

Playgrounds at the Crossroads

POLICY AND ACTION RESEARCH NEEDED TO ENSURE A VIABLE
FUTURE FOR PUBLIC PLAYGROUNDS IN THE UNITED STATES

ROBIN C. MOORE

INTRODUCTION

Public playgrounds in the United States have entered a crisis stage in their evolution. They have been criticized as adults' attempts to control children's behavior (Wood, 1977), damned as irrelevant to children's developmental needs (Frost & Klein, 1983), and described by children as boring, hurtful, and anti-social (Moore, 1989a). More often than not, these supposed spaces for healthy child development contain vast expanses of hot, hard asphalt, poorly maintained old metal equipment—oftentimes installed without adequate safety surfaces—water features that have not worked for years, pokey sandboxes without sand, and vegetation—if it exists at all—installed as an esthetic buffer rather than as a play setting (Bruya & Langendorfer, in press). And yet these spaces where children spend so much of their time could very well support educational principles and stimulate child development (Schools Council, 1974b; Sebba & Churchman, 1986).

Poor environmental quality goes hand in hand with a poor safety record. There has been a long history of concern extending back to 1909 when the first soft swing seat was introduced (Frost, 1986). But progress has been slow. Several massive suits in recent years (Sweeney, 1987) have made public officials apprehensive about what they should or should not be providing in the name of playgrounds and very cautious about accepting design innovations for fear they might be defined as "attractive nuisances" in a court of law.

ROBIN C. MOORE • School of Design, North Carolina State University, Raleigh, NC 27695.

The purpose of this chapter is to provide a perspective on the current state of public playgrounds in the United States and to propose research and policy directions to support their improvement as viable places for child development. A frame of reference drawn around children's use of the outdoors and children's right to play is briefly sketched. The main issues current in the field of practice and arising from a review of the empirical literature are discussed in depth. They include playground use, safety, the play value of different types of setting, adventure play, site planning, and the characteristics of settings that support social integration. A national action-research program is proposed. Emphases include play leadership and animation training, the implementation of risk-management models, the use of new media for public education, improvement of designer awareness, and the need for increased public-private partnership. Last, a detailed action-research agenda (Appendix) describes interventions required to solve specific problems associated with the design and development of particular play settings.

CHILDREN'S USE OF THE OUTDOORS

It is a clearly proven empirical fact that children are the major users of the outdoor environment in residential areas of the city (Björklid, 1982; Cooper Marcus, 1974; Moore & Young, 1978; U.K. Dept. of the Environment, 1973). It has been well documented that even in the most constraining environments children will wring the play potential from whatever is at hand: each other, street furniture, parked cars, vegetation, found objects, etc. (Moore, 1986a, 1987; Moore, 1989a). One may argue that developmentally this is the best of circumstances. It offers children a maximum opportunity to explore, to discover, to acquire knowledge of themselves and their surroundings through interactions with what van Vliet (1983) has called the "fourth environment," where they develop that sense of autonomy and self-esteem so critical to individual well-being (van Vliet, 1985).

The problem is that even though children are very resourceful in discovering free-play opportunities, often they are simply not available; or if they are, the perceived physical and social dangers are too great for parents to sanction their use. High-profile news stories about child molestations, attacks, and kidnappings (the large proportion of the latter perpetrated in custody battles) have made parents wary of allowing their children "free range." Social safety is a serious barrier to children's free play. "Fear of strangers" is deep-rooted among parents (Moore, 1986a). In a study of 8 to 12-year-olds' use of the San Francisco Bay Area landscape (Moore, 1980a), when asked the reasons why travel to certain places was prohibited, 27% of the children's replies covered social fears (fear of attack, assault, and kidnap; threats from other children; and nonspecific social apprehension, e.g., "There's a lot of strange people around here.").

We need to know (by analyzing police reports, for instance) how, and in what environments, children get attacked, and by whom. Until countered by more solid evidence, many parents and others directly or indirectly responsible for children will, with good reason, restrict their children's territory.

Physical safety is an equally important and more tangible issue (Wilkinson & Lockhart, 1980). In 1984, 34% of all pedestrians killed or injured in traffic accidents were children under the age of 15 (National Safety Council, 1986). In the Bay Area study referred to above, traffic danger accounted for 22% of the replies stating why travel to certain places was prohibited by parents (Moore, 1980a). In addition to traffic, other physical dangers (fear of water, getting wet, drowning; snakes, dogs, bugs, animals; and miscellaneous other things) accounted for a further 25% of the children's replies.

THE CHILD'S RIGHT TO PLAY

At the very time children are losing many traditional social supports (two-parent households, caregiver at home, proximity to extended family) and suffering restrictions on their free-range opportunities, public playgrounds are threatened with extinction. But children have a basic human right to play. The principle dates back to Jean-Jacques Rousseau's 1762 "charter of childhood" (Whitehead, 1922). In 1959, the right to play was built into the U.N. Declaration of the Rights of the Child, and in 1979, it was elaborated into a comprehensive mission statement (International Association for the Child's Right to Play, IPA, 1979). But implementation has been slow. At last count (Esbensen, 1979), only ten countries had some form of national standard for children's play spaces in the residential environment. The United States was not one of them.

Public playgrounds need to be as diverse, exciting, and accessible as the play opportunities elsewhere in the child's habitat. They must compensate for the restrictions of traffic dangers and parental apprehension and function as a valuable social asset in children's lives. The types of playground addressed here include small neighborhood facilities in residential districts, schoolgrounds, miniparks in new or redeveloped areas, and playgrounds sited in community parks.

PLAYGROUND RESEARCH FINDINGS

Of 34 empirical studies reviewed by Moore and Young (1978), only six related to play areas. Since then, a review by G. T. Moore (1985), focusing on the developmental impacts of play environments, appeared in a volume containing a number of new studies of playgrounds and manufactured equipment (Frost & Sunderlin, 1985). Several more studies have appeared in special issues of *Children's Environments Quarterly* (neighborhoods, 1984/1985; schoolyards, 1986; and safety in outdoor play, 1985). This new work represents a further addition to a knowledge base that is now substantial enough to both support

the development of comprehensive design guidelines and help identify gaps still needing research (Moore, Goltsman, & Iacofano, 1987).

HOW MUCH ARE PLAYGROUNDS USED?

For years, the term "playground" was shunned by many experts in the field because they felt playgrounds were unused facilities—at best irrelevant, at worst detrimental to children's developmental needs. But playground use varies greatly, even in the same community. The Berkeley Park Use Study (Mason, Forrester, & Herman, 1975) compared the use of six minipark sites containing playgrounds and showed a wide variation in the pattern of use, depending on the content and location of individual sites and the socioeconomic characteristics of the user population (Figure 1). The influence of these factors was confirmed by a comprehensive study of playgrounds in Rotterdam (Derickx, 1985), which concluded that "Urban design has a direct influence on the use of playgrounds . . . play equipment only partially determines the use of the site. . . . Identical sites in different circumstances yielded very different data" (p. 28).

Previously reported neighborhood behavior mapping studies (Moore & Young, 1978) indicated anywhere from 2% to 42% of children's outdoor activity taking place on public playgrounds. Schoolyards and playgrounds were mentioned as favorite places to go to in only 9% of the replies by 8- to 12-year-olds interviewed in the San Francisco Bay Area (Moore, 1980a). In Holme and Masie's study (1970), only 5% of Stevenage New Town mothers reported that their children played in the recreation grounds (in contrast to the 64% who reported garden play and 21% who reported street play). A study by Becker (1976) showed an average of 15% for playground use, with high values of 36% to 40% in four lowrise, multifamily developments in New York State.

More recent behavior-mapping studies, by Francis (1984/1985) and Björklid (1982), confirm these variations. Francis' study of Village Homes indicated only 4% activity on a playground that had been developed with prolonged community participation—reflecting the many other play options available in this innovative Californian suburban development. In contrast, Björklid's study of two Stockholm housing estates showed high levels of use for playgrounds adjacent to the Tanto Estate blocks (29% to 39% for girls aged 0–15) and even higher use levels for the adjacent playpark (33% to 45% for boys aged 7–15). These results suggest that children are much more dependent on public playgrounds in built-up urban areas because neighborhood play opportunities are more limited or inaccessible.

A similar conclusion was reached in a study of British children's favorite places. Playgrounds and schoolyards were the second most frequently mentioned item in children's drawings (Moore, 1986a). Some of the public playgrounds were in fact highly valued and were particularly well used when alternative options were limited. In a district like central London, even poor-quality traditional playgrounds served as important gathering places. When easily accessible to children's homes, play facilities were well used if they of-

fered a choice of settings. Playgrounds located in parks were especially popular because they were used in conjunction with other park settings: trees for climbing, water features, monuments, flower gardens, and wildlife (Moore, 1986a).

HOW SAFE ARE PLAYGROUNDS?

Several well-publicized cases of death and serious injury in playground accidents, massive awards to the plaintiffs, and an independently developing liability crisis, have brought the issue of playground safety to the forefront (Sweeney, 1987). City officials, staff, designers, manufacturers—all those involved in the provision and staffing of children's playgrounds—are apprehensive. But part of the apprehension has been bred from a lack of information describing both the general and detailed picture of playground safety.

A more accurate picture is needed of playground injuries compared with injuries in the child environment as a whole. In 1984 (National Safety Council, 1986), 4,300 accidental deaths occurred to 5- to 14-year-olds in the United States (a rate of 12.7/100,000 population). Of these, 2,300 (6.8/100,000) were motor-vehicle related (and of these, 1,070, or 3.2/100,000, involved pedestrians); 1,100 (3.2/100,000) occurred in the public environment but were not vehicle related; 800 (2.4/100,000) were home related; and 100 (0.3/100,000) were work related. In 1975, it was estimated that 23 children were killed on American playgrounds during a 15-month period (U.S. Consumer Product Safety Commission (hereafter USCPSC), 1975, cited in Sweeney, 1979), or approximately 18 per year. In other words, the chances of being killed at home or in the street as a pedestrian are roughly 45 to 60 times greater than the chance of being killed on a playground. Motor vehicles as a whole are about 125 times more lethal than playgrounds.

Narrowing the scope of the safety issue to school environments, where children spend the most amount of time, what is the comparative safety record of play settings? The National Safety Council (1985), reporting on 15,000 K–12 accidents for 8,600 school jurisdictions for the 1983–1984 school year, quoted rates per 100,000 K–6 student days as follows: equipment-related accidents, 0.42; ball playing, 0.18; running, 0.31; and miscellaneous accidents (including those on walls, fences, steps, and walks), 0.54. The rate for all school-related accidents for grades K–6 was 4.92. The rate for all building-related accidents was 1.40 while for physical-education-related accidents it was 1.04. In other words, equipment-related accidents accounted for about one-tenth of all accidents in the school environment and were less than one-third as frequent as accidents inside the school building (i.e., on stairs, with lockers, in classrooms, auditoriums, washrooms, and toilets). These data tell us that schoolyard play equipment is certainly a significant source of injury, but so are many other school settings.

