicality and familiarity might have actually encouraged more meaningful and imaginative literacy-based play.

Figure 6 Percentage of behavioral units for each speech act or action and type of reference to the literacy object. Nonintervention group

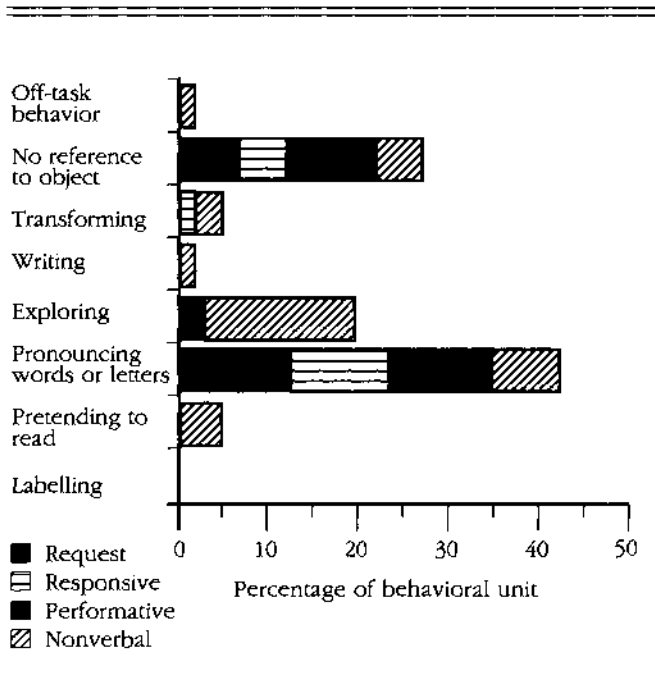
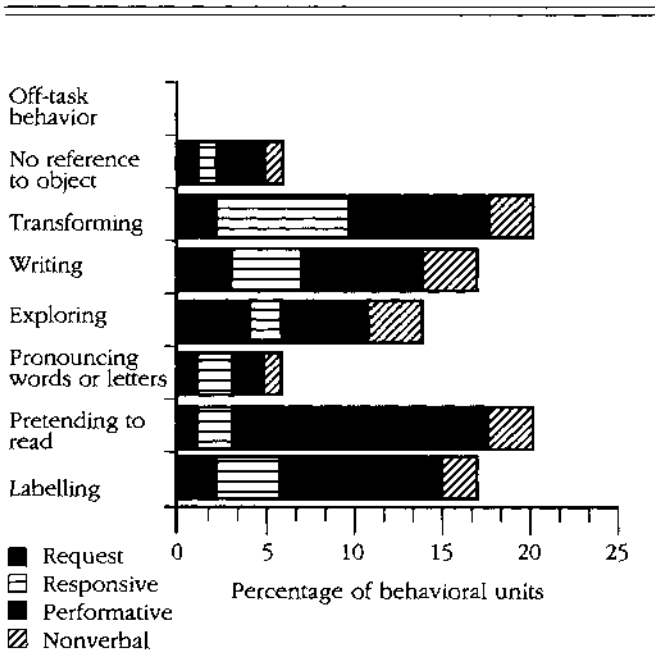


Figure 7 Percentage of behavioral units for each speech act or action and type of reference to the literacy object. Intervention group



In sum, our data indicated that children in the intervention group relied more often on the language of literacy over gestures and actions alone to elicit, respond to, and perform activities in play. In addition, they incorporated literacy objects into their play in more diverse and functional ways. These differences indicate that the physical presence of objects in their related settings may have assisted children in the use of more explicit language in literacy-based play.

Discussion

Ecologists have argued that early childhood classroom settings exert a "coercive power" over their inhabitants, constraining certain behaviors and permitting others (Gump, 1989; Weinstein, 1979). Factors such as room size, intimacy of setting, and material resources have been shown to elicit differences in the quality of children's pretend play, social interaction, and constructive activity (Fernie, 1985). Specifically, empirical evidence suggests that young children first use objects and settings they already know to construct meaning from experiences in play; these are replaced by more representational forms as they grow older (Elder & Pederson, 1978; Fein, 1975). How children use objects and settings within their environment is thought to reflect their growing capacity to create analogies (or symbols) that become increasingly independent of external stimulation, and increasingly representational of the events to which they refer (Werner & Kaplan, 1963). Consequently, in structuring play environments to enhance literacy interactions, we embedded common literacy objects in known settings to encourage young children to engage spontaneously in literacy-like behaviors, using their prior knowledge as well as that of their peers to extend their associations and understandings of literacy.

