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INTRODUCTION

The purpose of this thesis is to provide architects, designers, and teachers with design guidelines they must be aware of when designing the adequate environment that will provide and support the "prepared environment" in Montessori classrooms. This prepared environment is a physical and psychological situation made ready for the young child in order to enhance the child's opportunity to learn through experiences provided for the child (Rambusch, 1962). The thesis is based on three types of information gathering: 1) the reading and analyzing of the books written both by Montessori and her followers, 2) interviews and inventories done in six Montessori schools in Milwaukee, Wisconsin, and 3) the existing environment-behavior criteria for early child care environments.

The Montessori Method concentrates on enlarging a child's experience and on making the conversion of natural curiosity into learning patterns. The child's individual potential is set free for self-development in a "prepared environment" which includes a teacher or directress, and the didactic materials, which are a system of exercises to be utilized by the child in designated ways,
for specific purposes. The goals of the Montessori Method are the development of self-confidence, independence, self-discipline, and love of learning (Orem, 1971).

The character of the built environment of child care centers has an important impact on early cognitive development. Children learn through a series of interactions with the socio-physical environment, which includes teachers, parents, staff and other children, and the designed environment. The quality of these interactions depends upon the possibilities for engagement which the environment provides (Moore, Lane, Hill, & Cohen, 1979). An enriched environment will therefore accelerate the development of perceptual, motor, and cognitive skills (Baird and Lutkus, 1982).

The design guidelines in this thesis are not intended to provide all the information required for the successful preparation of project designs. Environment-behavior researchers have already provided design criteria, patterns, and guidelines, in order to aid designers in setting goals for the design of a variety of early childhood building types. These manuals can be used for the planning, programming, and design of children's environments. Some examples of these manuals are: Environmental Criteria MR Preschool Day Care Facilities (Texas A & M University, 1969), Recommendations for Child Care Centers (Moore, et. al., 1979), and Patterns for Designing Children's Centers (Osmon, F.L., 1971). The usefulness of these existing environment-behavior criteria is that they have already analyzed the general concepts of child-
environment relationships and have a fundamental goal in common: to help children become competent learners.

Why must we have a manual for Montessori schools, and not follow one set of guidelines for day care centers? Because just as there are different reasons for day care centers, there are also different ways of viewing their goals. There are different viewpoints, life styles, child rearing practices, and educational values, so it seems more likely to create dynamic learning experiences for children than a simple, uniform constructed model. The development of children cannot be viewed separate from the social context in which it takes place. What is especially useful for one place, may not be so important in another.

ORGANIZATION OF THE REPORT

Before analyzing the results of the information gathered, we must first look at the historical background, in order to understand what forces made the Montessori Method an important educational philosophy. This section will be followed by "Content and Context Analysis of Montessori's Recommendations" which not only analyzes Montessori's books but also lists the basic differences between Montessori Programs and other learning environments. "Methods and Settings" describes the purpose of the observation methods used to gather data in the Montessori Schools. The following section "Description of Montessori Schools in Milwaukee" includes the type of buildings and philosophy found at each school. "Description of the Prepared
Environment" defines the six components which the design guidelines are based upon. And the last section of this Thesis is the "Design Guidelines for the Prepared Environment" which states the design guidelines to be used by the user.
HISTORY OF THE MONTESSORI METHOD

Maria Montessori was born in Italy, in 1870. In 1894, she graduated from the University of Rome, becoming the first woman to receive a medical degree in Italy. For 12 years she followed medical and educational pursuits: she was a graduate student in psychiatry, assistant director of the university psychiatric clinic, a lecturer in anthropology, a teacher of mentally deficient children, and a teacher trainer (Orem, 1971).

As she visited asylums for the insane she took an interest in the mentally-deficient children who were grouped together with the insane. To her, mental deficiency was a pedagogical problem, rather than a medical one (Standing, 1957). She believed that a special educational treatment could change their mental condition, a view shared by Jean Itard (1775-1838), and Edouard Seguin (1812-1880); both had previously worked with mentally deficient children (Rambusch, 1962).

Working 13 hours a day with the mentally deficient children, she developed the didactic materials which allowed them to perform reasonably well on school work previously considered far beyond their capacity. After a few years she presented the children from the mental institutions at the public examination for primary certificates, where they passed the exams that were meant for normal children (Orem, 1971).