What do we know about the characteristics of playground accidents? In Australia, they include impalement, laceration, fractures, amputation, crushing, suffocation, dental damage, blindness, ruptured spleens, and kidney damage. Many could be prevented through improved setting design and manage-

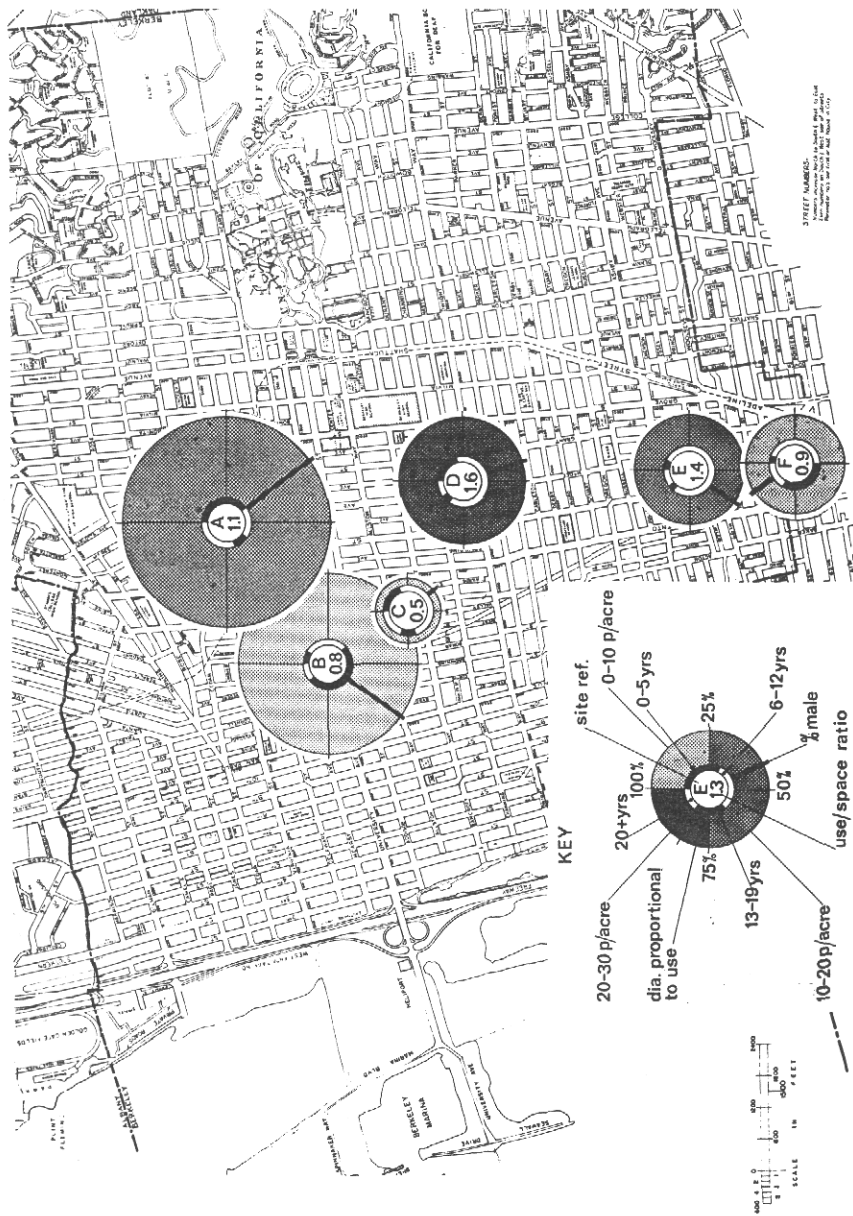


Figure 1. Variations of use profiles of miniparks in the same community. Behavior-mapping data were gathered over a 12-month period (1974-1975), for six mini-parks located in Berkeley, California (population, 100,000), in neighborhoods of similar population density and housing type but varied social characteristics. Although the sites were similar in size (0.15-0.43 acres), a variety of user groups and a wide range of use levels were indicated. In all the parks, use by children and adolescents predominated; in all but one (A) by more than 75%. In three of the parks (C, D, and E), 6- to 12-year-olds were dominant. Park A was fenced and had facilities specially designed for families with preschool children; hence the high proportion of 0-5 and 20+ age groups.

Three of the parks (A, C, and D) had more female than male users; in park A, this was because of the large number of mothers accompanying their children. In the other two cases, female dominance lay in the 6-12 age group, reflecting the value of close-to-home spaces to girls who, as shown in many research studies (Moore & Young, 1978), have a more restricted territorial range than boys. The male dominance in park F is explained by the presence of a basketball semicourt and its location in a predominantly black area of town.

The two smallest sites (D and E) were the most efficiently used, with the highest use density and use/space ratios (1.6 and 1.4 respectively). Effectiveness of the other sites varied considerably, with use/space ratios ranging from 0.5 to 1.1.

The analysis shows that each park has a distinct use profile, reflecting the physical content of the park and the characteristics of the surrounding population. These data give a standard of comparison for the diagnosis of each site, resulting in implications for site modifications and program changes, and acquisition criteria for new sites (source: Mason *et al.*, 1975).

ment (Root, 1983). The National Electronic Survey System 1978 figures used by USCPSC (Rutherford, 1979) highlighted the fact that 71% (66,000 of 93,000 reported cases) of public playground equipment-related injuries to under-10-year-olds resulted from falls, with half being head and neck injuries; 55,000, or almost 60% of the total, were direct falls to the surface.

The results of a two-year study in a large U.S. urban school district (Boyce, Sobolewski, Springer, & Schaefer, 1984), indicated that 23% of school injuries were related to play equipment, with about one-fourth being considered severe (concussion, crush wounds, fractures, and multiple injuries). Almost 60% occurred on climbing equipment. Rutherford (1979), citing injury estimates by type of equipment, showed climbers leading (42%), followed by swings (23%), slides (16%), merry-go-rounds (8%), seesaws (5%); with all others accounting for 6%. A New Zealand study (Langley, Silva, & Williams, 1981) indicated 21% of all school accidents (48% of these resulting in fractures) as falls from playground equipment, predominantly climbing structures. Even though these data are more than ten years old, and safety surface treatments have surely improved during this period, the figures still indicate that falls and safety surfacing are priority safety issues.

Until 1981, there were no acceptable national safety standards available to protect either the consumers or the designers and manufacturers of play equipment. After six years of work, the USCPSC (1981) published a two-volume report that has become the source of prevailing industry standards. However, the perspective of the reports is limited to a narrow range of issues, dealing only with play equipment design and installation. At this point, the guidelines are in need of revision and expansion, now based on several years of application. More detailed information is needed on playground accidents.

PLAY SETTING STUDIES

Investigations of play settings through observation, interview/questionnaires, and drawings or mental mapping are the most effective means of producing results that can be used to upgrade play-setting design guidelines to meet developmental objectives. Examples include a study of physical changes on a schoolyard (van Andel, 1986), a study comparing adventure playground behavior with neighborhood settings (Moore, G. T., 1985), and Hayward, Rothenberg, and Beasley's (1974) classic study comparing user responses to three different types of playground environment. These they termed "traditional" (typical schoolyard play equipment area with swings, slide, jungle gym, etc.), "contemporary" (professionally designed, supposedly with children's needs in mind), and "adventure" (no adult-provided permanent play structures, but instead loose materials and simple tools for children to build their own play settings).

The results clearly demonstrate differences in user-environment interaction between the three sites, especially differences between the adventure playground and the other two sites. Setting records show that the five most time-consuming activities on the adventure site were playing in clubhouses (31 min-

utes average duration per occurrence), followed by building and "fixing-up" the clubhouses, passive activity, and talking. On the contemporary site, top activities were play on multiple equipment (11 minutes per occurrence), followed by arts and crafts, water play, games, and sand play. On the traditional site, the top activity was swinging (8 minutes per occurrence), followed by water play, arts and crafts, connective play, seesawing, and general play. The authors conclude that "the opportunities and constraints of the physical environment may be seen to predict the majority of predominant activities" (p. 154).

PLAY VALUE, DIVERSITY, AND DESIGN

These results, pointing to the developmental benefits of setting diversity, are reinforced by a study by Campbell and Frost (1985), who coded behavior for developmental impact in a comparison of traditional and contemporary playgrounds. Three times the amount of constructive and solitary behavior occurred on the latter because of the presence of a wider diversity of equipment and materials.

A common argument against diversity equates it with chaos, or with placing the burden of an overwhelming number of choices on the child. But this concern is not reflected in research findings, and in any case overlooks the way in which children's play patterns in space and time are moderated by access. Diverse landscapes cannot be experienced all at once. They become progressively disclosed, over periods of time—years in some cases—at many levels of detail, through many seasons. Space-time sequences become gradually embedded in memory (Boulding, 1956; Moore, 1986a) as they are trodden on the ground. Diversity broadens the repertoire of possible behaviors as well as allowing for the simultaneous playing of individual children with different needs.

Besides expert opinion and practical site considerations, design decision making can be based on play value (measured by developmental objectives, user feedback, and preferences). Some work has been done using developmental objectives to guide the design of settings (Moore, Cohen, Oertel, & van Ryzin, 1979; Verkerk & Rijmpa, 1985), but we are far from being able to compare the developmental effects of a full range of settings. To be more effective, the developmental approach needs to be informed by children's preferences based on the results of empirical investigations of settings in use (Hayward *et al.*, 1974; Moore, 1980b, 1986b, 1986c). Direct measures of play value derived from behavior mapping, questionnaires, and mental mapping can be applied in design programming decisions so that intelligent tradeoffs can be made between play value and the dollar costs of installation and projected maintenance, for example, trees and vegetation compared with manufactured equipment.

A behavior-mapping study of the Environmental Yard (Figure 2) (Moore, 1978a, 1986b) identified 58 individual behavior settings ("activity places"), grouped into 10 major types of settings ("behavior-environment ecosystems") and three primary zones. The results (Table 1) show a range of preference across

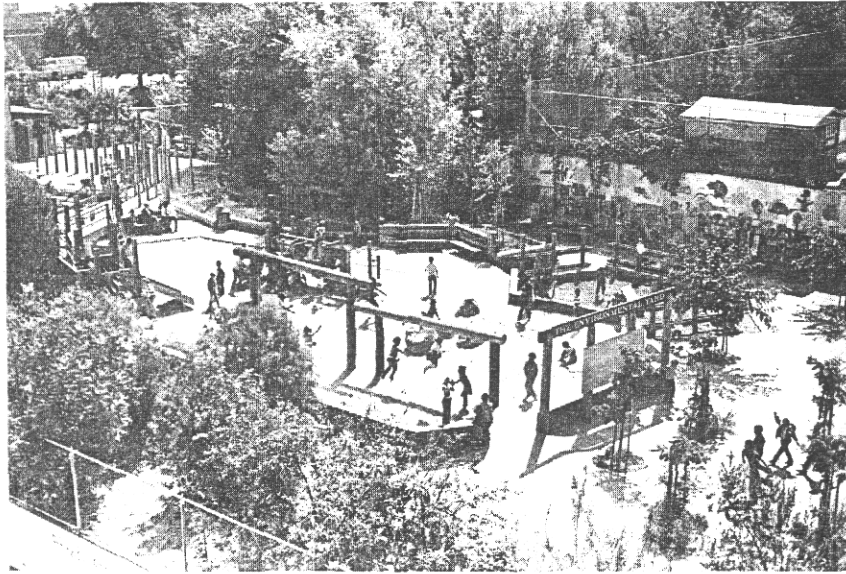


Figure 2. The Environmental Yard, Berkeley, California (founded 1971; photo by author, 1982), looking from the top of the school building across the central community play area to the natural resource area in the rear.

settings. The amount of use was not in direct proportion to size of settings, however; therefore the *density* of setting activity varied greatly (Figure 3), showing that it was not an accurate indicator of play value. Fixed play structures and manufactured equipment settings were the most densely used, whereas densely vegetated and asphalted settings were least used (Moore, 1986b).

Methods of assessing children's preferences include the use of questionnaires and so-called mental mapping (Moore, 1975, 1986b). The latter reveals the broadest range of setting impacts and is therefore the most useful in assessing the aggregate value of variables such as "nature" (biotic characteristics; Moore, 1986b).

SITE PLANNING: PATTERNS OF ACTIVITY IN TIME AND SPACE (PATs)

The spatial pattern of use can be misleading because it does not reflect the space-time dynamics of individual and small-group behavior. In an attempt to document this aspect, nine patterns of activity in time and space (PATs) were observed on the Lenox-Camden site and described along dimensions of territorial range and mobility (Moore, 1974). At one extreme were "concentrated foci" of intense activity in very limited spaces, for example, small-group social interaction, and play on single items of equipment. At the other extreme, were "expansive flowing" games of chase that occupied the whole site.

TABLE 1. USE/SITE RATIOS FOR THREE PRIMARY ZONES AND TEN PLAY SETTING TYPES FOR A RECONSTRUCTED SCHOOLYARD^a

Percent use, percent site, ratio	Percent use, percent site, ratio	Percent use, percent site, ratio
	Primary zones	
Natural resource area 38%, 33%, 1.2	Main yard 33%, 23%, 1.4	Asphalt 29%, 44%, 0.7
	Play setting types	
Structures 11%, 4%, 3.0	Structures 4%, 7%, 2.2	Ball play areas 17%, 26%, 0.7
Aquatic 9%, 6%, 1.7	Edges 12%, 13%, 0.8	Circulation/games 12%, 20%, 0.6
Pathways 6%, 5%, 1.1	Traditional equipment 7%, 3%, 1.9	
Densely vegetated areas 6%, 8%, 0.7		
Meadows 6%, 8%, 0.7		
100%, 100%, 1.0	100%, 100%, 1.0	100%, 100%, 1.0

^a Based on behavior mapping data collected at the Environmental Yard, Spring 1977.

The validity of these patterns was further supported by tracking studies conducted at the Environmental Yard, showing a wide range of individual PATs (Figure 3). Some children confined themselves to an intensive involvement in very small areas; others ranged over the broad terrain during the same time segment.

