BUILDING SUBSYSTEMS CRITERIA

This chapter includes selected criteria which are applicable to the design of the building's structure, its mechanical system, interior finishes, and its fixed and semi-fixed features, such as built-in furnishings. These criteria do not attempt to cover standard and common information which can be found in popular texts such as Time Saver Standards. Rather, these criteria focus on building subsystem information as it relates to the unique needs of the developing child.

1201 Simple Structural System on Display
1202 Floor Functions Within the Program
1203 Working Walls
1204 Accessible Plumbing Systems
1205 Accessible But Safe Electricity
1206 Child Scale Building Materials
1207 Child Comfort and Climate Control
1208 Acoustic Control
1209 Lighting Appropriate to Activities
1210 Activity-Appropriate Texture and Color-Cues
1211 Accessible and Operable Hardware
1212 Flexible Furnishings
MANY RECENT SCHOOL-TYPE BUILDINGS HAVE BEEN "SLICKED" ON THE INSIDE BY COVERING STRUCTURAL ELEMENTS WITH CEILING TILE AND CONCEALING THE SUPPORT COLUMNS WITHIN THE WALLS. BECAUSE OF THIS, CHILDREN ARE NOT ABLE TO HAVE A SENSE OF HOW THE BUILDING STANDS UP.

Most children (and most adults) accept the built environment around them without question. The use of Lincoln logs, tinker toys, erector sets, etc. may provide children with some awareness of building, but unless an analogy to the actual built environment is shown to them, children are unlikely to make the connection themselves.

In addition to children's awareness of building construction, another advantage to exposed structural elements is that ductwork and piping can also be exposed. In Acorn School in New York City (and in other school buildings elsewhere), the exposed metal is color coded and labeled so children can see how they are kept warm, where the water supply lines come in and where conduit supplies the lights with electrical power. Some of the "magic" of technology which most of us do not understand or simply take for granted until it breaks down, is thus "demystified" for children at an early age.

Exceptions to this principle should be noted: ceilings and other covers of structural elements do have important roles and should be used as appropriate. The functions of these elements are to serve as a control for noise, light reflection, heat loss, air return, and fire protection.

THE STRUCTURE AND RELATED BUILDING ELEMENTS SUCH AS BEAMS, AS WELL AS INTEGRATED MECHANICAL SYSTEMS, SHOULD BE EXPOSED AND ORGANIZED IN AN ORDERLY FASHION TO FACILITATE LEARNING AND UNDERSTANDING AS WELL AS UTILITARIAN FUNCTIONS.
RECOMMENDATIONS

- Coordinate the spacing of columns with activity areas so that exposed columns can be used as delineating elements and as starting points for dividers and movable partitions.

- Utilize exposed roof structures for hanging displays, furnishings, planters, bird cages, etc.

- Use simple structural systems for child-care facilities, e.g., geodesic domes. The key characteristic is consistency.

RELATED ITEMS

- Acoustical Control
- Child Comfort and Climate Control
- Floor Functions Within the Program
- Working Walls
- Accessible But Safe Electricity
ISSUE

THE FLOOR IN CHILDREN'S FACILITIES IS MORE THAN A CIRCULATION PLATFORM; IT ALSO FUNCTIONS AS A DEFINER OF SPACE, A WORK AND PLAY SURFACE, AS MULTIUSE FURNITURE, AND SHOULD BE DESIGNED TO ACCOMMODATE ALL THESE FUNCTIONS.

JUSTIFICATION

Osmon (1971) lists the following factors which have a bearing on floor design:

a) Children like to sit and play on the floor (Waechter and Waechter, 1951, p. 137).

b) A playroom floor must accommodate an unusual amount of liquid, both from play activities and from uncontrolled bodily functions.

c) Children's motor coordination is developing during the preschool period and they are accident prone (Landreth and Moise, 1949, p. 79).

d) Teachers and parents are concerned about germs passing from one child to another through physical objects (Leeper, et al., 1968).

e) Teachers do not want children getting colds from sitting on a cold, damp surface.

f) An excessive amount of furniture can hinder the free flow of children (EFL, 1970B, p. 17).

g) Noise from one activity can be disruptive to other activities in the group play environment. (p. 50)

Other behaviors and tendencies related to floor usage noted in research are the following:

• A floor can be a powerful organizer of traffic patterns (Prescott and David, 1976).