According to Montessori, if these children could be brought to the academic levels reached by normal children then there had to
be something wrong with the education of normal children (Montessori, 1964). She became concerned with the application of the new didactic materials to the normal personality, and at the age of 28, she became directress of a tax-supported school located in the worst slum of Italy, the San Lorenzo Quarter.

The San Lorenzo Quarter was an area of crime and poverty where most children were left unattended while the parents were away at work. The government decided that it was cheaper to place all the children in one room and pay someone to look after them, rather than to constantly pay for the damage they were doing (Orem, 1971).

So in 1907, the first "Casa dei Bambini" (Children’s House) was opened. Maria Montessori observed the children as they showed themselves to be in a natural environment. Maria Montessori considered a natural environment to be one where everything is suitable for the child's age and growth, where possible obstacles to development are removed, and where the child is provided with the means to exercise the child's growing faculties (Lillard, 1972). Inducing from her observations certain principles, she consciously constructed a prepared environment, which will ensure certain child responses (Rambusch, 1962). This prepared environment consisted of the directress, who also lived in the San Lorenzo Quarter, and the didactic materials Montessori had created.

As the weeks went by, the children exhibited a degree of concentration, self-discipline, serenity of spirit, and respect for the rights of others, which was not observed in the mentally
deficient children. Montessori discovered "that children possess different and higher qualities than those we usually attribute to them. It was as if a higher form of personality had been liberated and a new child had come into being" (Orem, 1971).

Due to widespread reports, visitors came to the first "Casa dei Bambini", not only from other parts of Italy, but from other parts of the world. Consequently, Montessori worked out her own system for the propagation of her ideas and training of teachers in her method. These International Training Courses were given in Italy, France, Germany, Spain, England, Austria, Ceylon, United States, South America, and India (Standing, 1957). These training programs concluded with the issuance of a certificate which allowed its possessor to describe themselves as a Montessori teacher but prohibited them to be an instructor in the Method (Montessori, 1964, b). In other words, she allowed only disciples, no collaborators.

The Montessori Method was enthusiastically welcomed in the United States before World War I. At least eight books on the Method were translated and published between 1912 and 1915, but in contrast to other European countries where the Method was further experimented with and was accredited, no growth or development of the Method took place in the United States. According to Emma Plank, in Montessori in Perspective, the enthusiasm in which new ideas are accepted and propagated in the United States carries a destructive element: there is a similar disposition to disregard and forget them, and to move forward. There is no climate for continuing "movements".
American educators responded in three ways: 1) a minority attacked Montessori's work on the basis of her educational theory and practices, 2) some attempted to incorporate Montessori's method in existing school structures, and 3) many defended their existing school system for its weaknesses. In the United States Montessori schools were established on a private basis, (unlike Europe where they were publicly developed), so financially able parents placed their children in Montessori schools (Publications Committee of the National Association for the Education of Young Children, 1974).

After spending her life teaching and writing books, Montessori died in Holland, in 1952. Many regard her as the founder of a new method of education for small children. Presently, Montessori's principles and practices can be found in educational programs from the nursery school to seventh and eighth grade levels.
CONTENT AND CONTEXT ANALYSIS OF MONTESSORI'S RECOMMENDATIONS

ANALYSIS OF MONTESSORIAN REFERENCES:

In order to understand what Montessori specifies for the prepared environment, the books written by Montessori and her disciples were read and analyzed. Until now, the Montessori message in America has been promulgated by former disciples of Maria Montessori: E.M. Standing, R.C. Orem, and Nancy McCormick Rambush. The most important book written by Montessori is The Montessori Method which focuses on the education of children from three to six years old. Two other important books are Spontaneous Activity in Education, a theoretical and philosophical book, and The Montessori Elementary Material, a teaching manual (both books are concerned with the education of children from seven to eleven years old).