The variety and complexity of these patterns of play calls to question the simple notions of play behavior that designers often apply to the physical form of playgrounds. This is one area of design where environmental determinism has no hope of succeeding. Functional, site-related issues (size, shape, orientation, drainage, existing vegetation, location of utilities, circulation, etc.) need to be considered, together with the predicted behavioral consequences of alternative setting configurations, so that the designer can make informed programming tradeoffs. Simplistic conventions used to "zone" playground sites into so-called "passive" and "active" or age-segregated areas are likely to fail. Indeed, the idea of zoning by age is unrealistic and unnecessary according to expert opinion (Moore *et al.*, 1987), except *maybe* for preschool ages and certainly for infants and toddlers. Any public playground that rigidly segregates ages will run into problems because older siblings are responsible for younger sisters and brothers and "best friends" often play in mixed age groups (Moore, 1980a, 1986a).

WHAT IS THE PLAY VALUE OF ADVENTURE PLAY?

Considering how strongly adventure playgrounds have been promoted in the last 40 years, there is surprisingly little empirical research to complement

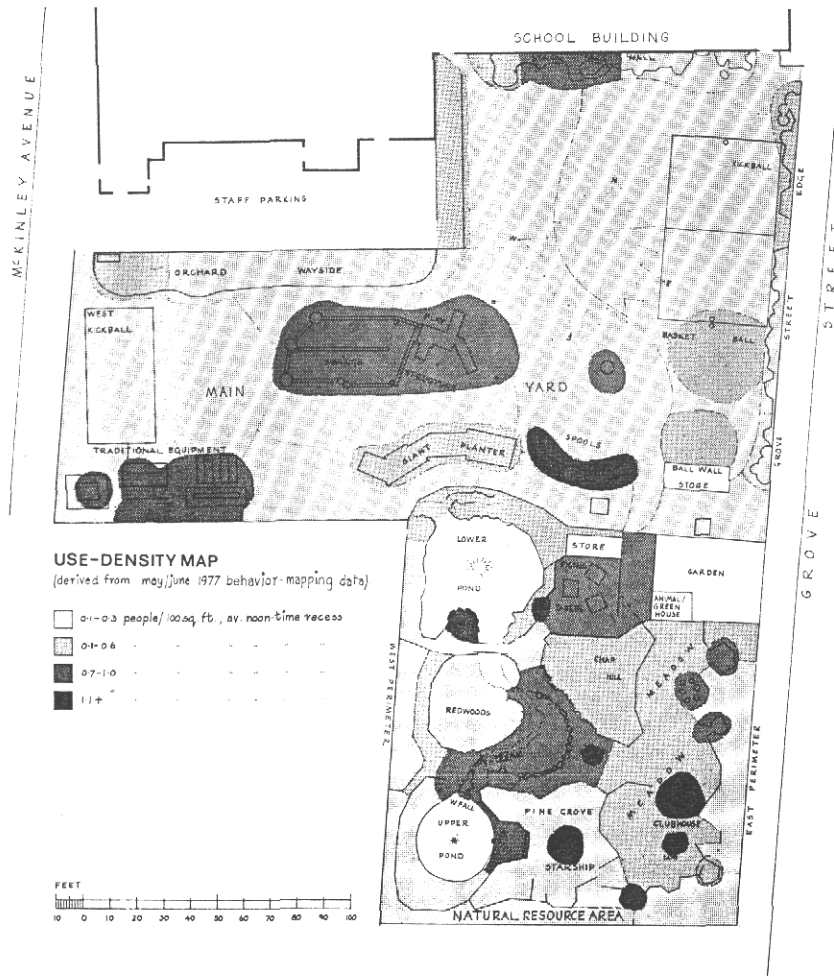


Figure 3. User density recorded during noontime recess on the Environmental Yard.

the substantial anecdotal literature (Balmforth & Nelson, 1978; Bengtsson, 1972; Benjamin, 1974; Lambert & Pearson, 1974; Petersen, 1985; Shier, 1984; Sutherland & Soames, 1984).

The empirical cupboard is not entirely bare, however. In addition to Hayward *et al.* (1974), G. T. Moore (1985) investigated the relationship between physical setting and developmental impact by comparing behaviors on an inner-city adventure playground with those occurring in the surrounding neighborhood. Twenty-six different behaviors were mapped in 31 different types of setting. A marked difference between the two environments was that

40% of cognitive play behaviors occurred on the adventure playground, compared with 10% in the neighborhood settings. Moreover, two to ten times the amount of fantasy, constructive, and cooperative play occurred on the adventure playground. On the other hand, there were more mixed-age and mixed-gender groups in the neighborhood settings who engaged in more social play. A further interesting observation was that adults in the adventure playground participated more by observing and interacting with the children (as Cooper, 1970, discovered), whereas in the neighborhood settings, adults exhibited more supervisory and controlling behavior.

Hayward *et al.* (1974) showed that adventure playground activity was quite different from the traditional and contemporary sites and focused to a large degree on building, fixing up, and playing in and around the clubhouses. Because the site could change and evolve over time according to the children's interests, it contrasted strongly with the permanence of the other two sites. Children who named the adventure playground as their favorite, said it allowed them freedom to do what they wanted.

The contrast in diversity of opportunity and experience is illustrated by differences in the children's conversations recorded at the three sites:

The overwhelming majority of conversational excerpts and topics at the traditional and contemporary playgrounds focused on aspects of equipment use and mutual play activities. . . . At the adventure playground, in contrast, children's conversations did not reflect a narrow focus on the immediate setting. Rather, the conversations dealt with building materials, mothers, dreams, marriage, seasons, fighting, spelling, clothing, house cleaning, and a host of other topics. (p. 156)

These findings mirror those of an earlier action-research study of the Lenox-Camden Playground, Boston (Moore, 1966, 1974), using play setting records. Lenox-Camden was not an adventure playground in the European sense because it lacked properly trained leadership; neither did it support large-scale hut building. Nonetheless, a diversity of loose play materials and objects was provided to compare the effects of fixed and manipulable settings on children's play behavior.

Adventure play was defined as any activity using loose materials. The proportion of children engaged in such activity at any given moment varied between 3% and 66%, with an average for all observation periods of 27% (Moore, 1974). Typical durations of adventure play ranged from a half to one hour and sometimes several hours (compared with a few minutes for equipment play). One of the more elaborate examples was spread over three days (reported by Moore, 1974):

On the first day, a small group of eight to 12-year-old boys spent an hour building two clubhouses and another couple of hours playing in and around them, adding to them, and just sitting inside talking—dreaming up imaginary situations, like being in the middle of a jungle. Finally, they smashed what they had built with energetic pleasure.

The second day I arrived to find a "Pepsi cart" constructed on a large wooden pallet in the same vicinity. A "milk-truck" was under construction, suggested

by the milk crates. The constructions were done in beautiful detail, complete with "levers," "head lamps," "wheels," "seats," "steering wheels," etc. Group imagination was flowing the whole time, the group growing in size (mostly boys), the younger members following behind, taking "orders" from the older members. Then for a long, long time the kids "drove" the vehicles, delivering milk and Pepsi, chatting to the "store-keepers" and "housewives," negotiating hazards on the highway—encountering "lights," "cops," "steep hills"—acting-out spontaneously scripted episodes from their perceptions of every-day adult life.

The third day saw the addition of two "motor-bikes," a "car," and a "club-house," again involving large group fantasy play. During the complete three-day period one 12-year-old boy maintained leadership of the group (which continuously changed members) for much of the time, directing action and contributing ideas.

Construction activity died down during the next four days—then started up again, the same boy leading. This time two "battleships" were built (two hours). Then followed a long period (three hours) of fantasy play centered around the ships with the two "crews," two "captains" and a "commander," acting out their conception of life on board ship—"sailing orders" from the "bridge," "sea-battles," "eating," "going to sleep," etc. About an hour was spent with the captain "drilling the crew," giving orders, getting them lined up, being saluted. Much of this activity occupied the whole 30' x 40' area behind the playhouse. The kids still imagined they were "on board," although in reality they were standing several yards from their "ships." Later on, one of the ships was smashed in battle and became replaced with a "hide-out." The play turned to "soldiering" and finally ended with a game of "combat" taking in the whole playground. This final sequence of events lasted about eight hours—a rich flow of imagination and expressiveness, truly wonderful to witness. (p. 131)

These observations, along with those of G. T. Moore (1985) and Hayward *et al.* (1974), reflect the deeper meaning of the open-ended, child-managed setting of the adventure playground, and its close relation, the urban farm (Boehm, 1980), and support an interactional-ecological, environmentally based theory of play (Björklid, 1986; Moore, 1986a). This suggests that development through play results from the child's interaction with the total physical, social, and cultural environment and that different types of settings support different types and amounts of developmentally related behaviors. A major implication of this theory points to the importance of physical and social diversity in play settings (G. T. Moore, 1975). For Petersen (1985), Danish adventure playgrounds (Figure 5) best illustrate this concept of the play environment as a developmental setting for childhood and culture:

To get the chance to discover oneself, not only as a biological being but as a cultural one and not only as an individual but also as a part of a totality bigger than oneself, is a fundamental right for every human being. Without this possibility, culture ceases to exist. For a child it is a question of discovering himself or herself by doing something with hands and imagination. The child has to gain . . . personal experiences, not by being taught by others, usually grownups. This is the challenge and the answer for the child. But the "classical playground" does not provide . . . for handling basic elements like fire, water and earth or for creating something of one's own out of raw materials such as wood, stone, clay and soil. It does not offer possibilities for contact with plants and animals,

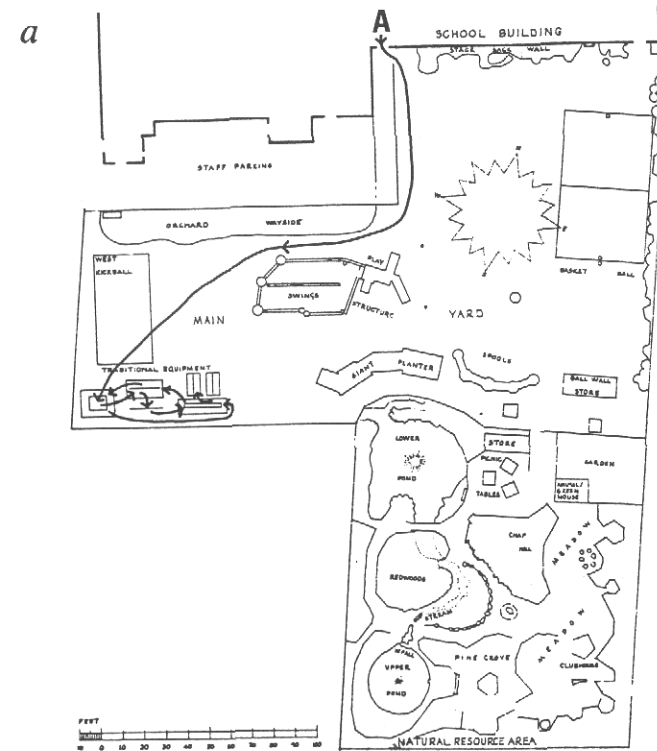


Figure 4. Individual differences in Patterns of Activity in Time and Space (PATs). Children were "tracked" during noontime recess (30 min) on the Environmental Yard (1977). Following are three contrasting examples illustrating the wide range of individual behavior of the 8-year-old users:

a. Traditional Equipment. Child A goes to the monkey bars, hangs upside down. Goes to rings, hangs, holds on with two hands, talks to friends. Goes to pole, holds on and twirls around. Goes to bars, climbs up, hangs and swings. Drops to ground. Goes to other side, climbs up, swings while going across. Goes to rings, then to monkey bars. Does a trick. Puts hands on ground, leans over lowest bar. Stands up, looking at kids playing. Does trick again on other side. Joins friend on same bars. Climbs and talks to her. Swings on bars. Laughs and smiles. Goes to rings again. Goes across swinging. Comes over to me [observer], puts flower in my hair. Goes to low bars, swings. Leans on bar, watching kids on other bar. Turns upside down, staying there a second, then swinging over. Repeats it several times. Talks to a girl, swings some more. Watches a girl do a trick, going around with one leg. Tries it. Gets stuck. Watches girl run up to bars going round fast. Keeps going around. They play "monkey tag" (the person who is "it" is a monkey). Bell sounds.

