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ABSTRACT

The Children's Learning Center in Providence, Rhode Island, is a prototypical teaching/learning environment for preschool children aged 3-5. The center represents the first prototypical application of the Multi-Activity Zones for Education (MAZE) system. This study attempts to demonstrate and test the physical and operational performances of the MAZE system and explore its educational implications. The responsiveness of the MAZE system to these concepts has been achieved by redefining the nature of two elements that make up an environment--space and hardware. A nonprogramed, multifunctional informal space and a set of mobile, activity modules that function as environmental control elements, i.e., containers for a wide range of teaching/leaDning media and stimuli for tactile interactions, have replaced traditional, monofunctional space and equipment. These modules operate in spatial zones and can continuously generate and transform a wide range and scale of activities. Since these modules can be manipulated by all of the teaching/learning participants, the system responds to individual as well as to group behavioral and educational needs. To secure an evaluation of the multifunctionality of MAZE, the modules were physically manipulated over a 10-week period, providing continual changes in the learning environment. Each modification of a module and/or activity zone was preceded by observations that recorded the effects of physical change on learning, child-child and teacher-child interaction. (Photographs may reproduce poorly.) (Author/MLF)

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The Children's Learning Center:

A STUDY OF A SELF-MANIPULATIVE PHYSICAL ENVIRONMENT ON EARLY CHILDHOOD LEARNING

O.E. Grant No. OEG-1-71-0022 (509)
O.E. Project No. 1-A-037

April 14, 1972

Project Directors: Stanley Thomasson and Raimund Abraham of S.E.T.
Richard Archambeau, Director of the Joslin Children's Learning Center

M.A.Z.E. MULTI-ACTIVITY ZONES FOR EDUCATION

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PREFACE

The Studio of Environmental Technology, S.E.T., was co-founded by Stanley Thomasson and Raimund Abraham in 1968 to research and develop prototypical design concepts. In 1970, S.E.T. engaged in the development of a prototypical educational system termed M.A.Z.E. (Multi-Activity Zones for Education). Concurrently, two Providence social workers, Larry Swartz and Robert Lavalle assisted the Manton Avenue area residents in Providence, R.I. in forming a neighborhood association that proved highly effective in developing locally based and run community programs.

S.E.T. was commissioned by this neighborhood association to convert an existing defunct school into the Joslin Multi-Service Center which would contain facilities for a wide range of health, social service and educational programs. The educational component of this facility, named The Children's Learning Center represents the first prototypical application of the M.A.Z.E. system, which is licensed by the state of Rhode Island for 60 children and was funded by the Department of Health, Education and Welfare, at a total construction cost of $90,000.00.

The following testing and evaluation study was made possible by a $5,000.00 grant from H.E.W. The basic objectives of this study are to demonstrate and test the physical and operational performance of the M.A.Z.E. system, and explore its educational implications in an effort to develop a teaching/learning program that fully utilizes the potential of the system.

The original director, Barbara Carey, resigned upon completion of Phase I and was replaced by Richard Archambeau; therefore the study suffered from a lack of continuity.

INTRODUCTION

The Children's Learning Center in Providence, Rhode Island is a prototypical teaching/learning environment for pre-school children aged hree to five. It represents an effort to create a physical framework that is responsive to innovative concepts in early education - an environment that encourages the growth of the child's confidence, independence, curiosity, resourcefulness, resilience, competence, patience and understanding. This child-centered environment is based on the following assumptions:

1. That the child has an enormous capacity for inquisitivness and discovery which should be the primary basis for his development rather than preconceived adult concepts of what, when and how he should learn.

2. That in order for the child to fully exercise his capacities, he must be able to shape his own environment to an equitable degree and facility like an adult.

3. That any educational system that is truly oriented toward the development of the individual must be sufficiently flexible to respond to a wide range of variations in child behavior.

4. That groupings should be on mutual interests instead of externally imposed age or learning level norms, therefore the environment should permit spontaneous interaction between children.