Montessori's writings have the spirit of reform that was emerging in the early part of the century. She has a creative and intuitive way of seeing and describing the developmental needs of children and observing which tools help them in their growth (Lillard, 1972). A major finding in her books is that Montessori describes the prepared environment with both abstract and detailed descriptions but few explicitly stated principles. For example, she defines the environment as "free and full of order"
and then describes the desks as having white tops so if the child
touches them with dirty fingers they can notice what they have
dirtied (Montessori, 1964, b). This "gap" between her
descriptions, from the high rhetorical descriptions to the precise
descriptions of the environment, provide the basis for this thesis:
to give architectural meaning to those highly abstract
descriptions.
The main aspects of this philosophy that revolutionized
educational methods are:

a) The design of an environment more in tune with the child's
size, with furniture she had constructed according to their size.
Montessori felt that fixed seats and desks of that time were
made to make the child immobile:
"... the seats were separated and the width so closely calculated
that the child could barely seat himself upon it, while to stretch
himself by making any lateral movements was impossible. This
was done in order that he might be separated from his neighbors."
(Montessori, 1964).

b) Her theories of the sensitive period in the development of
the child were new at that time. According to Montessori, there
are three stages of development: 1) the Absorbent Mind Period,
from birth to six years, 2) the Age of Instruction, from six to
twelve years, and 3) from twelve to eighteen years old, where
the "child", undergoes its most physical and mental
transformation (Kocher, 1973). It is during the Absorbent Mind
Period when the children's minds enable them to absorb the
stimuli of their environment with remarkable facility, where they
are attracted to certain exercises, activities, or occupations with an interest and concentration they can never display again for that particular kind of work. According to Edelson & Orem (1970), experiences during this sensitive period provide the foundations for later mental development. These findings reflect what we have mentioned before: an enriched environment will accelerate the development of perceptual, motor, and cognitive skills (Baird and Lutkus, 1982). Also, her discoveries of the child's need for repetition is stressed by modern child psychology (Publications Committee of the National Association for the Education of Young Children, 1974).

c) The Montessori Method is based on the principle of freedom in a prepared environment (Standing, 1962), where the traditional children's group was abandoned and children were left alone to pursue their own interests. To Montessorians, a free child is not one who can do anything the child wants, but one who behaves in accordance with accepted rules of the environment, and respects people and things (Orem, 1971). Therefore, when a child understands the idea of order and quiet, and wishes to rise and speak, they do it because they wish to, not because they are forced to (Montessori, 1964, b).

Regarding the success of the San Lorenzo Quarter there are two issues we have to consider:

1) Was its success due to several factors that we are not able to reproduce today? For example: a) These children had not been exposed to a "stimulating environment" or to an
"environment prepared just for them." Today's children have television, radio, electronic toys, and computers that influence their senses at a much earlier age. b) The Montessori school was one of the tenement buildings in the San Lorenzo Quarter. c) The fact that the teacher herself lived in the San Lorenzo Quarter was probably quite important.

2) The second issue Montessori mentions in her book, the *Discovery of the Child*: "The environment is secondary in the phenomena of life. It can modify, as it can assist or destroy, but it can never create. The source of growth lies within." (Montessori, 1967, p.63). Was this what happened in the San Lorenzo project? Probably a simple room, with a few pieces of furniture, but great accomplishments took place there. This is important for the designer, for the physical environment cannot be considered as the sole determinant of the behavior system since this weakens many aspects of the human-environment interface (Moleski, 1974).

The "wonders and miracles" of the Montessori Method have been widely publicized, but it has not been spared from some criticism by educators. According to the book, *Montessori in Perspective* (1974), the major criticism regarding the Montessori Method is the expected use of the highly structured didactic materials. The didactic materials are designed to teach specific concepts of size, space, contours, etc., but they may be used in only one way to fulfill the correct lessons they were designed to teach. According to educators, this limits the child in using them in an
imaginative way, such as discovering and creating different uses of the material.

Montessori also has been criticized in that even though the child is allowed to come together with others to work, most of the work is individualized work, and many feel that Montessori schools may not give young children enough experience associating with others of one’s age group, cooperating, etc.

**MONTESSORI IN CONTEXT:**

In Moore et al’s *Recommendations for Child Care Centers* (1977), four types of child care programs are described:

1) **The Custodial Child Care Programs** which meet the immediate needs of the child, overall well-being, safety, and health; it is similar to "baby-sitting."