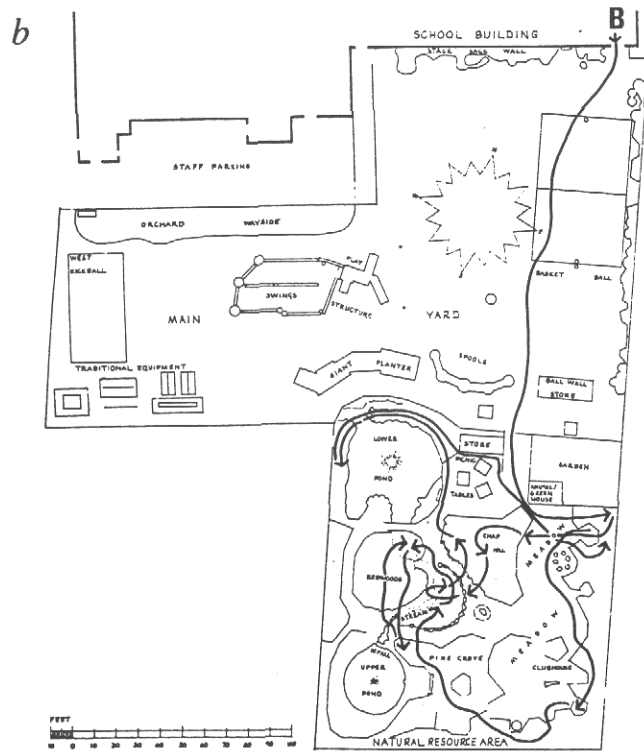


Figure 4 (continued)

b. Wandering, Vegetation Play. Child B walks to eucalyptus tree in NE corner of Natural Resource Area, plays with friend (another girl). They walk out of trees to fence by chaparral, stand by fence and talk, climb over fence and up chaparral hill. Walk to top, then down to beach. Jump over river together. B runs away, the other follows. They return to chaparral.

B picks a flower. Talks about how it looks like a tooth. Says "ow, that's my tooth!" Picks leaves off an acacia tree. Sits on fence with the same friend. Holds hand to mouth pretending to have toothache. Puts arm around friend. Holds up flower—says "an ant just crawled out—it's an ant house!"

They walk around lower pond. Stand on path. Walk back over rocks. Stand by dead tree. Walk back along path towards tables. Talk about how a witch lives on the island in the middle of the pond. Walk to picnic tables. Follow each other back to eucalyptus tree. They look at some playing cards together. Walk towards pine trees, return. Sit on branch of eucalyptus. Friend stands up, tries to clear ground of leaves with foot. Helps B off of branch. They wander to Corral #1, climb through fence.

B picks plants, shreds them. Walks toward clubhouse, past it to Corral #3 in corner. Fashions some grasses into a bouquet. Walks along fence edge toward sitting platform, picking plants along the way. Walks past railroad ties to trees by beach, making bouquet all the while. Picks pussy willows. Stands on ground while friend stands on fence trying to pick them. Adds pussy willows to bouquet. Stands on stepping stone. Picks more grasses. Walks toward upper pond, picks a flower. "Come over to me," she says, "we're going to give this [bouquet] to our teacher." Walks back to pussy willows. Comes over to me [observer], gives me a pussy willow. Picks more grasses. Walks back toward me, toward railroad ties, then back to the big rock. Picks more flowers. Bell sounds.

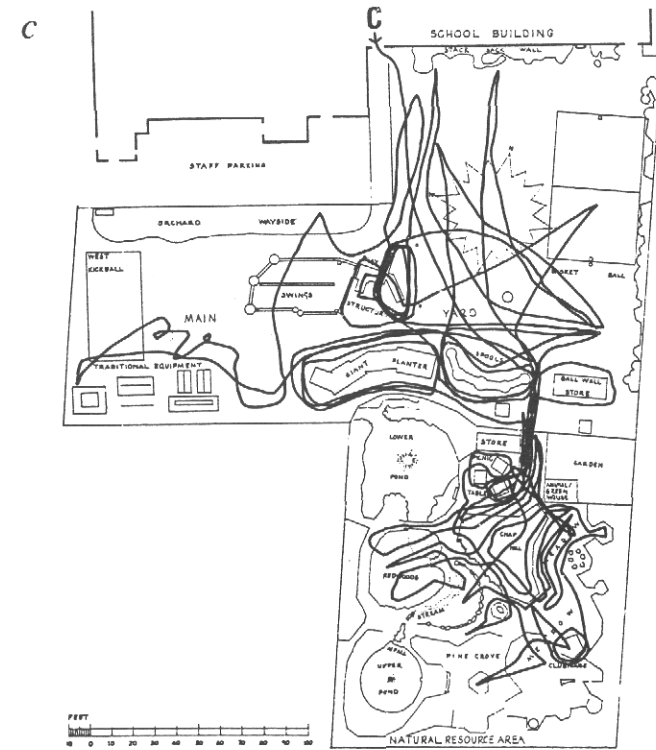


Figure 4 (continued)

c. Chase! Child C represents an extreme example of chase, tag, and hide-and-go-seek behavior ranging back-and-forth all over the space. There were many variations in the complex environment of the Yard.

not just in affectionate play but in situations demanding care and responsibility. And it does not provide many situations for building up a constructive comradeship where the desired goals are attained through cooperation, and life as a whole functions by virtue of mutual consideration. (p. 202)

WHAT TYPES OF PLAY SETTING SUPPORT SOCIAL INTEGRATION?

Socialization is an important function of children's play, and interaction between girls and boys is a critical aspect of socialization. Detailed behavior-mapping studies at the Environmental Yard (Moore, 1980b, 1986b) indicate that some types of settings tend to be segregated and others are integrated by sex (a conclusion also reached by Rijnen, 1985, in her study of Rotterdam playgrounds). Traditional equipment was almost exclusively used by girls; ball play on the asphalt was almost entirely engaged in by boys. Swings were dominated

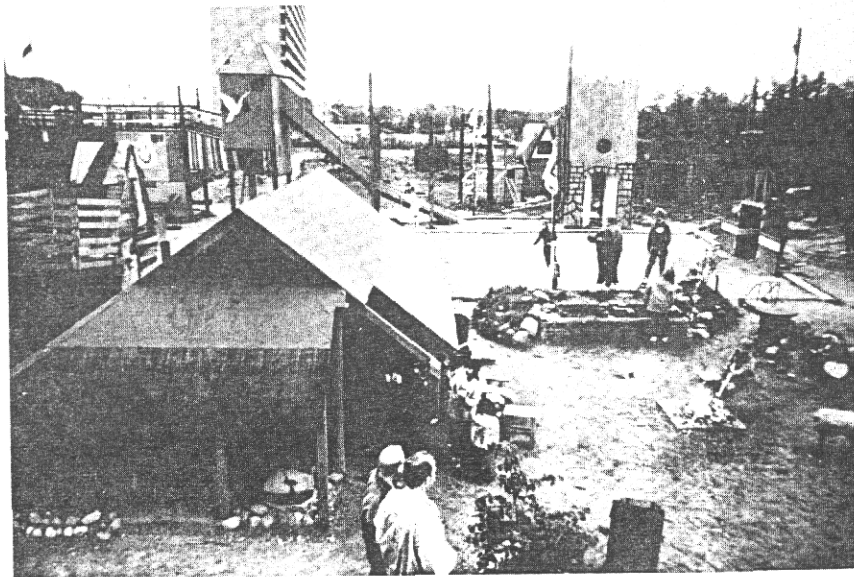


Figure 5. Bispevangens Adventure Playground, Copenhagen, Denmark (photo by author), is an example of the classic adventure playground. It is an active social center for all ages, with meeting rooms, kitchen facilities, a childcare center, and youth club. Animals of many types are to be found there, cared for by the children. Opportunities for "building play" abound. There are fireplaces, water play areas, and permanent play structures. The whole facility is managed by a team of play leaders.

by girls, climbing structures by boys. Behavior-mapping data converted into sex/use ratios show the pattern of these differences and indicate more integration by sex in the natural resource area of woodland, meadows, and ponds (Moore, 1986b). Play-setting observations in this area indicated many examples of play in groups mixed not only by sex but by age and ethnic background as well (Moore & Wong, in press).

Children can create their own world in natural settings (Olweg, 1986). In so doing they in effect support their own development (Hart, 1987). In a study of the impact of environmental diversity on social/emotional behavior, primary-aged children were asked to compare their feelings about a traditional schoolyard playground with their feelings for the site after it was reconstructed (the Environmental Yard). The addition of natural resources to the new site received the most positive comments (Moore, 1989a).

Natural materials that are alive, ever changing and renewing themselves, have very high play value. They stimulate imagination and fine-muscle coordination through play with vegetation parts, sticks, and dirt. They engage children in problem solving when making clubhouses from natural materials. They

support large-muscle activities though games like hide-and-go-seek played among bushes and weeds and in climbing rocks and trees.

The way children describe natural play settings as being alive (Moore, 1986b) illustrates something very deep and universal (Cobb, 1977), unavailable in other settings. Biotic settings powerfully impact children's untarnished senses, stimulating the creation of a world of fantasy and delight that knows no boundaries of mind or spirit (Moore, 1989b). Nature has this unique power because of its special content and process. Interactions with nature transport the child through her or his imagination to another state of being, where the world is presented as an open environment, one the child must understand and redefine for herself or himself. This life work provides a powerful opportunity to develop our humanity and sense of oneness with nature—it helps guarantee the future of our planet.

INTEGRATION OF CHILDREN WITH DISABILITIES

Passage in 1975 of Public Law 93-142, the Education of All Handicapped Children Act, which included recreation as a related service, paved the way for parents to demand integrated recreation facilities and programs for their children. The integration of children with disabilities into play settings allows them to gain the developmental stimulation of prolonged contact with able-bodied children instead of being segregated with other disabled children and special education staff. In integrated play settings, child-to-child interaction helps the able bodied discover that the disabled are basically children like themselves (Iacofano, Goltsman, McIntyre, & Moreland, 1985).

To what extent do children with disabilities have special environmental needs? This question has attracted a scatter of research interest (Duncan, Calasha, Mulholland, & Townsend, 1977; Schneekloth & Day, 1980; Shaw, 1987; Moore *et al.*, 1987; G. T. Moore *et al.*, 1979). The most promising broadening of this existing knowledge base will come from the three-year project conducted by Roger Hart and associates at the Playground for All Children, New York.¹ The main thrust of their work has been to consider the full range of disabilities in a public playground purposefully designed to meet the needs of all children and to encourage integration. Results have yet to be published.

Valuable development work has also been done, for example, by Adaptive Environments in Boston, the Playing and Learning in Adaptable Environments program in Berkeley, California, and the Handicapped Adventure Playground Association (1978) in England.² But their orientation is toward the higher priority of demonstration, advocacy, and training rather than empirical environmental design research.

¹ Children's Environments Research Group, Environmental Psychology Program, 33 West 42nd Street, New York, NY 10036.

² Adaptive Environments, Massachusetts College of Art, 612 Huntington Avenue and Evans Way, Boston, MA 02115-5801. Playing and Learning in Adaptable Environments, 1824 A Fourth Street, Berkeley, CA 94710. Handicapped Adventure Playground Association, Fulham Palace, Bishops Avenue, London SW6 6EA, UK.

One of the reasons for a lack of research interest is the sheer complexity of the issue. The range of disabilities is vast. Many are rarely seen. A national seminar of design educators held in 1982 concluded that if designers cared enough about the needs of people in general, the special needs of people with disabilities would not need so much attention (Ostroff & Iacofano, 1982). There is a very real question concerning the extent to which physical settings can be permanently modified to accommodate the vast array of possible needs, versus relying on day-to-day management to make temporary modifications and adaptations as the need arises. The latter demands more staff understanding and involvement, and more staff effort, but it is an infinitely more feasible strategy. Hence there is a need to train staff (playleaders, teachers, parents) to also be environmental managers (Moore *et al.*, 1987; Ostroff, 1978).

FUTURE DIRECTIONS FOR RESEARCH AND POLICY IN THE PLANNING, DESIGN, AND MANAGEMENT OF PUBLIC PLAYGROUNDS

Public playgrounds are at a crossroads in their evolution. Either they will become more and more irrelevant to the needs of contemporary childhood, less and less used, and finally abandoned altogether, or they will change radically to become significant child development sites and a vital aspect of local community life.

There is a growing literature supporting the idea that playgrounds can be an important factor in child development (Frost & Klein, 1983; G. T. Moore, 1985; Moore & Wong, *in press*). They are an important local resource where people can come together to share, reflect on, and create a common culture, to give their lives meaning and significance. Playgrounds have a respectable social history (Eriksen, 1985; Rainwater, 1922) and in a different form could be part of a new movement toward social integration and family support. To fulfill this promise, the physical quality of playgrounds must be improved through action-research-driven design. Safety issues must be counteracted through risk management and better information about accident prevention.

A NATIONAL ACTION-RESEARCH PROGRAM

A national program, Play For All, was launched in 1985 to establish a dialogue between the researchers, providers, designers, and manufacturers of children's environments. This culminated in 1986 in a working conference of more than 130 experts at Stanford University and in the publication of the *Play for All Guidelines* (Moore *et al.*, 1987) targeted toward the practical needs of designers, manufacturers, and managers of public play environments.