5. That behavioral patterns play an important role in establishing an auto-educational process, therefore the environment should be responsive to the individual child's fluctuating needs such as (1) areas of privacy to work out problems (2) areas of semi-privacy to concentrate on a specific involvement, uninterrupted (3) areas public in nature to engage in robust exercise and activities.

6. Any teaching/learning process with its related environment, no matter how successful, has a tendency to run down - to become formalized. Therefore, the participants should be able to periodically re-program to provide new stimuli and input.

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7. The physical environment must be sufficiently responsive to provide for many methods and processes of learning to continuously redefine the relevance of early education in contempory terms.

The responsiveness of M.A.Z.E. to these concepts has been achieved by redefining the nature of two elements that make up an environment i.e. space and hardware. The mono-functional, <u>fixed feature space</u>, as manifested in the traditional classroom, has been replaced by a non-programmed, multi-functional <u>informal space</u>. The static, fragmentary, specialized, array of media and equipment has been replaced by a set of mobile, activity modules which function as environmental control elements i.e. containers for a wide range of teaching/learning media and stimuli for tactile interaction. These modules operate in spatial zones and can continuously generate and transform a wide range and scale of activities. Therefore, <u>space can be structured by time rather than by its physical properties</u>.

Since these modules can be manipulated by all of the teaching/learning participants, the system is responsive to individual as well as group behavioral and educational needs.

In order to test and evaluate the performance of this system, it is essential that its basic properties be clearly understood. What follows is a more detailed description of its physical characteristics.

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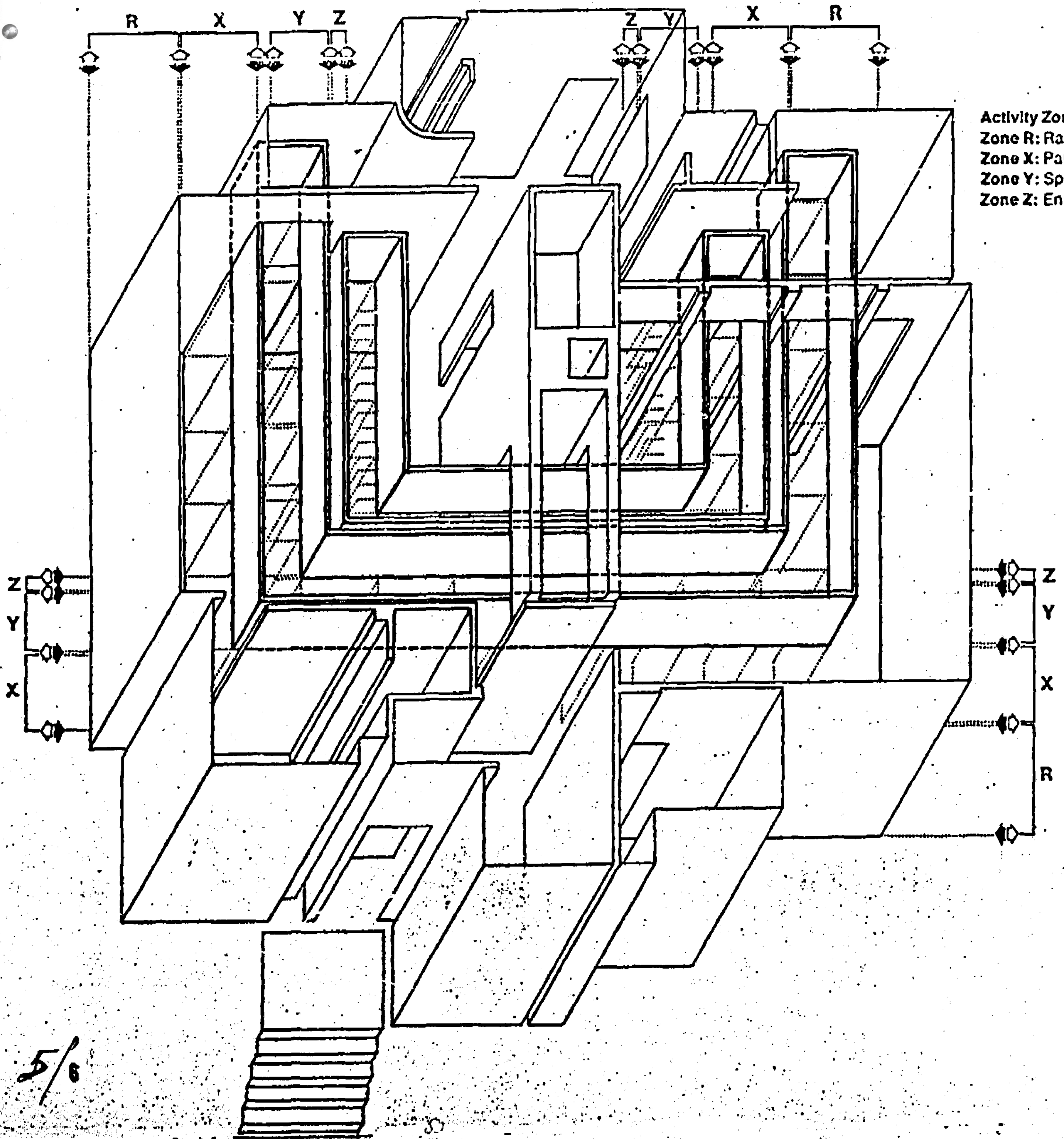