2) **The Developmentally-Oriented Child Care Programs** where opportunities are developed for social, intellectual, and physical interaction within a context of security, trust, and care. These programs employ trained caregivers, have appropriate materials, program structure, goals and activities, and use consultants in health, education, nutrition, exceptional education, and other fields.

3) **The Nursery School or Formal Preschools** include mostly 4-5 year olds, are academically oriented educational programs, and stress emotional, intellectual, and social development. Since they are usually half days, they assume parents will provide health, nutrition, and other needs.
4) The **Comprehensive Child Supported Programs** offer varied curricula activities, services, and opportunities for children and their families. Their purpose is to support family life in the broadest sense, including quality child care, daily counseling, health, nutritional services, and other community services.

*Recommendations for Child Care Centers* (1977) describes two distinct approaches to early childhood education:

1) The *highly structured teacher-directed approach* is characterized by specific objectives carried out under the direction of the teacher. Adults set predetermined goals for children and plan specific lessons which such goals may be achieved. Their main goal is to prepare children for elementary school.

2) The *free-choice, child-directed approach* allows the children to direct their own activities according to their individual inclinations. The adults set the stage carefully in this model, then act as resources for the children rather than as initiators of programmed lessons plans. All activities, including play and child care activities like diapering, eating, napping, are regarded as having developmental and learning potential.

The Montessori Method is regarded as a developmentally-oriented child care program, with an especially trained teacher by the "American Montessori Internationale" or the "American Montessori Society", with appropriate materials (the Didactic Materials), and with a definite program structure, goals, and activities (the Montessori Method).
Montessori schools tend to be more child-directed than the teacher-directed approach, since the child is allowed the freedom to work on self-chosen tasks in an attractive environment (the prepared environment), especially designed and equipped with the didactic materials to meet the child's needs. The Montessori Method does not emphasize learning through talking and listening, but learning through doing and manipulating without interruption. The central idea is that children cannot be educated by anyone else, they must do it by themselves or it is never done. But even though Montessori talks about the need of freedom to choose which didactic material to work upon, the child can only choose a didactic material the child has already been instructed in how to use, so the child does not have complete, absolute freedom.

Another important difference between Montessori schools and other early education centers is that within the Montessori classroom there is only one set of didactic materials, unlike other schools where there might be several sets of the same kind of toy. The didactic materials are arranged similarly in all Montessori schools. In other words, a child visiting a different Montessori school, will find the same didactic materials arranged in the same order. According to Montessori finding things in their proper places and putting them back again satisfies the child's need for order (Standing, 1962).

In conclusion, these are the basic differences between Montessori and other early learning environments:
1) A prepared environment that includes the directress and the didactic materials.
2) The child can work on any didactic material as long as the child has been instructed in how to use it.

3) The didactic materials are single in matter and are aligned in the same way in all Montessori schools.
METHODS AND SETTINGS

User programming studies are based on two factors: a) the research and analysis of the user group in a specific type of setting, and b) translating this research into design information useful for the designer (Zeisel, 1975). In order to understand the present needs of the Montessori school users (students, teachers, staff, etc.), of six schools in the Milwaukee area were visited. Multiple research methods, for example, field observations, interviews, map drawings, and observations of natural group behavior, were used to prevent biased information (Zeisel, 1975).

I have titled this section "methods and settings" and not observations because this word implies observing the children in each school for several hours, throughout several days, in order to obtain valid research data in the use of their environment, and how the environment enhances or inhibits their behavior. Observations for several days were not possible for two reasons: 1) some schools did not permit the observation of classes in session, and 2) lack of time to undertake lengthy observation times. Nevertheless, each school was visited from three to four hours, the classrooms were "observed", and the teacher and/or director were interviewed.

The purpose of the inventories were:
1) To understand how the prepared environment is set up in the classroom (including arrangement of the didactic materials around the room).
2) Amount of square footage allocated for the areas that contain the didactic materials. To obtain this information, for each classroom visited a plan of the room(s) was drawn, with the space allocated (if any) for each section, and the type and arrangement of the furniture for each area.

3) The uses and dimensions of "The Line" (exercise area for fine motor exercises defined by floor markings).

4) New needs of the Montessori schools that Montessori did not address in the early nineteenth century, such as computers, audio visuals, etc.