The Stanford Conference identified a program of design action-research needed to improve the physical quality and play value of specific types of play settings (Appendix). Until some of this work is carried out and the results presented, decision makers will find it difficult to make innovative choices and

will fall back on conventional wisdom with its overemphasis on fixed, manufactured equipment. Hopefully, the play equipment industry will expand its vision, realize that manufactured equipment is but one part of the picture, and become involved in developing other types of settings.

PLAY LEADERSHIP AND ANIMATION TRAINING

A new type of specially trained professional is needed in our nation's playgrounds. Free play provides children with the first essential steps of exploration and discovery—the building blocks of child development and culture. But to take the process further requires adult intervention, to remove inhibiting barriers and to extend the full developmental potential of the play process. The usual adults in this process are of course parents. But in many industrialized countries, because of factors such as both parents working and the increase in single-parent families, caretaking has been shifting to other professionals working in daycare centers, afterschool facilities, libraries, hospitals, playparks, and playgrounds. In her study of Stockholm housing estates, Björklid (1984/1985) concludes that the playparks with their playleaders and organized programs satisfied needs that could not be provided at unsupervised playgrounds.

Playleaders are different from teachers, parents, or conventional recreation leaders (Miller, 1987). In essence, they have the ability to interact with children at their own level in the most open "pure" spirit of play as an end in itself—whether at home (parents as playleaders) or in any other place where children gather. Play leadership covers the short-term organizing of activities by and with children. Nothing tangible need be produced except enjoyment for its own sake, the free movement of mind, body, and spirit. The principal measures of success are smiles and laughter. Results are indeterminate. On the other hand, productions (performances, artifacts, structures, stories) do occur because children like to have a sense of accomplishment, and it is healthy for their self-esteem.

Animation extends the spirit of play into a deliberately specified cultural frame, one created by playleaders or "animators" in response to particular circumstances of space, time, and culture. Animators use play as a tool to change behavior, perceptions, and attitudes. In this sense, animation can be considered an art form, using the movement, life, and vigor of play to achieve a social purpose, to create situations that children can take over themselves. As "enablers" or "facilitators," animators help children learn how to make their own decisions. Initially, they act as catalysts, but in the long run the idea is to make the animator redundant, as young people achieve decision-making skills and autonomy.

Animators assume play to be the raw material of education—helping children to express, apply, and assimilate experience in personal and community life, and to accommodate concepts about the world to their new experience. Themes range widely, from peace education to converting a playground into a temporary circus or making it into a living stage where child-scripted works

can be presented. There are no limits to the possibilities (Westland & Knight, 1982).

Animation is a very international field.³ Animators usually have backgrounds in theater, education, and design. They are able to draw the community into a political realm—not power politics, platforms, and speeches, but a more gentle, indirect rhetoric communicated through artistic expression. Important social products include development of solidarity and organization, which then helps the community work toward more explicit political ends (Fritid Stockholm, 1987).

Part of the job of an animator is to set up, manipulate, and modify the physical environment in order to facilitate creative, culturally relevant activity. Many times it is conducted on a temporary, short-term basis, day-to-day, often at lightning speed. It must be sure-footed to succeed. That is why designers sometimes make good play leaders and play leadership trainers. Designers must learn to design settings to support creative, effective leadership. Play-leaders must learn to be environmental managers. Effective play leadership can be either greatly facilitated or greatly hampered by the form and content of the physical setting (Moore *et al.*, 1987). Compensating for inadequacies in the physical environment is extremely demanding on leaders and takes too much of their time and energy.

A better understanding of the relationship between design and leadership will result from detailed action-research documentation of the day-to-day workings of animated settings. Children's play in the United States must move away from an overemphasis on physical setting, which in its most extreme form is a piece of equipment unloaded off the back of a truck and instantly installed, without any involvement or foreknowledge of the community. At the other extreme is the concept of the mobile play programs known as "playbuses" common in Europe, each of which has a team of playleaders and props on board and is able to serve virtually any space in the city (Westland & Knight, 1982).

Play leadership and animation have become or are becoming professionalized in several countries, including Sweden, Denmark, France, Japan, and the United Kingdom (Westland & Knight, 1982). In the United States, the approach is beginning to receive serious attention because of the recognition that, to solve the present crisis, playgrounds must be staffed, not with temporary, minimally trained staff with whistles around their necks, but with professional leaders able to organize and facilitate a wide range of creative, engaging activity for all children. Without this, children will find adventure elsewhere. However,

³ In helping me understand this somewhat confused area, I am indebted to IPA colleagues Nick Balmforth, Ted Birch, Nilda Cosco, Susan Goltsman, Isami Kinoshita, Jane Knight, Karla Leonhardt-Zacharias, Wolfgang Leonhardt-Zacharias, Nic Nilsson, and Junzo Okada; and the animation groups where several of them work: Fritid Stockholm, Pädagogische Aktion, Munich; Inter-Action, London; Kinderfreunde, Vienna; PLAE, Inc., Berkeley, USA; and SS Cat San-Ta, Taishido, Setagaya-ku, Tokyo.

the concept has yet to achieve institutional recognition. There does not seem to be one full-time professional training course offered in play leadership and animation in the United States.

PREVENTIVE RISK MANAGEMENT

Children need to be challenged by their environment and to take risks in order to learn. It is an essential aspect of development (Jambor, 1986). At the same time, play environments must be safe, that is, injury free. To allow safe risk taking and to protect children socially, play leadership is a critical dimension of effective risk management. The interaction of physical setting, program, and leadership lies at the heart of any effective management model, which must be based on community involvement and public awareness (Moore *et al.*, 1987; Moreland, McIntyre, Iacofano, & Goltsman, 1986). The prevailing idea of playgrounds as segregated places just for children must be challenged through broader programs that engage the whole community in playground-related community events.

NEW MEDIA

The results of action-research need to be packaged and disseminated in such a way that they will have a direct impact on decision makers and consumers (Zimring & Barnes, 1987).

Networking is nothing new to the multidisciplinary field of children's environments. Now, with the advent of electronic media, a more effective level of information exchange is possible that is not so dependent on face-to-face meetings, or, rather, it gives new, more precisely honed purposes to such meetings.

Documentation and transfer in the form of video has presented new possibilities for building a new kind of knowledge base. New visual media products will bring into the arena of discussion tacit knowledge that is the source of the deepest truth for many who work with children: human expression, emotional response, the subtleties of body language, and environmental interaction.

Such "data" cannot be adequately conveyed on paper. It dies in transmission. Audiences need to feel the joy of play, the sensuousness of settings, and the relationships of settings to dimensions of development: imagination, fine-muscle coordination, risk taking, social interaction, cognitive problem solving—all supported by differentiations of setting, leadership, animation, time, and materials.

Audiovisual media are paving the way to a future more accessible to the political power base of consumers. Internationally, this will help greatly to reduce the severe language barriers that exist in the field.⁴ Visual/electronic

⁴ For more information, contact the IPA VideoExchange, c/o Robin Moore, School of Design, Box 7701, North Carolina State University, Raleigh NC 27695-7701, USA.

media opens a powerful educational door in addition to the slower-moving pace of empirical research. The two approaches need to run together in counterpoint. The facts and figures of research can lend conviction to and broaden the base of demonstration projects. Demonstration projects can provide vehicles for broadcasting research results more widely, more powerfully, more vividly.

The principal need is not more research about what makes a good play environment but (1) a political, public education strategy to convince consumers and decision makers to pay attention to what we already know; (2) an institutional shift toward leadership, programming, and risk management; and (3) a nationwide upgrading of existing environments.

DESIGNER AWARENESS

The design of an effective playground is an extremely challenging task. Design for winter use, for instance, is an issue requiring special attention (Thomsen & Borowieka, 1980; Wilkinson, Lockhart, & Luhtanen, 1980). How should designers approach this specialized field? The main requirement, as in any social design, is to involve representative users in a close working relationship over a long enough period so that a genuine understanding can evolve. There exists a well-developed methodology for design participation, which can not only result in higher quality, socially relevant settings, but also has important social and psychological benefits for children independent of the project at hand (Bakos, Bozic, & Chapin, 1987; Berkeley City, 1985; Childhood City Newsletter, 1980, 1981, 1982/3; de Monchaux, 1981; Hart, 1987; Gröning, 1986; Moore, 1978; Moore *et al.*, 1987; Sanoff, 1986). Community involvement is the key to educational impact.

Having said this, it is also a fact that full participation is rarely possible because of the very real constraints of politics, time, and money, or simply because of contextual circumstances (a playground in a new development, for instance, where there is no existing population). In these situations, the designer must rely on professional expertise, but it must be informed by design research related to child development objectives.

PUBLIC/PRIVATE PARTNERSHIP

In reviewing the new initiatives in public play environments of the last few years in the United States, it is clear that many of the most innovative programs are being generated by private nonprofit organizations willing to take substantial risks on behalf of children. But without municipal support, even the most innovative play programs can easily flounder. They cannot pay for themselves or accommodate children from families who cannot afford to pay—the children most in need. Government must be involved, and public funds must be applied if progress is to be made.

THE CHOICE

The choice is clear. In one direction is a negative path toward an increasingly conservative, highly proscriptive view of children's play, reinforced by tendencies that are already abroad in our society—the abandonment of recess in public schools for instance (Sutton-Smith, in press). This road leads toward the slow and painful degradation of the U.S. playground and its eventual demise. Some might say, "Good, it wasn't much use anyway."

The other road leads to public playgrounds that serve an important social, cultural, and educational role for children. For those living in high-density urban areas, it is literally the only place to go, good or bad. It is imperative that the bad be improved and the good be made better through creative problem solving. Research and development must be integral to this positive direction.

Playgrounds need to accommodate the full range of children's behaviors by offering a diversity of settings, including successful traditional settings. Research activity needs to focus on the content of settings rather than their form (Moore, 1966). Alternative models need to be adapted to the American context: playparks, adventure playgrounds, and urban farms are obvious candidates. Playgrounds must become places for people of all ages as zones of social vitality in the community. New public locations like shopping malls and airports should be promoted. At the same time, small individual play settings need to be scattered throughout the neighborhood (a swing on every street corner).

Children's play and its physical settings must be better understood and more highly valued by parents and the general public (Gaunt, 1987). Children are a critical group in society, their healthy thriving is everyone's business. Those involved directly in making decisions that affect the quality of children's environments (parents, educators, public officials, designers, manufacturers, park and recreation officials) carry the burden of responsibility.

APPENDIX: PLAY SETTING RESEARCH RECOMMENDATIONS

The seventeen setting types defined here derive from the action-research results of the Environmental Yard, later refined and added to in Moore *et al.* (1987), which, together with the findings of the Play for All Program, are the source of the following action-research recommendations to improve the physical quality of specific settings.

1. ENTRANCE/EXIT SETTINGS

Entrance/exit settings create and reinforce a sense of arrival and departure. They are places for hellos and goodbyes, with opportunities to meet, gossip, and hang out. They provide for pick-up/drop-off and delivery activities.

Action-Research Tasks:

- How do the drop-off/loading zone standards specified in Moore *et al.* (1987) work in practice, particularly with respect to wheelchair access?
- What arrangements of seating, bicycle racks, wheelchair access, bulletin boards, signs, litter receptacles, overhead shelter, and expressive features such as archways and flags and banners make the most effective settings?

2. PATHWAY SETTINGS

Primary pathways provide direct pedestrian routes connecting entrance/exit settings to centers of activity, important landmarks, indoor facilities, toilets, drinking fountains, telephones, etc.

Secondary pathways follow less direct routes, allowing children to wander and explore different settings at their own pace. They are a principal setting for hiding-and-chasing games.

Action-Research Tasks:

- What are appropriate dimensions, surfacing, and levels of accessibility⁵ for secondary paths?
- What are the design and management criteria necessary for bicycles, to avoid conflict with other users?
- What are the most appropriate settings for different types of wheeled toys, by age group, including children with disabilities?
- What are reasonable standards and criteria for dimensions, surface treatments, edges and curbs, warning textures, and levels of accessibility for wheelchair and visually impaired users?

3. SIGNAGE AND DISPLAY SETTINGS

a. *Functional sign systems* contain four different types of signs associated with the design of primary pathways (Nordhaus, Kantrowitz, & Siembieda, 1984; Robinette, 1985). *Informational* signs present general information in words and graphics (for those who cannot read) about site layout, pathways, and the location of facilities (entry signs are an important subcategory). *Directional* signs, located at all entry and decision points, present information that indicates direction to a space or facility, change in route, or confirmation of correct direction. *Identification* signs present information in both words and pictographs indicating special features or facilities. *Regulatory* signs present notification of rules, requirements, warnings, and restrictions and are used for traffic delineation and control.