The results of this study indicate that the deliberate enrichment of the play environment with familiar literacy objects in equally familiar contexts of literacy use enhanced young children's literacy activity in play. Over the period of the intervention, the frequency, duration, and complexity of children's playful literacy activities increased, suggesting that, unlike toys, the objects encouraged children's self-generated literacy activity in richer and more elaborated play sequences.

Further, through their language and actions, children's uses of literacy objects became increasingly varied, incorporating a greater repertoire of questions, responses, and behaviors involving literacy. These findings support our previous research, indicating that children's collaborative engagement in literacy through

play may provide substantive input in their learning about written language as reflected in their discourse. In our study, we found children's instructional discourse focused on designating the names of literacy objects, on negotiating their meaning, and on coaching another child in some literacy task (Neuman & Roskos, 1991). Taken together, these results suggest that more challenging and complex language use may be produced in play environments that are literacy based with objects and settings that are not only familiar but instrumental in nature. In short, the physical play environment permitted the creation of situational contexts in which literacy may be used.

In addition, the results indicate that within this enriched play environment children incorporated literacy objects and roles into their play, creating new play themes to express their ideas about literacy. In the process of play, the constellation of objects-contexts-roles provided a network, luring children into the language and actions of literacy while simultaneously enhancing the quality of their literacy-based play. In this respect, the play environment scaffolded the children's "comprehension of the act" of literacy prior to their formal induction via instruction. Wood, Bruner, and Ross (1976) have argued that this form of recruitment is the first stage of scaffolding, to be replaced by later assistance in more and more conventional forms.

Findings from this study indicate the need for certain ecological considerations related to the literacy enrichment of play environments. That the children in the intervention site evidenced more and qualitatively different literacy activities in play appears to be linked more to the conscientious application of environmental design principles than to the simple littering of play areas with literacy objects. What seems key here is the insertion of known literacy objects embedded within familiar play areas. This kind of nested familiarity within well-designed play environments tended to create networks of literacy behaviors easily incorporated into children's naturally developing play themes. In this manner, literacy settings and objects appeared to serve as pivots (Vygotsky, 1967), supporting the play and assisting the use of language over action as a means of conveying meaning about literacy.

In particular, these findings suggest that a more calculated approach to the design of literacy enrichment in early childhood play environments is needed—one that uses information from a variety of sources. Specifically, parents need to be surveyed as to the kinds of literacy activities and situations that naturally occur outside the early childhood program; teachers, as well, need to rework play centers to include familiar literacy objects and routines. This implies that literacy-enriched

play settings and objects will vary across programs, reflective of the broader cultures of their participants. In this respect, "travel agency" and "restaurant" play centers may be appropriate to one early childhood environment but not to others, where the generic "offices" and "grocery stores" may more likely represent real-world literacy contexts to children.

There are several important limitations to consider in this research. While clearly significant, physical dimensions of an educational setting represent only one factor in the definition of a learning environment; the role of the teacher, parent involvement, the curriculum, and program philosophy have a critical influence in providing literacy opportunities for children. This suggests that further research focusing on the role of the adult in enhancing preschoolers' literacy-related play is sorely needed to explore how properly timed interventions may assist and enrich play as a medium for literacy learning. Since internal control and intrinsic motivation are fundamental to the definition of play (Garvey, 1977), such adult interactions must be subtly introduced so as not to disrupt or control the play flow, but to accentuate certain features of the literacy task that are relevant to children.

Further, creating opportunities for literacy engagement is certainly not sufficient to bring about literacy acquisition. This study makes no claim that increased frequency in literacy-enriched play directly impacts the broad array of abilities associated with literacy achievement. In fact, we suspect that the linkage between these settings and literacy learning would be more closely associated with a greater understanding of the functions of contextualized print directly related to the play settings themselves. In a current study, we are examining the effects of literacy-related play in an office area on children's knowledge of functional print associated with working in an office.

Finally, although creating environments for literacy may provide opportunities to engage in these practices, the very nature of play suggests that it is child initiated, spontaneous, and voluntary. Children in this study were free to enter into the literacy play settings or not, raising the issue of self-selection. For example, it could be that the children who may benefit the most from these types of settings will be the least inclined to enter them. This suggests that these play settings represent only one potential route to effective engagement; early childhood learning environments must include multiple routes to literacy interactions.