Activity Zones:
Zone R: Random Play / Informal Groups / Concept Formation
Zone X: Patterned Play / Large Muscle Development
Zone Y: Specialized Learning / Equipment Storage
Zone Z: Entrance / Individual Storage

PART 1

Physical Characteristics of M.A.Z.E.

A. Operation

M.A.Z.E. consists of a set of mobile multifunctional activity modules that operate in, and activate, a universal space. These modules move in activity cycles along activity zones in response to programmatic requirements such as the range, scale and distribution of activities. When operational, they respond, interact and generate overlapping spatial territories.

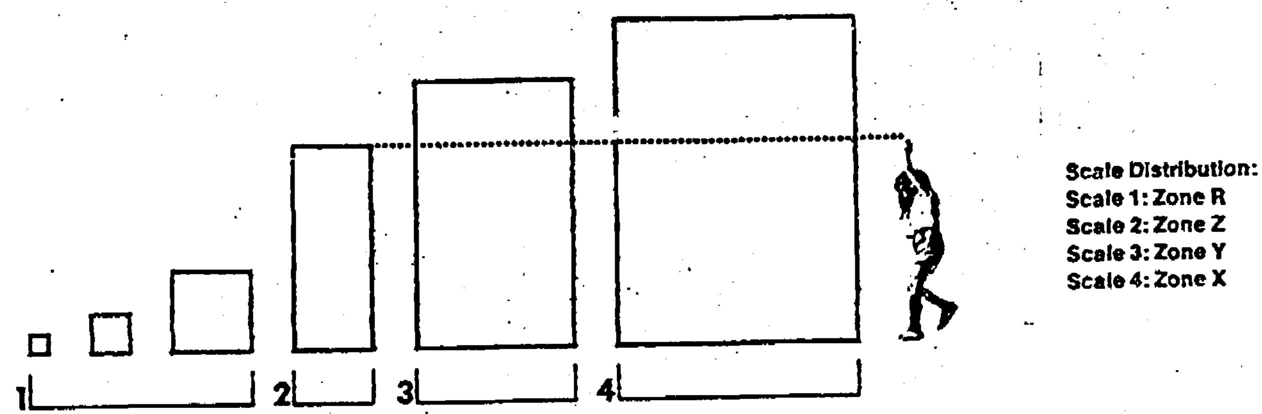
The function of these zones is three fold:

1. To provide a clear order, for structured change
2. To facilitate movement of the modules
3. To provide structural stability for the Teaching/Learning Modules

B. Scale Distribution

These multifunctional modules supplant the monofunctional fragmentary equipment in the traditional classroom. They operate in the four activity zones R, Z, Y, X at four activity scales:

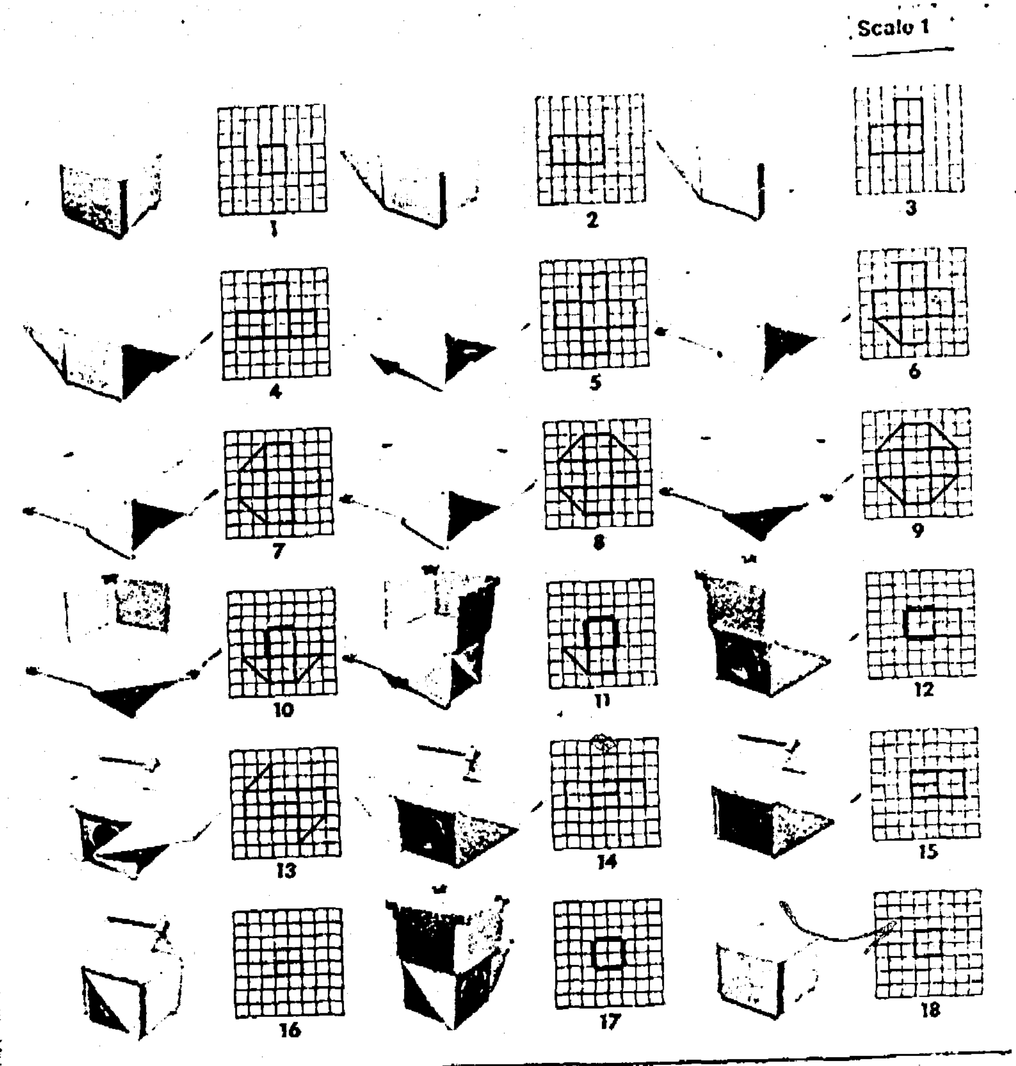
Scale 1: the equivalent of furniture
Scale 2: the equivalent of individual storage
Scale 3: the equivalent of general storge
Scale 4: the equivalent of play equipment