Action-Research Tasks

- What colors, configurations, icon systems, and locations work best for readability by different populations, including young children with limited reading comprehension, those whose mother tongue is not English, and visually impaired children and parents?

b. *Expressive/informative displays* use the walls, floors, ground surfaces, structures, ceilings, skywires, and roof lines of a playground site, to hang, suspend, and fly all manner of artwork, informational, cultural, and historical material.

Action-Research Tasks

- What arrangements work best, including new electronic media applications?

c. *Bulletin boards* display day-to-day information about playground programs and community events. An almost universal characteristic of bulletin boards is that they are usually scarce and too small.

Action-Research Tasks

- What configurations and formats provide maximum communication—especially for young children. Can electronic media applications help?

⁵ The "levels of access" principle is used as a design concept to predict the degree of difficulty for wheelchair and other physically impaired users: level 1, "accessible"; level 2, "usable"; level 3, "difficult." The principle is fully described in Nordhaus, Kantrowitz, and Siembieda (1984).

4. FENCES, ENCLOSURES, AND BARRIERS

Fences, enclosures, and barriers protect vegetation and other fragile environments by directing pedestrian traffic flow. They define pathways, enclose activity areas, and define social settings. Enclosure is a primary means of differentiating and articulating the child's environment; for example, fences can double back on themselves to provide small social settings.

Action-Research Tasks

- Which enclosure alternatives work best and serve to (1) direct pedestrian flow, (2) protect vegetation, (3) create social enclosure, and (4) be visually attractive?

5. MANUFACTURED EQUIPMENT/PLAY STRUCTURE SETTINGS

Manufactured equipment/play structure settings primarily support motor development (Heusser, 1986). They are highly significant because even in the most diversified playground with many competing choices, they are well-liked (Moore & Wochiler, 1975) and attract both the highest density and greatest absolute level of use (Moore, 1986b). The most common items are (using industry terms) balance beams, climbers, enclosure structures, rocking equipment, slides, spinning equipment, swings, upper-body equipment, storage facilities, safety surfaces.

Because of burgeoning safety and liability issues, equipment settings have come under close scrutiny. Several countries have produced official guidelines and standards for play equipment: United States (United States Consumer Product Safety Commission [USCPS], 1981), Australia (Standards Association of Australia, 1981, 1982a,b), Germany (German Standards Institute, 1985), New Zealand (Standards Association of New Zealand, 1986), and the United Kingdom (British Standards Institution, 1979). Canada is also preparing a set of standards.

Action-Research Tasks

Responsibility for many of the tasks specified below rests with the play equipment industry. Hopefully, the more progressive firms will link themselves to university-based research units so that programs of systematic research can be used to upgrade the industry's products.

- Is there an optimum level of complexity of configuration of manufactured equipment beyond which children become confused and distracted by too many choices?
- To what extent can the full range of large-muscle activity (balancing, bouncing, climbing, crawling, hopping, jumping, knee walking, lifting, pulling, pushing, rolling, skipping, sliding, sliding on the same level, spinning, swinging, and twirling) be integrated into a single piece of equipment?
- Can settings be developed where these behaviors can be supported by a continuously linked series of events?
- How can the primary dimensions of heat, light, resiliency, texture, color, and sound be integrated in equipment design?
- Can alternative settings be developed where challenge is either not based on height or where it is "graduated" in easy steps?
- What are some of the novel ways of incorporating movement into manufactured settings?
- How can the safety of manufactured equipment settings be improved by conducting studies of:
 - Entrapment configurations by size and shape of openings for various limbs?
 - Warning signs that code equipment by "degree of difficulty," possibly using color?
- How can reliable, detailed information on playground accidents be efficiently collected and analyzed?
- What setting characteristics best support the full range of impairments, including physical, learning, perceptual, mental, sensory, communicational, health-related, and social/emotional impairments?

- Do children respond best to primary colors, as is often assumed? If not, what are the most appropriate colors?
- What are the developmental disadvantages and benefits of thematic/figurative versus abstract equipment designs?
- What is the advisability of age separation and under what conditions might it be appropriate and useful?
- How can manufactured items be sized to fit the motoric and perceptual characteristics of very young children?
- Are "monumental" manufactured items that are much larger than the children using them inappropriate to their needs?
- What are the safety aspects of the areas around equipment locations, where circulation occurs and where equipment settings interface? The transition zone around swings is particularly important.
- How can playgrounds be made accessible by providing a hard surface for wheelchairs, cane users, and walkers, while at the same time providing a soft surface to protect against falls?
- How can detailed, routine site inspection programs be instituted as the cornerstone of effective risk management (Moore *et al.*, 1987)? How are new construction materials, finishes, surfaces, and hardware, which are constantly appearing on the market (with unpredictable or unknown characteristics), to be researched?
- How can the experiences of progressive parks and recreation and public school agencies be collated as the next step in creating a set of national maintenance and inspection standards?
- How can the USCPSC guidelines be improved? Priority research topics include non-climbable enclosure height, slide gradients, chute rails, stair treads, exit and entry zones and chute materials; swing heights, seats, traffic flow barriers, setbacks, and accessibility; climber heights, rung size, free-fall zones; static versus dynamic balance events; balance height and linkage; upper-body events graduated challenge, linkage, mount-dismount arrangements and height; spinning events size and speed, surfacing, entrapment; rocking/spring mounted events; age groups and spring performance.

6. MULTIPURPOSE GAMES SETTINGS

Multipurpose games settings support formal ball games and informal kickabouts. Because they are large and flat, difficult design tradeoffs with other types of space-demanding settings are involved.

Informal ball play and games settings are less demanding on space and more flexible. Close observation of these settings (Moore & Wong, in press) indicates children's capacity for inventing adaptations of ball games to the characteristics of whatever setting is at hand (e.g., three-dimensional ball tag on play structures). Such constraints in fact force children to exercise ingenuity and are perhaps preferred.

Many games, whether traditional or "new," whether child or leader initiated, are adaptable to variable space constraints, especially with skilled playleaders (Orlick, 1978; Orlick & Botterill, 1975).

Action-Research Tasks

- How can traditional and "new" games be successfully adapted to small-scale settings?
- What alternatives are there to costly, well-drained, irrigated turf areas that will stand up to heavy use and not turn into hazardous, hard-baked dirt?

7. GROUNDCOVERS AND SAFETY SURFACES

Both soft and hard play surfaces are needed to support different types of play activity (Cooper Marcus, 1974). For children to have contact with nature, and in order to provide habitats for small animals, a choice of natural ground covers is needed. Options include turf;

unmown, rough areas of wild grasses and plants; carefully managed grassy areas suitable for crawling infants; and nonaccessible erosion control areas.

Because the majority of playground injuries are due to falls from equipment (USCPSC, 1981), much attention is being focused on the development of practical, reasonably priced alternative surfaces. The principal standard is the "under 200 g's" impact attenuation, conducted according to ASTM F-355/86 (Standard Test Method for Shock-Absorbing Properties of Play Surface Systems and Materials, American Society for Testing and Materials, 1986).⁶

Action-Research Tasks

- What are the surfacing requirements of outdoor play settings for infants and toddlers?
- How can managers of children's playgrounds get an immediate reading of impact attenuation of fall-absorbing surfaces so that necessary maintenance action can be taken?⁶
- How can standardized testing procedures for safety surfaces be implemented and consumers informed of the results?

8. LANDFORMS/TOPOGRAPHY

Landforms support varied interaction of the body in three-dimensional space, and varied circulation within and between spaces. Topographic variety stimulates fantasy play, orientation skills, hide-and-go-seek games, viewing, rolling, climbing, sliding, and jumping.

Action-Research Tasks

- How can the problem of erosion by foot traffic on slopes over a few degrees be solved?

9. TREES AND VEGETATION

Trees and vegetation constitute one of the most ignored topics in the design of public play environments. Vegetation is an intrinsically interesting play setting and a major source of play props, including leaves, flowers, fruit, nuts, seeds, and sticks (Moore, 1986c). It marks the passing of the seasons, introducing a sense of time into the child's environment. It stimulates exploration and discovery, fantasy, and imagination and provides an ideal setting for dramatic play (Kirkby, 1987) and hide-and-seek games (Talbot, 1985). "Specimen" plants are important orienting elements.

Trees and vegetation give greater spatial and textural variation to play settings (Moore, 1976). Indoor-outdoor transitions can be softened with vegetation—especially for people whose eyes adjust slowly to changing light levels and glare. Plantings used along paths create a complex sequence of texture, smell, light, shade, and color. Trees add a positive ambience to play settings through light modification, color, texture, fragrance, and softness of enclosure—esthetic impacts that both adults and children appreciate (Moore, 1989a). Broad-leaved deciduous trees can reduce the direct impact of heavy rain and extend the runoff period. Surface root systems bind the soil and help it resist erosion.

Children are especially attracted by a mix of natural and people-made elements (Mason, 1982; Moore & Wong, in press). Design should emphasize the integration of planting into play settings, rather than creating segregated "nature areas."

Action-Research Tasks

- What are the specific ways in which trees and vegetation can be integrated into play settings?
- What types of plants, methods of planting, and protection work best under different climatic conditions and site configurations?

⁶ A safety surface resiliency tester has been developed. It is a head form that can be dropped from any height onto a surface to determine the G force of a fall. For more information, contact Paul Hogan, Playground Clearinghouse, Inc., 36 Sycamore Lane, Phoenixville, PA 91460-2921.

10. GARDENING SETTINGS

Gardens enable children to interact with nature, to learn about the ecological cycle, and to cooperate with peers. They stimulate social interaction, fine-motor skills, and sensory stimulation. Gardening is a powerful play-and-learning activity with specific but flexible design requirements. Because they are dependent on skilled leadership, gardening programs are rare in U.S. public parks and playgrounds, whereas in many European countries they are a common practice (Westland & Knight, 1982). Practical applications have been well documented (Ortho, 1978), including developments in the community gardening movement (Francis, Cashdan, & Paxson, 1984).

Action-Research Tasks

- What are the child development and educational impacts of gardening? How can the evidence be presented to child development experts and educators, to convince them of its value?

11. ANIMAL HABITATS

The two main categories of animals are domestic/farmyard, and wildlife. Animals stimulate a caring and responsible attitude toward other living things. They provide therapeutic effects and offer opportunities for learning about biology (Blue, 1986; *Childrens' Environments Quarterly*, 1984). Animals are a source of wonder and fascination; they are living things that children can interact with, talk to, and invest in emotionally. They provide companionship in nonthreatening ways and almost always come back for more contact. This can be critical for a child with limited self-esteem. Caring for animals can produce a strong sense of personal competence and pride in children, making animals a powerful socialization medium. Documented examples of childhood animal care are very strong (Moore, 1986a).

The most popular and easiest to care for domestic animals include rabbits, guinea pigs, hamsters, and chickens (Schools Council, 1974a). Larger farmyard animals include goats, sheep, pigs, ponies, and donkeys. They are often found on playgrounds in some countries (Westland & Knight, 1982).

Wildlife provides an important childhood experience (Leedy and Adams, 1982; Moore & Wong, 1984; Schicker, 1986). For purposes of programming and design, categories include:

- Nonharmful insects and insect-like organisms.* Caterpillars, butterflies, moths, ladybugs, beetles, pillbugs, spiders, millipedes, and snails are particularly attractive to children. The vast majority of insects are beneficial to the human race, do not bite, do not eat valuable materials or spread disease. They are an inevitable part of any vegetated setting.
- Birdlife.* It is difficult for children to make close contact with birds (unless caged); nonetheless, birds add movement, color, and song to play settings. Specific habitat requirements include high places for nesting, sources of nesting materials, and food-producing plants.
- Small animals, amphibians, and reptiles.* Salamanders, tortoises, squirrels, toads, mice, moles, snakes, and lizards are typical species. Each is adapted to specific habitat conditions that may be replicated through design (Moore & Wong, 1984). Gerbils are a popular caged animal.

d. *Pond life.* Fish and frogs and other pond organisms are very attractive to children (Moore, 1986b, and see Aquatic Settings below).

Vegetation and natural features such as ponds provide food and shelter essential to wildlife. Plants with fruits, cones, and seeds can be selected to attract birds, squirrels, and other wildlife (City of Seattle, 1986; Moore *et al.*, 1987).

Action-Research Tasks

- What types of naturalistic habitats for small mammals can be most readily designed into play settings? The results of work that has been done in zoos need to be adapted to public playgrounds. It is a fertile area for experimentation.