With these considerations in mind, however, this research suggests that children's functional engagement with literacy objects in play settings may serve an important role in their early attempts to gain power and

control over written language. Through play, children may explore the cultural tools of literacy, making them a functional and valued part of their own experience.

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FOOTNOTES

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¹ A Panasonic Camcorder was used for videotaping. Two table-top cordless microphones and a portable mixer were used for audiotaping play talk. One microphone was centrally placed in the play area and the other hand-held by an observer who moved with the children. The observer also controlled the mixer, which was positioned near the different videotaped play areas.

² Due to differences in the number of literacy-related play frames across sites, all frames from Site A were used for qualitative analysis, while a random sample of frames was selected from Site B.

APPENDICES

Appendix A

Percentage of behavioral units for each speech act or action and type of reference to the literacy object:
Nonintervention group

Object references	Speech act and actions					N ^a
	Requestive	Responsive	Performative	Nonverbal	Total	
Labelling					0%	0
Pretending to read				5%	5%	6
Pronouncing words or letters	12%	12%	11%	7%	42%	47
Exploring			2%	18%	20%	22
Writing				1%	1%	1
Transforming		1%		3%	4%	4
No reference to object	6%	5%	10%	6%	27%	30
Off-task behavior				1%	1%	1
Total	18%	18%	23%	41%	100%	111

^a Number of behavioral units.

Appendix B**Percentage of behavioral units for each speech act or action and type of reference to the literacy object: intervention group**

Object references	Speech act and actions				Total	N ^a
	Requestive	Responsive	Performative	Nonverbal		
Labelling	2%	4%	9%	2%	17%	55
Pretending to read	1%	2%	15%	2%	21%	68
Pronouncing words or letters	1%	2%	2%	1%	7%	23
Exploring	4%	2%	5%	3%	12%	39
Writing	3%	4%	7%	3%	17%	55
Transforming	2%	8%	8%	2%	20%	65
No reference to object	1%	1%	3%	1%	6%	20
Off-task behavior					0%	0
Total	14%	23%	49%	14%	100%	317

^a Number of behavioral units

Appendix C**Summary of representative play frames for intervention and nonintervention groups**

Phase of study and group	Duration	Play frames		Topic of play
		Number of children		
		Boys	Girls	
Preenrichment phase				
Intervention	8 sec.	2		Spelling a word on the typewriter
	9 sec.		3	Reading in the book corner
	39 sec.		3	Flipping pages of a book in the book corner
	112 sec.		1	Reading in the book corner
	300 sec.		1	Reading in the book corner
Nonintervention	26 sec.		2	Pretending to have a picnic and reading a book
	18 sec.		1	Sitting in a chair reading
	109 sec.		1	Reading names of children in the class
	200 sec.		1	Singing the alphabet song in housekeeping corner
	100 sec.		1	Turning pages of a book in the book corner
Mid-enrichment phase				
Intervention	700 sec.		2	Reading books in the library
	1,037 sec.	3	4	Playing mail carrier and writing in the office
	200 sec.	1	1	Reading books in the library
	450 sec.		1	Reading a book in the library
	633 sec.		4	Doing "homework" in the kitchen

(continued)

*Appendix C (continued)***Summary of representative play frames for intervention and nonintervention groups**

Phase of study and group	Duration	Number of children		Topic of play
		Boys	Girls	
Mid-enrichment phase (continued)				
Nonintervention				
	50 sec.		3	Reading in the book corner
	38 sec.		2	Pretending to fall asleep holding a book in the book corner
	53 sec.		2	Showing a friend a paper in the big block area
	102 sec.		2	Pretending that a paper is a "map" in the big block area
	42 sec.	1		Scribbling with a marker in the arts and crafts area
Late-enrichment phase				
Intervention				
	925 sec.	2		Playing with a "magic genie" recipe book in kitchen
	1,032 sec.	2	4	Making and sending valentines in the office
	648 sec.	1	3	Organizing a "show" in the office
	358 sec.		1	Reading a recipe book in the kitchen
	453 sec.	2	3	Writing letters and mailing them in the office
Nonintervention				
	60 sec.		5	Turning pages of a book in book corner
	100 sec.		1	Reading names of the children in the class off the back of carpet squares
	40 sec.		3	Setting up a library for storybook reading
	30 sec.	1		Reading letters off an alphabet chart
	30 sec.	2		Reading letters off an alphabet chart