• Children use wheel toys indoors as well as outdoors (Evans, Saia, and Evans, 1974).

• Infants need varied surfaces for crawling. Different textures, colors, slight level changes with slopes help hold interest.
FLOOR FUNCTIONS WITHIN THE PROGRAM

THROUGH LEVEL MANIPULATION, COLOR, TEXTURE, AND MATERIAL OF COVERING, THE FLOOR CAN FUNCTION AS AN ACTIVITY DEFINER, AND AS PART OF THE FURNISHINGS FOR BOTH WORK AND PLAY.

RECOMMENDATIONS

- These tendencies imply the following design criteria for the flooring surface:

1. It must be free of drafts and warm to the touch, to minimize the potential for colds and to maximize the child's comfort when playing on the floor.

2. It should be easily maintained to minimize slipping hazards and to minimize germ retention.

3. It should be resilient to minimize accidents from falls and to minimize the floor as a sound-producing element.

4. It should be designed with a minimum of change of level along major circulation paths to eliminate places to stumble.

5. It should be considered for its potential as work/play surface to minimize the clutter of furniture and maximize the number of play/work postures. (Osmon, 1971, p. 50)

- Manipulate the floor plane to create ramps, steps, pits, and platforms.

- Choose floor covering which is appropriate for specific activity areas, e.g., hard surface for wheel-toy play.

- Choose floorings which resist moisture, e.g., vinyl, urethane, basket carpet, etc.

- Minimize the types of flooring to make maintenance easier. However, carpet in three colors and five textures will still only be one type for maintenance equipment and supplies.
- Carpeting should comply with provisions of DOD 4270.1-M.
- Provide a variety of soft surfaces with slight level changes in infant crawling areas.
- Define activity areas and circulation through use of color, texture, and-or slight level changes.

RELATED ITEMS
CHILD COMFORT AND CLIMATE CONTROL
LIGHTING APPROPRIATE TO ACTIVITIES
CHILD-SCALE BUILDING MATERIALS
ACTIVITY-APPROPRIATE TEXTURE AND COLOR CUES
THE NEED FOR INTERIOR PARTITIONS MAY CHANGE AS PROGRAMS, TEACHERS, AND ADMINISTRATORS CHANGE. WITH POPULATION SHIFTS, SPACE MAY NEED TO BE REAPPORTIONED.

Whatever kind of partition system is being used within a facility, the walls must be a functional part of the child-care program to earn their existence. They should be used to create visual and aural privacy between different activities. They should also function as display space, chalkboard surface, include storage, shelves, coat hooks, pegboards, etc.

In order to stimulate touch and vision, walls may be muraled, carpeted, corked, bricked, etc. to provide color and tactile experiences. Half-walls may do most things a full wall does, but in addition, provide climbing, seating, plant area, puppet stage, etc. Glass walls may be considered where acoustic but not visual separation is required.

Surfaces of walls must be cleanable because areas which are not well-maintained invite further careless use, vandalism, and litter (Cooper, 1975; Allen, 1968).

WALLS MUST WORK AS STORAGE, DISPLAY, SENSE EXPERIENCE, WRITE-ON SURFACE, AS WELL AS DIVIDE SPACE AND PROVIDE ACOUSTIC SEPARATION. FURTHER, INTERIOR PARTITIONS SHOULD BE AS FLEXIBLE AS POSSIBLE TO PERMIT THE REARRANGEMENT OF SPACES AS PROGRAMS AND POPULATIONS CHANGE.

- Use fixed interior partitions only where frequent changes in needs are not likely to occur (e.g., plumbing cores).
- Use of demountable partitions implies structural ceiling grid and flat ceiling in areas of use. If this is not desirable, use free-standing partitions instead.
Use all interior partitions as part of the child-care program by providing colors (murals) and textures for sense experience, storage, seating, write-on surfaces, display, and acoustic separation.

Provide display, write-on surfaces at child height (e.g., chalk boards or wipe-off plastic and water-color markers).

Provide a wall to paint on near the ARTS AND CRAFTS AREA.

Providing a sense of enclosure at child height may only require walls to be 2.5-3 ft. high. This will not interfere with the caregivers' view of the area. Half walls and low, free-standing partitions should be considered.

Provide all interior walls and trims with easily cleaned surfaces (e.g., gloss or semi-gloss finish and dark colors on trim and doors).