The interviews were used to reinforce and refine data gathered by observational methods. The purpose of the interviews was to answer: 1) new issues that the Montessori Schools are facing, 2) present use and meaning of the different didactic materials, 3) specific needs of the prepared environment, and 4) interpret the meaning behind any previous observed behavior.

A sample copy of the interview forms can be found in Appendix A.
DESCRIPTION OF MONTESSORI SCHOOLS IN MILWAUKEE

This section covers the general information regarding the Montessori schools, while the detailed findings (those that apply directly to the design guidelines) are in the chapter of design guidelines.

Out of ten existing Montessori schools in the Milwaukee area, six schools were visited; the rest could not accommodate me into their schedules. Out of six interviews done (one for each school) two were either teachers or directress, and the rest were the directors of the Montessori schools.

BUILDING TYPE:

Montessori schools are located in all different kinds of environments: two renovated houses, two school buildings, a church's annex, and an office building (Refer to Table 1: Building Type and Philosophy, at the end of this chapter). The next diagrams illustrate the wide range of building types. Under each illustration, the name of the school and its location is given:
Lakeshore Montessori School: 1841 Prospect Ave.

Montessori Downtown School and Day Care: 831 N.Van Buren St.
Montessori Family School LTD, 5806 W. Burleigh ST.

Milwaukee Montessori School: 4610 W. State St.
Highland Community School: 2004 W. Highland Ave.

Montessori New World School: 7240 N. Lombardy Rd.

It must be clarified that the complete building was not studied in each case. The purpose of this thesis is to look at the "Children's House", which includes the ages of 2 1/2 to 6 year olds and not the elementary Montessori schools that were located
within some of the same buildings. Highland Community School
and New World Montessori School are the only two schools that
also had the elementary grades. Therefore, only the first floor of
Highland Community School, and one classroom in the second floor
of New World Montessori were observed.

Lakeshore and Downtown Schools are the least integrated
schools to a residential fabric. Family and Montessori schools
are located on the border of a commercial and residential area,
while Highland and New World Schools are located within the
residential fabric.

**Montessori Philosophy:**

Out of the six schools visited, three of them consider
themselves to be "true" or "pure" Montessorian schools, meaning
that they are more traditional in the Montessori Philosophy (refer
to Table 1: Building Type and Philosophy). They accept
Montessori teachings as being completely true, with no need to
change or to adapt Montessori's teachings to today's children.
The other three schools regard themselves as less traditional,
accepting new forms of technology such as VCR's and computers,
and believe that Montessori would have observed children in
today's environment and accepted these new forms of technology
as an important aspect of their environment. Regardless of this
philosophical difference they all agree on the importance and
exact usage of the didactic materials.
### Table 1: Building Type and Philosophy

<table>
<thead>
<tr>
<th>SCHOOLS</th>
<th>BUILDING TYPE</th>
<th>PHILOSOPHY</th>
</tr>
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<tbody>
<tr>
<td>LAKESHORE</td>
<td>RENOVATED HOUSE</td>
<td>○</td>
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<tr>
<td>DOWNTOWN</td>
<td>CHURCH ANNEX</td>
<td>○</td>
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<tr>
<td>FAMILY</td>
<td>OFFICE BUILDING</td>
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<tr>
<td>STATE</td>
<td>SCHOOL BUILDING</td>
<td>○</td>
</tr>
<tr>
<td>HIGHLAND</td>
<td>RENOVATED HOUSE</td>
<td>○</td>
</tr>
<tr>
<td>NEW WORLD</td>
<td>SCHOOL BUILDING</td>
<td>○</td>
</tr>
</tbody>
</table>

*TRADITIONAL ○
NON-TRADITIONAL ☐
DESCRIPTION OF THE PREPARED ENVIRONMENT

Montessori stresses the importance of the prepared environment for effective teaching and learning. This prepared environment, or "living lab" (Orem, 1971), is designed by an adult before the child enters it, and its aims are to: 1) help the child grow, 2) help the child grow physically independent, 3) satisfy his basic needs and tendencies, 4) help the child become self-sufficient, and 5) discipline the child (Kosher, 1973).

The two main components of the prepared environment are the directress and the didactic materials which are described below.