C. Module Characteristics

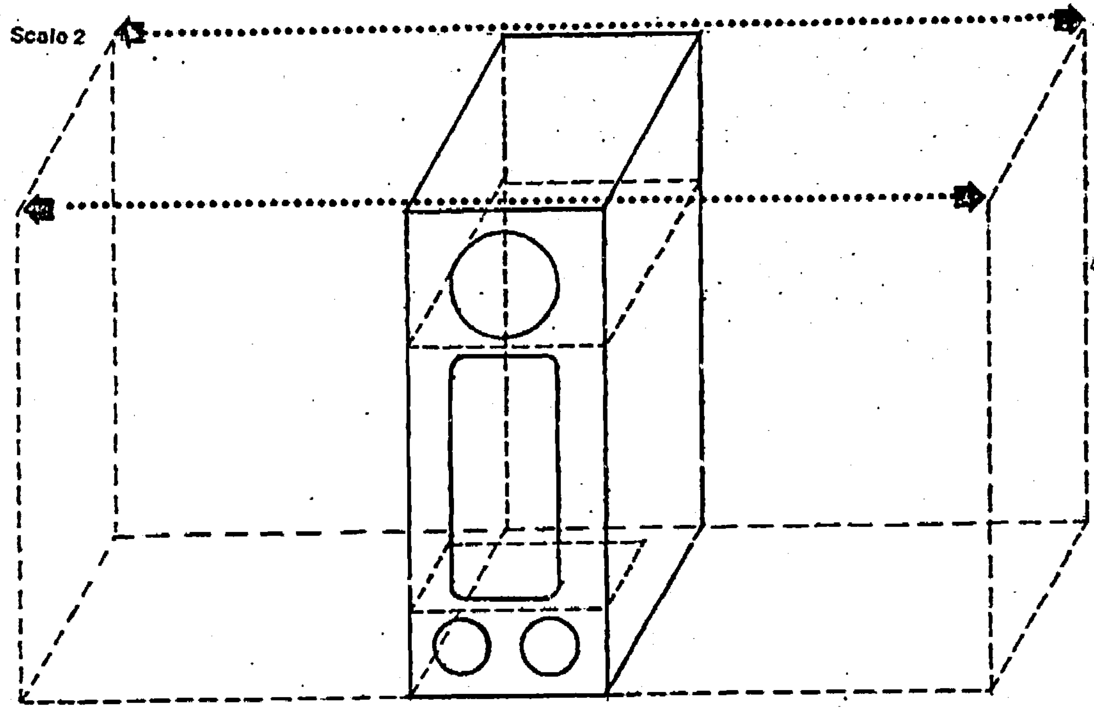
M.A.Z.E. consists of four types of modules.