RELATED ITEMS
CHILD-SCALE BUILDING MATERIALS
FLEXIBLE FURNISHINGS
LIGHTING APPROPRIATE TO ACTIVITIES
PLUMBING FIXTURES AND SYSTEMS IN A CHILD-CARE FACILITY WILL BE USED NOT ONLY IN ORDINARY WAYS, BUT MAY ALSO BE USED IN "EXPERIMENTAL" CHILD-EXPLORING WAYS.

Small children are not just learning how to use plumbing fixtures and systems; they are learning to wash in basins, and to use toilets. They may also be learning to clean their own utensils (e.g., paint brushes).

Thus, plumbing is a novelty, and not yet taken for granted. Children will want to experiment with the phenomenon of toilet flushing. For the sake of maintenance, it is therefore necessary that waste pipes in particular be easily reached; clean outs should be placed frequently in the line in order to remove towels, toys, etc., which have been flushed.

Plumbing cores are a sensible solution to plumbing problems. In a child-care facility, clean outs from each core would be helpful. But shut-off valves for supply lines should be provided fixture by fixture rather than core by core, since a temporary shut-off for repair could be disastrous for small children.

Floor drains in washroom, laundry, and bathing areas are necessary because drain-clogging and overflows can happen frequently.

Another addition for child-safety includes water temperature controls which automatically control water from becoming too hot to handle.

Plumbing noise should be acoustically separated from other activity areas. This may be accomplished in ways other than with solid walls and doors.

ACCESSIBLE PLUMBING SYSTEMS

PLUMBING IN CHILD-CARE FACILITIES SHOULD HAVE ACCESSIBLE CLEANOUTS; INDIVIDUAL SHUT-OFF VALVES FOR EACH FIXTURE; FLOOR DRAINS IN EACH AREA; AND WATER THERMOSTATS WHICH ONLY ALLOW TEMPERATE WATER.
RECOMMENDATIONS

- Provide frequent accessible clean-outs in drain line to control many clogging problems.

- Provide shut-off valves to each fixture, thus precluding shut-down for an entire plumbing core during repair.

- Provide floor drains in each washroom, bathing area, and laundry area to help prevent flooding.

- Provide temperature controls on hot water supply to prevent scalding water being fed to child areas. Maximum water temperature should be 110°F.

- Provide drinking fountains with mouthguard and angled jet. They should be sized for children, with at least half of the fountains mounted 30 inches from the floor.

RELATED ITEMS

CHILD COMFORT AND CLIMATE CONTROL
ACCESSIBLE AND OPERABLE HARDWARE
WORKING WALLS
ISSUE

EDUCATIONAL TECHNOLOGY--AND DEPENDENCE ON ELECTRICAL POWER--IS EXPANDING AND CHANGING SO RAPIDLY THAT ELECTRICAL NEEDS TODAY MAY BE VERY DIFFERENT FROM THOSE 10 YEARS FROM NOW.

JUSTIFICATION

Schools which do not have sufficient electrical outlets for all the demands made on them cannot function properly. Being able to plug in equipment in only one or two spots severely limits the variety of ways in which children and staff would otherwise use a space.

Putting sufficient electrical outlets in new construction or drastic remodeling will be less expensive than having wasted space and/or having to add outlets later.

This is also true for built-in sound and video systems. Providing for easy installation (maybe even at some future date) of a p.a. system, closed-circuit T.V., and stereo broadcasting systems is prudent since the lines are much less costly to put in during construction whether equipment is planned immediately or in the future.

The trend to use video-taping equipment in education is well established. Video tapes are used by children and teachers to see and hear themselves and to improve their own performance. Commercial video tapes are used for learning. Video taping of network T.V. shows (e.g., Sesame Street, Charlie Brown specials, etc.) is an inexpensive way of saving these special programs for use at appropriate times. At Oakland Army Base, observers saw teachers viewing special video tapes for inservice training.

Obviously, electrical systems in an open-plan child-care facility cannot rely on walls for sufficient outlets. Floor grids or ceiling grids must be considered.