12. AQUATIC SETTINGS

Water in all its forms is a popular, universal play material because it can be manipulated

in so many ways (splashed, poured, used to float objects) and mixed with sand, dirt, and vegetation. Water features and aquatic environments are highly valued by children because of their multisensory impact in sounds, textures, changes of state, and feelings of wetness (Moore, 1986a,b). Water both excites and relaxes; it adds a substantial esthetic dimension to any recreational setting. Children are strongly attracted to natural settings that range from a dew-covered leaf, to ponds, streams, and marshes. They support a variety of terrestrial and aquatic life that fascinate children, have a strong perceptual impact, and are vividly remembered for years (Moore, 1989a).

Other water settings include a hose in the sandpit, puddles, ponds, drinking fountains, bubblers, sprinklers, sprays, cascades, paddling, wading and swimming pools—places to cool off in hot weather—and post-rain settings (these deserve special design-research attention).

Action-Research Tasks

- What are the specific design criteria for water features relating to water movement, continuity of water flow, character of water channel, edge character (especially configurations that support maximum impact between users and setting while minimizing impact of users on the natural setting), and multiuse (skating/sliding in winter, for example)?
- Which configurations work best as waterplay/cool-off features?
- Which configurations work best for safety?

13. SAND/DIRT/SOIL SETTINGS

The younger the children, the more likely they are to play in dirt wherever they find it. Wood's (1976) highly detailed study provides overwhelming support for the developmental significance of classic dirt play. Using "props" such as a few twigs, a small plastic toy, or a couple of stones, children can create an imaginary world of their own in the dirt, around the roots of a tree for instance, or in part of a raised planter.

The sandbox is a refined and sanitized version of dirt play and works best if it retains the qualities of dirt play (intimate, small-group spaces, play surfaces, access to water and other small play props). Sand is an excellent medium for creative play and social interaction. It is easy to move and mold. It can be dug, sifted, sculpted, poured, thrown, and drawn upon. It is the ultimate loose part. Large sand areas enable children to engage in more expansive sand play and create imaginary landscapes using all manner of "found objects" (Hart, 1974; Moore, 1986a).

Action-Research Tasks

- What are the optimum means of managing sand settings? How can they be made accessible to children in wheelchairs?
- Can above-ground sand areas be developed for wheelchair users without transfer skills?
- What are the best means of enclosing sand play settings so that sand is kept in place and animals are kept out?
- How can children be kept from running through sand play settings (disturbing the sand play of others)?
- How can enclosures provide a psychologically calm atmosphere and provide shelf-like play surfaces and places on which to sit or "perch" with peers?

14. MANIPULATIVE SETTINGS, PLAY PROPS, AND ADVENTURE PLAY

Manipulative settings range from found objects in fixed settings to adventure playgrounds. Props include a wide variety of small natural and synthetic found objects, such as insects and small mammals, sticks and stones, bottle tops and popsicle sticks, logs, rocks, plant parts, sand, dirt, and scrap lumber, and larger manufactured items such as modular systems, wheeled toys, and dress-up clothes. They provide a low-cost method of enhancing existing play settings (Moore *et al.*, 1987; Moore & Wong, in press). Their developmental significance

has been demonstrated in several studies (G. T. Moore, 1985; Moore, 1966, 1974, 1986c; Moore & Wong, in press; Nicholson, 1971).

Using larger-scale props, children and trained leaders can transform a playground into a completely different, temporary setting (Playing and Learning in Adaptable Environments, in press).

Action-Research Tasks

- How can loose-parts systems and props be integrated into conventional playground and park settings?
- How can educators be convinced of the developmental value of manipulative settings?

15. GATHERING, MEETING, AND WORKING SETTINGS

To support social development and cooperative working relationships, children need small, comfortable gathering places where they can meet and work together in small (2-7), medium (7-15), and large (15+) groups. Such spaces are very often missing from public play areas (Cooper Marcus & Sarkissian, 1986). Parents, too, need comfortable places in which to sit where they can interact, but from which they can keep an eye on their children.

Architectural forms include benches, decks, patios, verandas, gazebos, and sitting circles. When used as "activity stations" in recreation or education programs, such settings need to have a strong identity and be located next to display settings so that products can be exhibited (Moore et al., 1987).

Action-Research Tasks

- What combinations of specific design characteristics (location, microclimatic comfort, social support, bodily support, multilevel configuration, enclosure, identity, materials, and physical dimensions) produce the best settings?

16. STAGE SETTINGS

Stages support performances, dramatic and fantasy play, and performance activities. They stimulate presentation of self, encourage teamwork, and foster a sense of community. They are places where local culture can be created. Architectural forms include campfire circles, mini-arenas, stages and arenas, groups of picnic tables, and amphitheatres.

Action-Research Tasks

- What forms of stage settings exist? How can their value be demonstrated?

17. FIELDHOUSE AND STORAGE SETTINGS

Fieldhouses function as program bases, storage facilities, communication centers, emergency/first aid posts, and toilet locations. Because of their cost they are sometimes hard to justify. They are a traditional setting in European playparks and adventure playgrounds. Proper storage space helps to reduce clutter that can limit activities. Accessible storage areas that are clearly defined, labeled, and properly placed will encourage children to clean up after their own activities (Adaptive Environments, 1980). Scandinavia offers a wide range of examples, most of which would have to be adapted to the harsh vandalism climate of most American cities. Storage is frequently overlooked in design programming and rarely researched, yet it makes a large difference to the viability of play programs that use loose parts and props. It should be designed as an integral part of the play environment.

Action-Research Tasks

- What are the minimum building requirements to support different kinds of users and programs?
- What are the essential characteristics of buildings and their management that protect them from vandalism damage in a harsh urban environment?

REFERENCES

Adaptive Environments. (1980). Environments for all children. In *Access information bulletin*. Washington, DC: National Center for Barrier-Free Environments.

- American Society of Testing and Materials. (1986). Standard test method for shock-absorbing properties of play surface systems and materials. (F-355/86).
- Andel, J. van. (1986). Physical changes in an elementary schoolyard. *Children's Environments Quarterly*, 3(3), 40-51.
- Bakos, M., Bozic, R., & Chapin, D. (1987). Children's spaces: Designing configurations of possibilities. In C. S. Weinstein & T. David (Eds.), *Spaces for children: The built environment and child development* (pp. 269-288). New York: Plenum Press.
- Balmforth, N., & Nelson, W. (1978). *Jubilee street*. London: British Broadcasting Corporation.
- Becker, F. D. (1976). Children's play in multifamily housing. *Environment & Behavior*, 8, 545-574.
- Bengtsson, A. (1972). *Adventure playgrounds*. London: Crosby Lockwood.
- Benjamin, J. (1974). *Grounds for play*. London: National Council for Social Service.
- Berkeley, City of. (1985). *Berkeley youth downtown planning project: Findings and recommendations*. (Report available from Moore Iacofano Goltsman, 1802 Fifth St., Berkeley, CA 94710.)
- Björklid, P. (1982). *Children's outdoor environment: A study of children's outdoor activities on two housing estates from the perspective of environmental and developmental psychology*. Lund: Liber Förlag.
- Björklid, P. (1984/1985). Environmental diversity on housing estates as a factor in child development. *Children's Environments Quarterly*, 1(4), 7-13.
- Björklid, P. (1986). *A developmental-ecological approach to child-environment interaction*. Stockholm: Stockholm Institute of Education.
- Blue, G. F. (1986). The value of pets in children's lives. *Childhood Education*, 63, 85-90.
- Boehm, E. (1980). Youth farms. In P. F. Wilkinson (Ed.), *Innovation in play environments* (pp. 76-84). London: Croom Helm.
- Boulding, K. (1956). *The image: Knowledge and society*. Ann Arbor: University of Michigan Press.
- Boyce, W. T., Sobolewski, S., Springer, L. W., & Schaefer, C. (1984). Playground equipment injuries in a large, urban school district. *American Journal of Public Health*, 74, 984-986.
- British Standard Institution. (1979). BS5696: Play equipment intended for permanent installation outdoors. London: Author.
- Bruya, L., & Langendorfer, S. (in press). *Where our children play: Elementary school playground equipment*. Reston, VA: American Association for Leisure and Recreation.
- Cambell, S. D., & Frost, J. L. (1985). The effects of playground type on the cognitive and social play behaviors of grade two children. In J. L. Frost & S. Sunderlin (Eds.), *When children play* (pp. 81-88). Wheaton, MD: Association for Childhood Education International.
- Children and animals. (1984). *Children's Environments Quarterly*, 1(3).
- Cobb, E. (1977). *The ecology of imagination in childhood*. New York: Columbia University Press.
- Cooper, C. (1970). Adventure playgrounds. *Landscape Architecture*, October 18-29, 88-91.
- Cooper Marcus, C. (1974). Children's play behavior in low-rise, inner-city housing developments. In R. C. Moore (Ed.), *Man-environment interactions: Vol 12. Childhood city* (pp. 197-211). Washington, DC: Environmental Design Research Association.
- Cooper Marcus, C., & Sarkissian, W. (1986). *Housing as if people mattered: Site guidelines for medium density family housing*. Berkeley, CA: University of California Press.
- Derickx, C. (1985). Children's play in the city. In P. Heseltine (Ed.), *Play and playgrounds in Rotterdam: A research approach* (pp. 30-37). Birmingham, UK: Association for Children's Play and Recreation.
- Duncan, J., Calasha, G., Mulholland, M. E., & Townsend, A. (1977). Environmental modifications for the visually impaired: A handbook. *Visual impairment and blindness*, 444-452.
- Eriksen, A. (1985). *Playground design*. New York: Van Nostrand Reinhold.
- Esbensen, S. B. (1979). *An international inventory and comparative study of legislation and guidelines for children's play spaces in the residential environment*. Ottawa: CMHC.
- Francis, M. (1984/1985). Children's use of open space in Village Homes. *Children's Environments Quarterly*, 1(4), 36-38.

- Francis, M., Cashdan, L., & Paxson, L. (1984). *Community open spaces*. Washington, DC: Island Press.
- Fritid Stockholm (Stockholm Leisure Department). (1987). A political programme for Fritid Stockholm (English version, mimeo). Stockholm, Sweden: Stockholms Fritidsförvaltning.
- Frost, J. L. (1985). History of playground safety in America. *Children's Environments Quarterly*, 2(4), 13-23.
- Frost, J. L., & Klein, B. L. (1983). *Children's play and playgrounds*. Austin, TX: Playscapes International.
- Frost, J. L., & Sunderlin, S. (1985). *When children play*. Wheaton, MD: Association for Childhood Education International.
- Gaunt, L. (1987). Room to grow—in creative environments or on adult premises? *Scandinavian Housing and Planning Research*, 4, 39-53.
- German Standards Institute (Deutsche Institut für Normung—DIN). (1985). Play equipment for children: Concepts, safety regulations, testing (DIN 7926—Parts 1-5). English translation, Milton Keynes: British Standards Institution (copies available from Kompan, Inc., 80 King Spring Rd., Windsor Locks, CT 06096).
- Gröning, G. (1986). An attempt to improve a school yard. *Children's Environments Quarterly*, 3(3), 12-19.
- Handicapped Adventure Playground Association. (1978). *Adventure playgrounds for handicapped children*. London: Author.
- Hart, R. (1974). The genesis of landscaping: Two years of discovery in a Vermont town. *Landscape Architecture*, October, 356-362.
- Hart, R. (1987). Children's participation in planning and design. In C. S. Weinstein & T. David (Eds.), *Spaces for children: The built environment and child development* (pp. 217-239). New York: Plenum Press.
- Hayward, D. G., Rothenburg, M., & Beasley, R. R. (1974). Children's play and urban environments: A comparison of traditional, contemporary and adventure playground types. *Environment & Behavior*, 6, 131-168.
- Heusser, C. P. (1986). How children use their elementary school playgrounds. *Children's Environments Quarterly*, 3(3), 3-11.
- Holme, A., & Massie, P. (1970). *Children's play: A study in needs and opportunities*. London: Michael Joseph.
- Iacofano, D., Goltsman, S., McIntyre, S., & Moreland, G. (1985). Project PLAE: Using the arts and environment to promote integration of all children. *California Parks and Recreation*, 41, 14-17.
- International Association for the Child's Right to Play. (1977). *Declaration of the child's right to play*. Birmingham, UK: Author.
- Jambor, T. (1986). Risk-taking needs in children. *Children's Environments Quarterly*, 3(4), 22-25.
- Kirkby, M. A. (1987). *Young children's attraction to refuge in the landscape: An opportunity for dramatic play*. Landscape architecture thesis, University of Washington, Center for Planning and Research, Seattle, WA.
- Lambert, J., & Pearson, J. (1974). *Adventure playgrounds*. Harmondsworth, Middlesex, England: Penguin.
- Langley, J. D., Silva, P. A., & Williams, S. M. (1981). Primary school accidents. *New Zealand Medical Journal*, 336-339.
- Leedy, D. L., & Adams, L. W. (1982). *A guide to urban wildlife management*. Columbus, MD: National Institute for Urban Wildlife Management.
- Mason, G., Forrester, A., & Hermann, R. (1975). *Berkeley park use study*. Berkeley, CA: Department of Parks and Recreation.
- Mason, J. (1982). *The environment of play*. West Point, NY: Leisure Press.
- Miller, J. (1987). The work of the play leader. *Australian Parks and Recreation*, 23(2), 27-32.