Directress: Even though Montessori and her disciples refer to the "directress", ("because she directs the child to learning" (Orem, 1971)), as a "she", two of the teachers interviewed were men. One of the directors suggested the use of the word "guide", and for the purpose of this last section, the word teacher and/or guide will be substituted for the word "directress."

The guide is the dynamic link between the didactic materials and the child (Montessori, 1967). The teacher is a perceiver of the child's needs, the preparer of the child's environment, the programmer with the materials and lessons, the protector of the child's right to learn, and must have the capacity and desire to observe accurately (Orem, 1971).

At first, the teacher may work collectively with the children (for example: tell them a story, play games, etc.), and after
conducting observations of the children the teacher attempts to
instruct and present each child to the ordered and active life of
the environment (Standing, 1962). The teacher must never force
an activity on the child, because then it would not be the child's
"spontaneous activity". The teacher does not have a desk or
table, but a low chair like the children's, and moves constantly
about the classroom (Rambusch, 1962).

Didactic Materials: The didactic materials, or "learning games"
(Orem, 1971) are designed to capture and stimulate the child's
curiosity, because they isolate particular sensory stimulus
(Standing, 1962). They are based on the materials used by Itard
and Seguin in their attempts to educate mentally deficient
children (Montessori, 1967). The didactic materials are divided in
four categories: daily living exercises (practical life), sensorial
materials, academic materials, and cultural and artistic
materials. The child "progresses" from one section to another,
provided he has been instructed by the teacher in their use.

The materials progress from the concrete to the abstract and
from the simple to the complex (Orem, 1966). The aim of the
didactic materials is to educate the senses by means of repeated
exercise (Montessori, 1964, b). They develop the child's
"independence, self-confidence, concentration, compliance,
coordination, and order" (Orem, 1971).

No child is allowed to use any didactic material until the child
has been fully instructed in its proper use (Standing, 1962,
1957). A child may take a didactic material only from the place
where it is displayed and when the child has finished using it, the material must be put back in its place and in the same condition it was found. The child may never pass a material to a companion, nor take the materials from someone who is using them.

The child can work with the didactic material wherever the child chooses: on a table, or on a rug spread out on the floor, and use the object as long as the child wants (Montessori, 1967). Children are free to group together in order to work on a certain project, or request help from the teacher if they need to (Orem, 1971).

The most important characteristic of these materials is their "control of error" (Montessori, 1964, b; Orem, 1971), which provides the children with continuous evidence of the correctness or incorrectness of their performance. If the child is using incorrectly the didactic materials, the materials are put away, and used again some other day. If the child is interested in the didactic materials, then the teacher leaves the child free to the choice and execution of the work (Montessori, 1967).

Components: In the book, Montessori, A Modern Approach (1972), the prepared environment is defined with six components: freedom, order, beauty and atmosphere, didactic materials, community life, and reality and nature. Architecture is not the sole determinant of these components, it may enhance the best environment for these to take place, but there are other factors
that affect this environment: the teacher, school philosophy, culture, willingness of child to study, etc.

Since these six components are the basis of the prepared environment, they have been used as the set of issues that the architect must be aware of when designing the prepared environment. The purpose of this thesis has been to define architectural solutions that support these components. Main architectural issues such as siting, image, circulation, overall layout, scale, light, and views have not been mentioned as different subtopics. These issues have not been ignored; rather they are mentioned under the "component" of the prepared environment that best supports it. The attempt of this thesis has been to present and develop the issues that are unique to the Montessori philosophy.

The components have been changed and have been ordered in what I consider to be most important in the prepared environment. Therefore, the components have been divided as follow:

I. Freedom

II. Order and the Didactic Materials: These have been combined since order is reflected in the placement and usage of the Didactic Materials.

III. Beauty and Atmosphere

IV. Community Life

V. Nature: The component "Reality" has not been dropped, it has been assumed to be in every component. Reality is having a
child scaled environment, and the appropriate materials to be used.

VI. Related Issues: Contains those issues that are presently important to the Montessori Philosophy, but do not fall into a specific category.

In this thesis a "classroom" refers to a room or set of rooms that contain within them one set of the didactic materials, have one or two directress, and a group of children that work there for extended periods of time (that is, they do not move from one room to another). Of the six schools visited, eleven classrooms were studied.