Another aspect of the electrical system is the necessity for safety with small children. Outlets must either be out of reach or protected in some child-proof way. There are currently available covers for outlets which require special knowledge to open. This type of protection should be considered.
ENCLOSED ELECTRICITY EVERYWHERE

BUILDING OPERATIONAL FLEXIBILITY REQUIRES THAT SUFFICIENT ELECTRICAL OUTLETS BE AVAILABLE THROUGHOUT ALL SPACES TO PERMIT MULTIUSE. FUTURE CIRCUITRY NEEDS (E.G., CLOSED-CIRCUIT T.V., VIDEO-TAPING EQUIPMENT, ETC.) SHOULD BE PLANNED FOR AT THE BEGINNING.

RECOMMENDATIONS

- Double electrical outlets 12' O/C in large spaces would probably ensure sufficient electricity for flexible use (see Travel Report, 1978).

- Electrical outlets in smaller spaces should suit usage (e.g., office space will require extra outlets for type writers, adding machines, and other production equipment).

- All outlets must be out of children's reach or protected with child-proof covers.

- Provisions for easy installation of audio and video equipment should be made at the beginning.

- See TM5-811-2, "Electrical Design-Interior Electrical System" for recommendations on wiring systems.

RELATED ITEMS

WORKING WALLS
LIGHTING APPROPRIATE TO ACTIVITIES
ISSUE

CERTAIN BUILDING MATERIALS ARE APPLIED IN
WAYS WHICH CREATE SURFACES AND SPATIAL
IMPRESSIONS INCONGRUENT WITH CHILDREN'S
SCALE.

JUSTIFICATION

Units of wood, masonry, glass, etc. can appear
to a child to be something which could actually
be handled (e.g., a single brick, a narrow
grooved piece of wood, a small pane of glass,
etc.), or they can be massive (e.g., an
expanse of featureless white wall).

Because of children's size and activity
patterns, they tend to stay closer to the
floor than do adults. They are also more
likely to be in closer contact with windows
and walls, and are more occupied than are
adults with activities which involve tactile
and visual interaction with materials and
surfaces around them.

Therefore, it is important that their environ-
ment consist of materials which are child
scale and are more reassuring and inviting.
The children may even be able to perceive a
relationship between the building materials
used and the elements of building toys with
which they play (e.g., blocks, lincoln logs,
etc.).

PATTERN

CHILD-SCALE BUILDING MATERIALS

CHOOSE MATERIALS WHICH INDIVIDUALLY COULD BE
HANDLED BY A CHILD OR WHICH APPEAR TO BE OF
A SIMILAR SIZE.

RECOMMENDATIONS

• Bricks, small concrete blocks, or textured
  masonry which look like small pieces (e.g.,
  large concrete blocks scored to look like
  smaller units) are preferable to featureless
  poured concrete.

• Narrow grooved wood is preferable to wide
  planks.
• Relatively small panes of glass are more in keeping with child use than wide expanses of sheet glass.

• Walls without texture can be "re-scaled" with graphics, murals, tackboards, display shelves, etc.

RELATED ITEMS

SCALE: CHILDREN USE THE BUILDING INDEPENDENTLY WORKING WALLS
SMALL CHILDREN'S NEEDS FOR CLIMATIC CONDITIONS MAY BE DIFFERENT FROM ADULT NEEDS, AND WILL ALSO VARY ACCORDING TO THE LEVEL AND TYPE OF ACTIVITY.

Because children spend so much time on the floor and are naturally nearer the floor, the air quality at this lower-than-normal level must be considered.

For this reason, it would seem logical to suggest radiant floor heat. But it was found at The Learning Place that radiant floor heat was so fatiguing for staff feet and legs that they had to rely on another peripheral heating system instead.

Because optimal climate conditions will vary with age, health, activity level, and other factors, it is difficult to make specific recommendation on exact combinations of radiant temperature, air temperature, relative humidity, and air movement (Prescott and David, 1976).

Prescott and David (1976) suggest that correct licensing procedures and state requirements will also help determine thermal requirements appropriate to each locality and situation.

PAYING PARTICULAR ATTENTION TO CONTROL AT CHILD LEVEL, THE HVAC SYSTEM MUST BE DESIGNED AND ZONED TO RESPOND TO A VARIETY OF THERMAL NEEDS.

Temperatures in all rooms occupied by children should be between 68-72° Farenheit, measured within 1 foot of the floor.

Separate the climate control of very active areas and relatively quiet areas.

Tamper-proof thermostats should be provided and located at children's height and no more than 36 inches above the floor.
A relative humidity of 50-55% should be maintained during the heating season.