- Monchaux, S. de. (1981). *Planning with children in mind: A notebook for local planners and policy makers*. Sydney: New South Wales Department of Environment and Planning.
- Moore, G. T. (1985). State of the art in play environment. In J. L. Frost & S. Sunderlin (Eds.), *When children play* (pp. 171-192). Wheaton, MD: Association for Childhood Education International.
- Moore, G. T., Cohen, U., Oertel, J., & van Ryzin, L. (1979). *Designing environments for handicapped children*. New York: Educational Facilities Laboratories.
- Moore, R. C. (1966). An experiment in playground design. Unpublished master's thesis, Massachusetts Institute of Technology, Department of City and Regional Planning, Cambridge, MA.
- Moore, R. C. (1974). Patterns of activity in time and space. In D. Canter & T. Lee (Eds.), *Psychology and the built environment* (pp. 118-131). London: Architectural Press.
- Moore, R. C. (1975). The place of adventure play in planning for children's leisure. In *Adventure playgrounds and children's creativity: Proceedings of the Sixth World Congress of the International Playground Association* (pp. 16-25). Birmingham, UK: International Playground Association.
- Moore, R. C. (1976). The environmental design of children-environment relations. In *Children, nature and the urban environment. Proceedings of a Symposium-Fair* (Publication No. 19028, pp. 207-213). Darby, PA: U.S. Forest Experiment Station.
- Moore, R. C. (1978a). Meanings and measures of child/environment quality: Some findings from the Environmental Yard. In W. E. Rogers & W. H. Ittelson (Eds.), *New directions in environmental design research* (pp. 287-306). Washington, DC: Environmental Design Research Association.
- Moore, R. C. (1978b). A WEY to design. *Journal of Architectural Education*, 31(4), 27-30.
- Moore, R. C. (1980a). Collaborating with young people to assess their landscape values. *Ekistics*, 281, 128-135.
- Moore, R. C. (1980b). Learning from the Yard: Generating relevant urban childhood places. In P. F. Wilkinson (Ed.), *Play in human settlements* (pp. 45-75). London: Croom Helm.
- Moore, R. C. (1986a). *Childhood's domain: Play and place in child development*. London: Croom Helm.
- Moore, R. C. (1986b). Plant parts as play props. *Playworld Journal*, 1, 3-6.
- Moore, R. C. (1986c). The power of nature: Orientations of girls and boys toward biotic and abiotic settings on a reconstructed schoolyard. *Children's Environments Quarterly*, 3(3), 52-69.
- Moore, R. C. (1987). Streets as playgrounds. In A. Vernez-Moudon (Ed.), *Streets are public* (pp. 45-62). New York: Van Nostrand Reinhold.
- Moore, R. C. (1989a). Before and after asphalt: Diversity as a measure of ecological quality in children's play environments. In M. Bloch & T. Pellegrini (Eds.), *The ecological context of children's play*. Ablex Publishing.
- Moore, R. C. (1989b). Dance of life: Child development and the ecology of outdoor play. In M. Kurosaka (Ed.), *Resonance in nature*. Tokyo: Shisakusha.
- Moore, R. C., Goltsman, S., & Iacofano, D. (1987). *The play for all guidelines: Planning, design and management of outdoor settings for all children*. Berkeley, CA: MIG Communications.
- Moore, R. C., & Wochiler, A. (1975). An assessment of a redeveloped school yard based on drawings made by child users. In R. C. Moore (Ed.), *Man-environment interactions: Vol 12. Childhood city* (pp. 107-119). Washington, DC: Environmental Design Research Association.
- Moore, R. C., & Wong, H. (1984). Animals on the Environmental Yard. *Children's Environment's Quarterly*, 1(3), 43-51.
- Moore, R. C., & Wong, H. H. (in press). *Another way of learning: Child development in natural settings*. Berkeley, CA: MIG Communications.
- Moore, R. C., & Young, D. (1978). Childhood outdoors: Toward a social ecology of the land-

- scape. In I. Altman & J. Wohlwill (Eds.), *Children and the environment* (pp. 83–130). New York: Plenum Press.
- Moreland, G., McIntyre, S., Iacofano, I., & Goltsman, S. (1986). The risky business of children's play: Balancing safety and challenge in programs and environments for all children. *Children's Environment's Quarterly*, 2(4), 24–28.
- National Safety Council. (1985). *Accident facts: 1985 edition*. Chicago: Author.
- National Safety Council. (1986). *Accident facts: 1986 edition*. Chicago: Author.
- Neighborhoods as childhood habitats. (1984/5). *Children's Environments Quarterly*, 1(4).
- Nicholson, S. (1971). How not to cheat children: The theory of loose parts. *Landscape Architecture*, 62, 30–34.
- Nordhaus, R. S., Kantrowitz, M., & Siembieda, W. J. (1984). *Accessible fishing: A planning handbook*. Santa Fe, NM: New Mexico Natural Resources Department.
- Olweg, K. R. (1986). The childhood "deconstruction" of nature and the construction of "natural" housing environments for children. *Scandinavian Housing and Planning Research*, 3, 129–143.
- Orlick, T. (1978). *The cooperative sports and games book: Challenge without competition*. New York: Pantheon.
- Orlick, T., & Botterill, C. (1975). *Every kid can win*. Chicago: Nelson-Hall.
- Ortho Chemical (1978). *A child's garden*. San Francisco: Chevron Chemical Company. (Public Affairs Department, Box 3744, San Francisco, CA 94119).
- Ostroff, E. (1978). *Humanizing environments*. Cambridge, MA: The Word Guild.
- Ostroff, E., & Iacofano, D. (1982). *Teaching design for all people: The state of the art*. Boston: Adaptive Environments Center.
- Participation 1. (1980). *Childhood City Newsletter* No. 22.
- Participation 2: Survey of projects, programs and organizations. (1981). *Childhood City Newsletter*. No. 23.
- Participation 3: Techniques. (1982/3). *Childhood City Newsletter*. 9(4)/10(1).
- Petersen, J. (1985). The adventure playground in Denmark. In J. L. Frost & S. Sunderlin (Eds.), *When children play* (pp. 201–207). Wheaton, MD: Association for Childhood Education International.
- Playing and Learning in Adaptable Environments. (in press). *Play scores*. Berkeley, CA: M/G Communications.
- Rainwater, C. (1922). *The play movement in the United States*. Chicago: University of Chicago Press.
- Rijnen, J. (1985). Sex differences in play. In P. Heseltine (Ed.), *Play and playgrounds in Rotterdam: A research approach* (pp. 30–37). Birmingham, UK: Association for Children's Play and Recreation.
- Robinette, G. (1985). *Barrier-free site design: Anyone can go anywhere*. New York: Van Nostrand Reinhold.
- Root, J. (1983). *Play without pain*. Melbourne: Child Accident Prevention Foundation of Australia.
- Rutherford, G. (1979). Injuries associated with public playground equipment. Washington, DC: U.S. Consumer Product Safety Commission.
- Safety in outdoor play. (1985). *Children's Environments Quarterly*, 2(4).
- Sanoff, H. (1986). Planning outdoor play in the context of community politics. *Children's Environments Quarterly*, 3(3), 20–25.
- Schicker, L. (1986). *Children, wildlife and residential developments*. Unpublished master's thesis, North Carolina State University, Raleigh, NC.
- Schneekloth, L., & Day, D. (1980). *A comparison of environmental interactions and motor activity of visually handicapped and sighted children*. Blacksburg, VA: Virginia Polytechnic Institute and State University. (mimeo).
- Schools Council. (1974a). *Animal accommodation for schools*. London: English University Press.

- Schools Council. (1974b). *The school outdoor resource area*. London: Longman.
- Schoolyards. (1986). *Children's Environments Quarterly*, 3(3).
- Seattle Department of Parks and Recreation (1986). *Guidelines for play areas: Recommendations for planning, design and maintenance*. Seattle, WA: Author.
- Sebba, R., & Churchman, A. (1986). Schoolyard design as an expression of educational principles. *Children's Environments Quarterly*, 3(3), 70–76.
- Shaw, L. G. (1987). Designing playgrounds for able and disabled children. In C. S. Weinstein & T. David (Eds.), *Spaces for children: The built environment and child development* (pp. 187–213). New York: Plenum Press.
- Shier, H. (1984). *Adventure playgrounds*. London: National Playing Fields Association.
- Standards Association of Australia. (1981). *Australian Standard 1924: Playground equipment for parks, schools and domestic use* (Parts 1 and 2). Sydney: Author.
- Standards Association of Australia (1982a). *Australian Standard 2155–1982: Playgrounds—guide to siting and to installation and maintenance of equipment*. Sydney: Author.
- Standards Association of Australia (1982b). *Australian Standard 2555–1982: Supervised adventure playgrounds: Guide to establishment and administration*. Sydney: Author.
- Standards Association of New Zealand (1986). *NZS 5828: Part 1. General guidelines for new and existing playgrounds—equipment and surfacing*. Wellington, New Zealand: Author.
- Sutherland, A. T., & Soames, P. (1984). *Adventure play with handicapped children*. London: Souvenir Press.
- Sutton-Smith, B. (in press). What right do children have to play? Play as creativity v play as passion. In P. Heseltine (Ed.), *Play and creativity. Proceedings of the 10th World Conference of the International Association for the Child's Right to Play*. Stockholm, Sweden. London: International Association for the Child's Right to Play.
- Sweeney, T. (1979). Playground accidents: A new perspective. *Trial*, 15, 40–44.
- Sweeney, T. (1987). Playgrounds and head injuries: A problem for the school business manager. *School Business Affairs*, 53, 28–31.
- Thomsen, C. H., & Borowieka, A. (1980). *Winter and play*. Ottawa: Central Housing and Mortgage Corporation.
- Talbot. (1985). Plants in children's outdoor environments. In J. L. Frost & S. Sunderlin (Eds.), *When children play* (pp. 243–251). Wheaton, MD: Association for Childhood Education International.
- U.K. Department of the Environment. (1973). *Children at play*. London: HMSO.
- U.S. Consumer Product Safety Council. (1981). *A Handbook for public playground safety* (vols 1 & 2). Washington, DC: Author.
- van Vleit, W. (1983). Exploring the fourth environment: An examination of the home range of city and suburban teenagers. *Environment & Behavior*, 15, 567–588.
- van Vleit, W. (1985). The methodological and conceptual basis of environmental policies for children. *Prevention in Human Services*, 4(1 & 2), 59–78.
- Verkerk, J., & Rijmpa, S. (1985). Criteria for judging playgrounds. In P. Heseltine (Ed.), *Play and playgrounds in Rotterdam: A research approach* (pp. 38–43). Birmingham, UK: Association for Children's Play and Recreation.
- Westland, C., & Knight, J. (1982). *Playing living learning: A worldwide perspective on children's Play*. State College, PA: Venture.
- Whitehead, A. N. (1968). In T. Talbot (Ed.), *The world of the child*. New York: Doubleday/Anchor. (Original work published 1922)
- Wilkinson, P. F., & Lockhart, R. S. (1980). Safety in children's formal play environments. In P. F. Wilkinson (Ed.), *Innovation in play environments* (pp. 85–96). London: Croom Helm.
- Wilkinson, P. F., Lockhart, R. S., & Luhtanen. (1980). The winter use of playgrounds. In P. F. Wilkinson (Ed.), *Innovation in play environments* (pp. 103–122). London: Croom Helm.
- Wood, D. (1976). *Early mound building: Some notes on kids' dirt play*. Raleigh, NC: North Carolina State University, School of Design (mimeo).

- Wood, D. (1977). Free the children! Down with playgrounds! *McGill Journal of Education*, 12, 227-243.
- Zimring, C., & Barnes, R. D. (1987). Children's environments: Implications for design and design research. In C. S. Weinstein & T. David (Eds.), *Spaces for children: The built environment and child development* (pp. 309-318). New York: Plenum Press.