1. Table T
2. Locker L
3. Teaching/Learning T/L
4. Play P



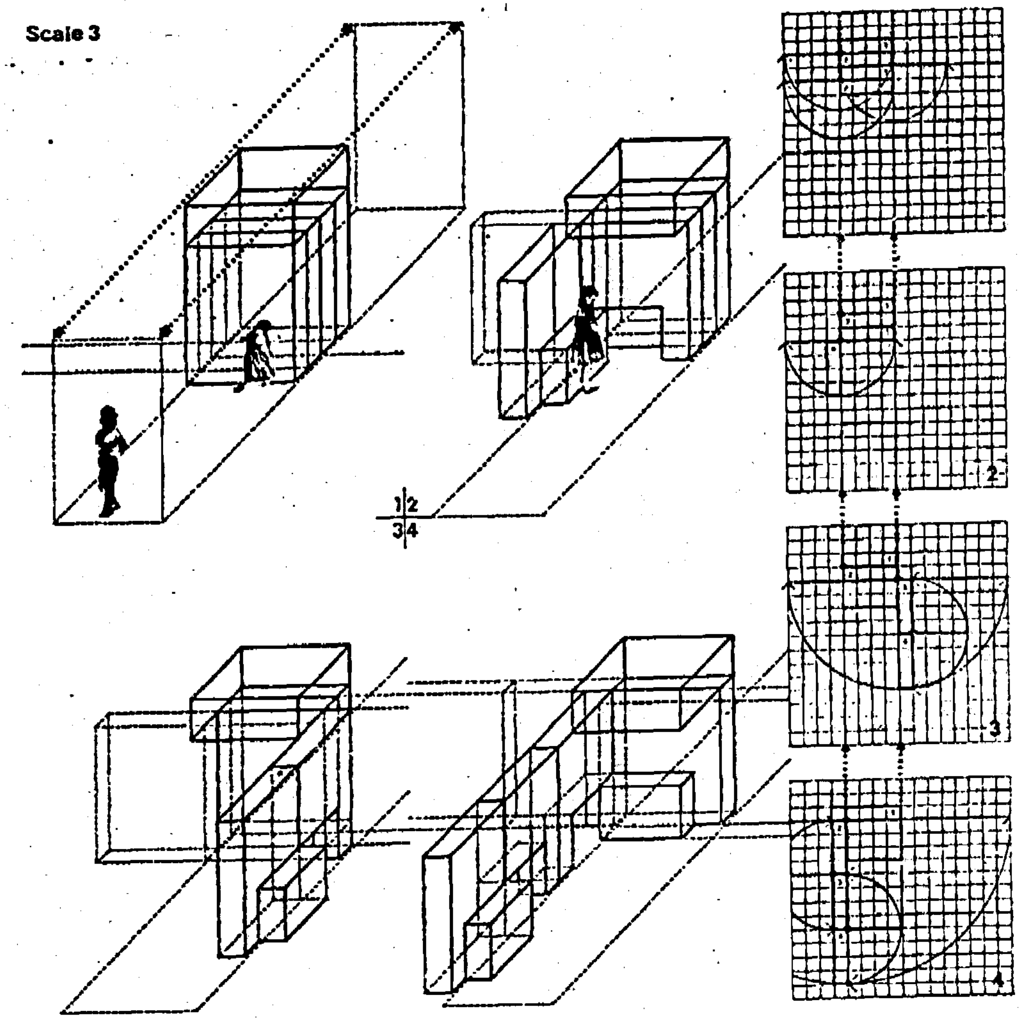
1. Table Module

This consists of a two foot plywood cube that has hinged leafs that expand to form table surfaces of varying capacity, carrels, easels and play wagons. The module operates on casters and has unrestricted movement in the universal space.