At least 5 cubic feet per minute of outdoor air for each occupant should be provided, based on the posted maximum occupancy of the facility.

Toilets, lavatories, and kitchens should have adequate exhausts.

Smoke detectors should be installed on the ceiling of each story in front of the doors to the stairways and at no greater than 30 feet spacing in the corridors of all floors containing the center. Detectors shall also be installed in lounges and recreation areas in centers. The detectors may be single-station units with an integral alarm having a decibel rating of at least 85.

Infants will require special conditions and zoning of HVAC systems should reflect this.

Air conditioning is recommended in hot climates.

Locate any equipment (room heaters, fans, etc.) out of children's reach or screened from touch.

Provide warm floors through a combination of heating methods, floor construction, and floor coverings.

If facilities are used part time rather than all day, a system which can alter conditions rapidly would be advisable.

Provide siting for thermal requirements, heavy insulation and planning for solar gain as a necessary part of thermal system design.

RELATED ITEMS

FLOOR FUNCTIONS WITHIN THE PROGRAM
ACCESSIBLE AND OPERABLE HARDWARE
ISSUE

CERTAIN SOUNDS ARE COMFORTING AND INTERESTING TO CHILDREN WHILE OTHERS PRODUCE IRRITATION, DISTRACTION, AND FATIGUE.

JUSTIFICATION

Sound can be used to heighten interest in activities and to relate activities to space, e.g., a quiet space for resting, an acoustically alive space for physical activity.

The level of constant background noise which is usually acceptable is defined as that level which allows one to hear normal speech easily. Continuous, featureless noise at low levels appears to have little effect on performance, while intermittent or irregular sounds can be more annoying and distracting than steady sounds.

Extreme quiet does not necessarily provide an appropriate environment for many learning activities. Familiar noise is less annoying than strange or unnecessary sound and high-pitched noise is more fatiguing than low-pitched noise.

Therefore, an examination must be made of noise relationships between activity areas (see ZONING) and appropriate acoustic protection must be provided where needed.

It would, of course, be most effective to double-function chalkboards, pin-up surfaces, storage, etc., as acoustic barriers and absorbers.

PATTERN

ACOUSTIC CONTROL

WHEN ZONING ACTIVITY AREAS, GROUP QUIET AND NOisy AREAS SEPARATELY. USE SOUND INSULATORS OR SOUND ABSORBERS TO PROTECT QUIET ACTIVITY SPACES. THE NEED IS TO PROVIDE AN ENVIRONMENT IN WHICH WANTED SOUNDS CAN BE COMFORTABLY AND EFFECTIVELY HEARD, AND UNWANTED SOUNDS CAN BE CONTROLLED, DISSIPATED, AND ABSORBED.
RECOMMENDATIONS

- If noise around the site is unavoidable, sound intercepting materials should be placed in exterior walls and landscaping should be arranged to provide insulation from the noise source.

- Sound barriers must be airtight. Even the smallest cracks or open joints greatly reduce sound insulating value of walls.

- Back-to-back wall outlets, air ducts, location of plumbing facilities can create openings through which sound can escape.

- Group noisy activities together and separate from quiet spaces.

- Open plans do not necessarily produce a high noise level, but rather produce a background hum which is adjusted to by users.

- Hard flooring can be expected to produce high noise levels.

- Treat either the floor or ceiling acoustically, but not both because of the possible deadening effect.

- Floor treatment stops sound where it starts while a hard ceiling reflects sounds where they are wanted.

- Double-function chalk boards, dividers, tack boards, storage units, etc. by placing sound absorbing materials on the appropriate side.

RELATED ITEMS

SIMPLE STRUCTURAL SYSTEMS ON DISPLAY
WORKING WALLS
ISSUE

PROPER LIGHTING DESIGN HAS THE POTENTIAL TO PROVIDE NOT ONLY THE REQUIRED LIGHT LEVEL FOR THE TASK, BUT ALSO TO CONTRIBUTE TO THE SPIRIT OF THE ACTIVITY.

JUSTIFICATION

Teachers and others who spend time with children have long recognized the powerful effect light levels have on the behavior of children. Many teachers use light to cue children to expected behavior (turning down the lights when it is "quiet time," etc.).

It is also accepted that light levels affect attention spans; children (and adults) tend to focus on that which is most highly illuminated. Uniform background lighting actually makes distractions more likely. For these reasons, Alexander, Ishikawa, and Silverstein (1977) recommend "pools of light" which help define activity and group areas.

Osmon (1971) and others recommend daylight from windows and skylights because light from a window falls horizontally and makes a useful contribution to softening the effect of down-lighting. A view through a window also helps to avoid an oppressive sense of enclosure as it provides a link with the constantly changing out-of-doors.

Art display areas have a special need of the total light spectrum for color definition. This can be provided by natural daylight and-or supplementary incandescent lighting.

There is also evidence that fluorescent lighting can induce or exacerbate hyperactivity in children because of the type of radiation it emits (Ott, 1975; see also Painter, 1976, for preliminary empirical research). Because of the nature of alternating current, electricity passing through a tube fixture causes the gas to emit 120 flashes of light per second. Although this is too many flashes to be perceived by the naked eye, the physiology of the people in the room is undeniably affected.
ACTIVITY-APPROPRIATE LIGHTING

WITH THE EFFECT ON CHILDREN'S BEHAVIOR IN MIND, COMBINE NATURAL AND MANUFACTURED LIGHT TO CREATE ACTIVITY-APPROPRIATE LIGHTING DESIGNS.

RECOMMENDATIONS

- In general, use low illumination levels for less-active areas and higher illumination for more-active areas.
- Create "pools of light" as appropriate to activity areas. In an open program, these "pools" may need to move, so changing light patterns must be possible (e.g., with mobile track lights, fixed lights with separate dimmer switches, movable luminaries, etc.).
- Use siting baffles, roof overhangs, shades, etc., to control natural light so that brightness ratios are not too disparate.
- Use natural light and supplementary incandescent light to give the full color spectrum viewing in art areas.
- Consider maintenance operations and costs when designing lighting.
- Highlighting of activity areas, displays, and objects will work only if other light levels are low by comparison.
- See NFPA 101 Life Safety Code (1976; Section 5-9) for emergency lighting requirements.
- Illumination levels and recommendations for lighting design are made in DOD 4270.1-M and the IES Lighting Handbook.
- If because of its relative cheapness, fluorescent lighting is unavoidable, supplement it with incandescent and natural lighting. This will lessen the effect of the 120 flashes per second emitted from fluorescent tube fixtures.

RELATED ITEMS

ACCESSIBLE BUT SAFE ELECTRICITY
ISSUE

COLOR IS KNOWN TO STIMULATE VERY INTENSIVE REACTIONS IN YOUNG CHILDREN. INAPPROPRIATE COLOR USAGE CAN ACTUALLY PRODUCE UNINTENDED BEHAVIOR AND USE OF FACILITIES.

JUSTIFICATION

Research indicates that perception of color dominates over form in early childhood. (Texas A & M University, 1969). Therefore, the usual architectural clues which indicate entry, activity area, etc. may actually be imperceptible to small children and will certainly be superceded by color stimuli. Using color to indicate expected activity intensity, to guide children within the center through use of graphics, may be abhorrent to purests who would prefer to use form, but the reality is that color will be a stronger visual cue.

To be effective, color cues must be at least partially at child level—the floor and wall up to 3 feet. Large expanses of very vivid colors are probably not appropriate. Neutral colors for large blocks with smaller areas of bright color to highlight entry areas, special activities, even special objects, would be more useful.

A band of color in the floor or lower wall could actually guide children and draw them on. Particularly if the band is a special texture, fun to touch, a child could be directed to the yellow activity area and left to get there by following the band. This would be especially useful for children who "drop in" but do not attend regularly.

Textures will also help cue children in activity areas. Taylor and Vlastos (1975) found that soft textures helped children to feel relaxed and quiet. Harder finishes and surfaces will help make a space noisier and livelier. Textures can emphasize activity space boundaries (e.g., carpet and harder flooring edges). Different carpet textures can even be used as boundaries since children spend so much time on the floor.
In choosing colors, the generally accepted interpretation is that the red-orange-yellow part of the spectrum stimulates excitement, tension, and a feeling of warmth, while the purple-blue-green hues result in a feeling of calm, coolness, and reduced anxiety (Prescott and David, 1976). Obviously, high activity areas will be more likely to use warm colors, while napping, reading, etc. areas would require cooler colors.

A problem which must be considered when color is an important element in design, is maintenance. When repainting (or other "redecorating") is necessary, some provision must be made to ensure that original, clear, bright colors are not repainted with duller, less vivid colors simply because the duller colors are easier to get.

**PATTERN**

**ACTIVITY-APPROPRIATE TEXTURE AND COLOR CUES**

USE SMALLER AREAS OF VIVID COLOR APPROPRIATE TO ACTIVITY WITHIN THE AREA, WHILE USING MORE NEUTRAL COLORS (WHITE, PALE GRAY, ETC) FOR LARGE EXPANSES WHERE CHILD ART WORK, ETC., WILL BE DISPLAYED. USE COLOR GRAPHICS ON THE FLOOR AND WALLS AS GUIDANCE CUES IF APPROPRIATE TO DESIGN. USE A VARIETY OF TEXTURES TO HELP CHILDREN DISTINGUISH QUIET AND ACTIVE SPACES.

**RECOMMENDATIONS**

- For large background areas and walls which will be used for display, choose neutral colors (white, cream, pale gray, etc.)

- For smaller areas where color can emphasize expected activity level or can highlight a high-use object (e.g., a climbing frame), use bright, vivid colors appropriate to activity: red-orange-yellow hues for very active areas; blue-green-purple shades for more quiet areas.
• Use softer textures in quiet areas, some harder surfaces in active areas to help cue children to anticipated use. Since textures are so important in learning (Montessori), use as many kinds of surfaces as can be made consistent with design.

• If appropriate to design, use color-texture graphics on floor and walls (no higher than 3 feet) to guide children through the center. Color will probably be the single most powerful visual cue the designer can give to small children.

• Army Regulations (AR 608-1) prohibit the use of lead-based paint in child-care facilities. In renovated facilities, existing paint is to be tested for lead content either by direct read-out instrumentation or by chemical analysis of samples. If lead paint is found, the lead paint must be removed or the lead painted construction enclosed in new impervious construction.

RELATED ITEMS

WORKING WALLS
FLOOR FUNCTIONS WITHIN THE PROGRAM
ISSUE

CHILDREN NEED TO OPERATE MOST HARDWARE IN A CHILD-CARE FACILITY. BUT THERE MAY BE SELECTED STORAGE AREAS (E.G., FIRST AID) WHICH ADULTS DO NOT WISH TO BE ACCESSIBLE TO CHILDREN FOR SAFETY AND OTHER REASONS.

JUSTIFICATION

Children must be able to reach and operate most hardware. Latches, doorknobs (if there are doors), handrails, etc., all must be within child height and operable by child-size hand and strength.

In areas where children should not have access, locks and bolts should be placed out of children's reach.

Since small children can lock themselves in (accidently or not), hardware for children should be openable from either side and non-locking.

Latches or other hardware may also be a source of experimentation for children. Learning how latches work may be a child's goal. Hardware should then be as simple and as easy to repair as possible.

Hardware can be a source of danger if it has sharp edges or protrusions. Children do not yet have full control of body movements and can fall against or run into surfaces easily. Sharp or protruding hardware can be very hazardous to small children.

PATTERN

ACCESSIBLE AND OPERABLE HARDWARE

HARDWARE INTENDED FOR CHILDREN SHOULD BE AT CHILD HEIGHT, EASY FOR SMALL HANDS TO OPERATE, AND FREE OF DANGER. HARDWARE NOT INTENDED FOR CHILDREN SHOULD BE OUT OF CHILDREN'S REACH.
RECOMMENDATIONS

- Hardware for children should not be higher than approximately 2-2½ feet.

- Hardware for children should have knobs, railings, or handles small enough for children's hands.

- Hardware for children should operate from either side (so a small child cannot be shut in a cabinet and unable to get out, etc.).

- Hardware for children should be free of sharp edges and dangerous protrusions.

- Hardware for children should be simple and easy to repair and maintain.

- Hardware not intended for children should be placed out of children's reach.

- Hardware not intended for children should still be operable from either side (just in case of accident).

RELATED ITEMS

FLEXIBLE FURNISHINGS
CHILD-SCALE BUILDING MATERIALS
ISSUE

FURNISHINGS IN A CHILD-CARE FACILITY CAN EITHER SUPPORT OR INHIBIT VARIETY OF PLAY-WORK EXPERIENCES. THEY CAN HELP CREATE A WARM, HOMEY FEELING, OR EMPHASIZE AN INSTITUTIONAL ATMOSPHERE.

JUSTIFICATION

Inappropriate furnishings can be counterproductive even in the most carefully planned space. Some obvious points should be made:

- Furnishings which cannot be moved easily will limit the flexibility of use of any space.

- Both adults and children will use the facility and furnishings must be sized to be comfortable for each user group. Therefore a variety of seating, play, and work positions should be possible.

- Very few children spend much time sitting in a straight chair at a table or desk. Not many adults prefer this position for extended time periods either.

- For safety, furnishings which can be easily tipped, which have sharp corners or edges or splinters, or which have possibly toxic finishes are not suitable in a child-care facility (Texas A & M University, 1969).

Beyond these rudimentary requirements, furnishings may be examined to determine their positive contributions to child-care facility programs. Examples of these would be furnishings which are mobile enough to push out of the way; which can help define activity areas and circulation while also providing storage, writing surfaces, cubbies, display space, informal napping space, and becoming puppet stages, back-drops for dramatic play, etc., when needed. A stackable table-top stool which can be used to stand on, sit on, draw on, etc., is another example of truly flexible furniture.

Since children spend a majority of time on the floor, level changes, soft floor areas, roll-up mats, floor cushions, etc. may provide a majority of necessary seating space. For a "homey" atmosphere some soft, comfortable seating that adults and children can share together and a few rocking chairs for lap-
sitting would encourage pleasant adult-child relationships.

Since research has shown that a child's interest span is directly related to the variety of environmental elements and choices available, furnishings should help provide that variety. Further, the ability of a child to affect and change the environment to suit immediate needs is developmentally important and should be considered when planning furnishings.

However, if everything is changeable by children, stability will be lacking and adults and children will be confused and disoriented. So, major furnishings such as large storage pieces, bookshelves, etc., should have lockable casters or some other method of preventing random movement so that adults will be the ones to move them.

Finally, furnishing in a child-care facility should be planned recognizing that there are indeed three dimensions and that the space between three feet and the ceiling is usually wasted. Displays can be hung from the ceiling, even seating (i.e., basket chairs, hammocks, etc.) can be hung and then pulled out of the way when necessary.

FURNISHINGS SHOULD BE EXAMINED FOR VARIETY, SAFETY, STURDINESS, ANTHROPOMETRIC SUITABILITY AND FLEXIBILITY. FURNISHINGS SHOULD BE CHOSEN FOR THE POSITIVE CONTRIBUTION THEY CAN MAKE TO CHILD-CARE FACILITY PROGRAMS.

THE BUILDING MAY INCLUDE BUILT-IN FURNITURE THROUGH USE OF LEVEL CHANGES, SOFT FLOORINGS, DISPLAY WALLS, ETC. WHILE MUCH OF THE FURNISHINGS WILL BE MOVEABLE, LARGE PIECES USED TO DEFINE SPACES SHOULD BE MOVEABLE ONLY BY ADULTS.

- Almost all furnishings should be easily moved by one adult. Most furnishings should be movable by children, but incorporate methods of fixing them (e.g., lockable casters).
• Furnishings should be adaptable, adjustable, or through duplication, provide for the scales of both child and adult.

• Furnishings should be flexible, multi-use.

• Furnishings should be sturdy but should provide texture, color, softness, reminiscent of home.

• Furnishings should not be easily tipable, have sharp corners or edges, have splinters, or have possibly toxic surfaces.

• Use of floor as furniture will be enhanced by level changes (e.g., a seating pit), soft flooring, floor cushions, etc.

• Use of walls as furniture may be enhanced by display surface, built-in shelves, storage, and window seats.

• The third dimension may be used with furnishings that stack and furnishings that hang from the ceiling (e.g., hanging chairs, hammocks, display, etc.).

• Insure that there are plenty of soft objects which can be used by children, especially the very young ones, both for sensual-tactile stimulation, for comfort, and for the creation of privacy. Examples include: large rug or full carpeting; child-adult cozy furniture; rockers, couches.

• Beds, cots, cribs, and playpens should be provided for children appropriate to age and size and should be placed at least three feet apart on all sides unless placed against a wall. In conformation with FDA recommendations, spaces between crib slats should not be greater that 2 3/8 inches to prevent infants from strangling. (AR 608-1).

RELATED ITEMS

FLOOR FUNCTIONS WITHIN THE PROGRAM

WORKING WALLS