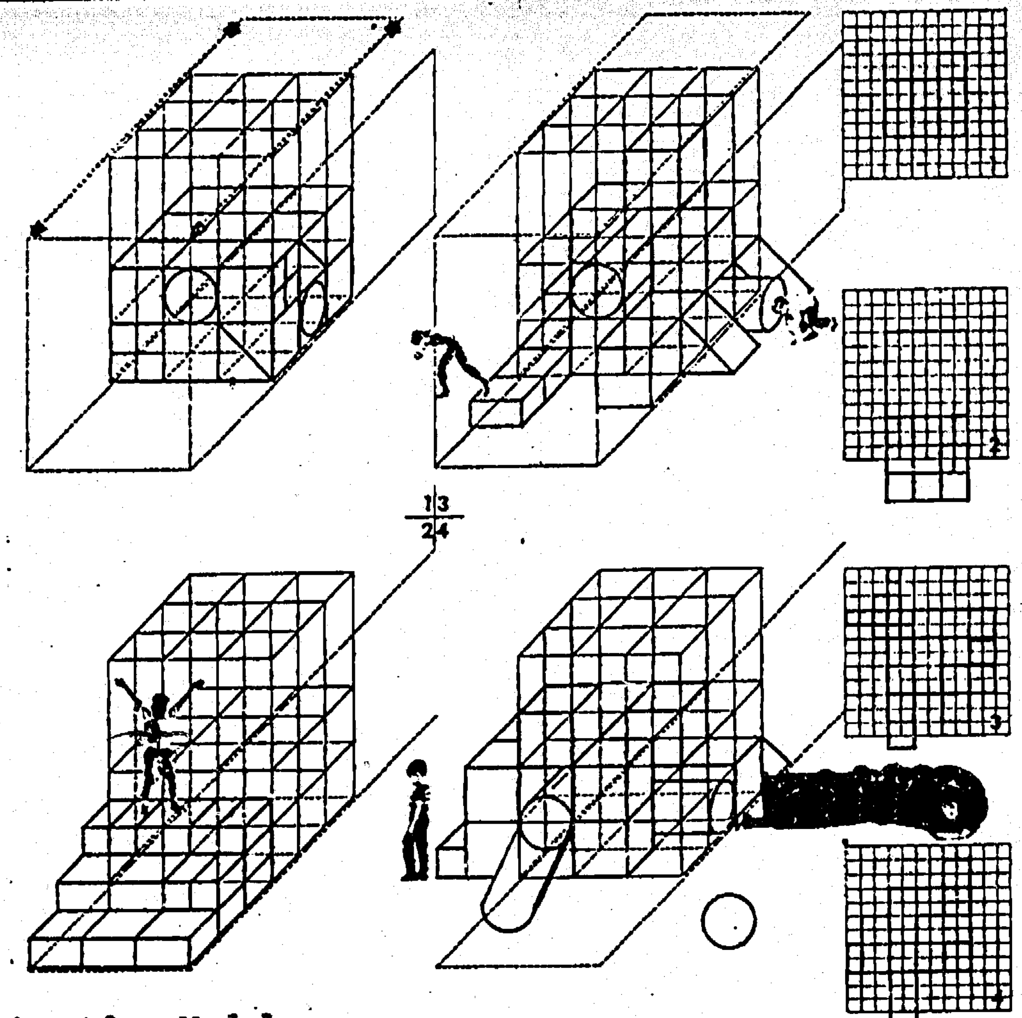
2. Locker Module

This consists of a 2'x2'x5' H plywood and homosote box which performs the functions of individual storage, enclosure and vertical work and display surface. This module operates on casters on floor tracks.



3. Teaching/Learning Module

In its neutral position this module measures 4'x4'x5' high. It is constructed of plywood and consists of two types of components (1) overhead storage (2) hinged leafs (one of which is attached to the overhead component). These leafs expand to perform the function of environmental control, storage of specialized media and equipment and work surfaces. Sliding masonite panels permit them to be operable from both sides. The modules operate on casters with an overhead guidance track.



4. Play Module

This consist of three types of components

1. A tubular aluminum space grid that measures 6'x6'x7' high.
2. Plywood panels that clip into the grid horizontally and vertically
3. Modular light weight vinyl coated polyurethane blocks that store in the grid

The module provides the elements and framework for the construction of a wide range of play environments e.g. play houses, slides, jumping mats, jungle gyms, etc. The foam blocks also function as seating and sleeping elements. The module operates on casters with overhead guidance.

PART 2

Testing and Evaluation Program

The basic purposes of the following testing and evaluation program are three-fold; first, to instruct the staff of the Joslin Children's Learning Center in the operation and potential of M.A.Z.E., second, to evaluate its performance in terms of its original design objectives and third, to determine its initial value and impact upon the Center's educational concepts and programs.

This testing and evaluation program was conducted over a period of three months and was divided into two sequential phases, as follows:

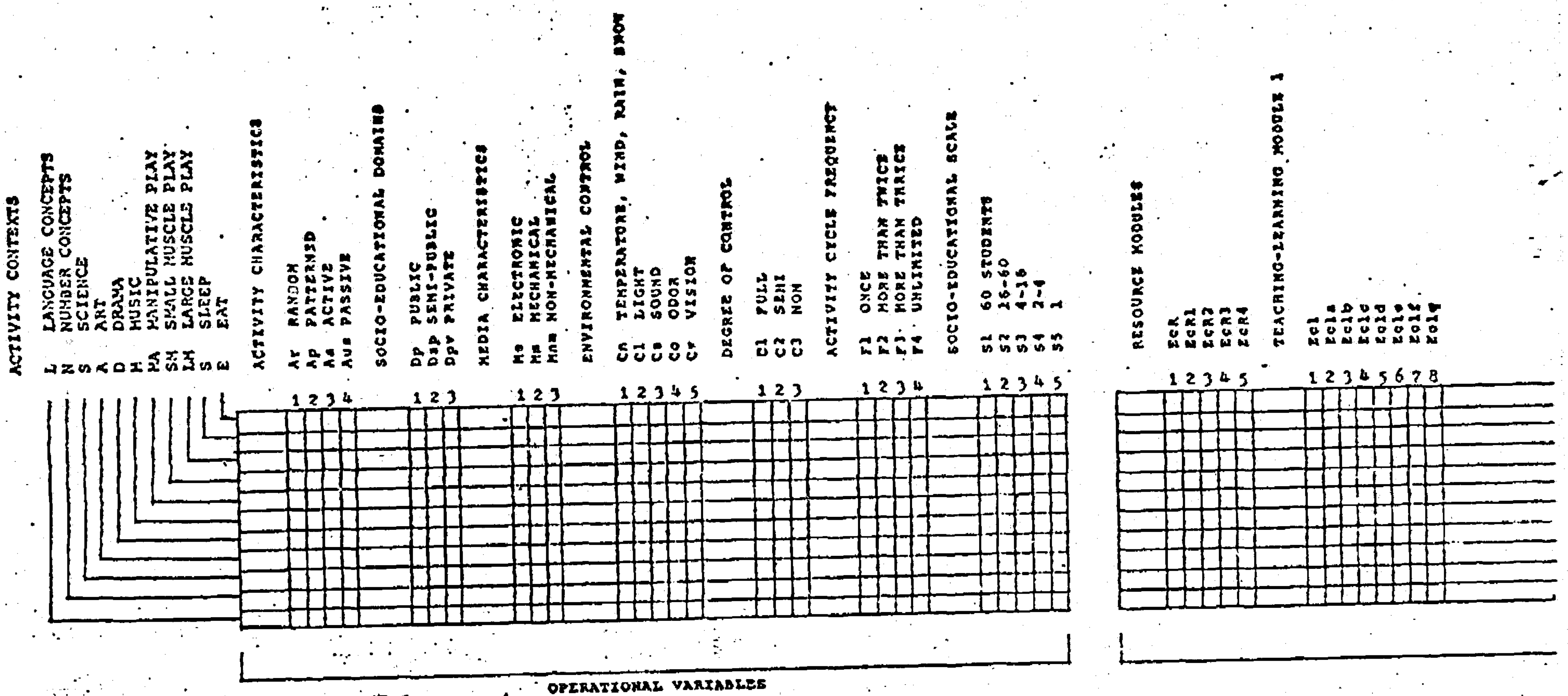
Phase 1: Duration: two weeks

1. Demonstration of M.A.Z.E.'s basic characteristics to Joslin Staff, by S.E.T.
2. Initial evaluation of its performance by S.E.T. and Joslin.

Phase 2: Duration: six weeks

Application of M.A.Z.E. to the Joslin Children's Learning Center's program, by Richard Archambeau, the director of the Joslin program.

M.A.Z.E. PROGRAM MATRIX



Phase 1: Testing and Evaluation of M.A.Z.E.

A. Criteria and Language

The Activity Matrix, shown above, defines the basic criteria and language for testing and evaluation. The variables in the Activity Matrix are divided into four catagories:

1. Activities
2. Operational
3. Physical
4. Zonal

PHYSICAL SYSTEM		
TEACHING-LEARNING MODULE II		
1	EcII	
2	EcIIA	
3	EcIIAa	
4	EcIIAb	
5	EcIIAc	
6	EcIIAd	
7	EcIIAe	
8	EcIIAf	
9	EcIIAg	
10	EcIIB	
11	EcIIBa	
12	EcIIBb	
13	EcIIBc	
14	EcIIBd	
15	EcIIBe	
16	EcIIBf	
17	EcIIBg	
18	EcIIC	
19	EcIICa	
20	EcIICb	
21	EcIICc	
22	EcIICd	
23	EcIICe	
24	EcIICf	
25	EcIICg	
26	EcIID	
27	EcIIDa	
28	EcIIDb	
29	EcIIDc	
30	EcIIDd	
31	EcIIDe	
32	EcIIDf	
33	EcIIDg	
ENVIRONMENTAL CONTROL COMPONENTS		
1	Ce	ELECTRONIC
2	Cm	MECHANICAL
3	Cs	STRUCTURAL
MODULE CHARACTERISTICS		
1	CCm	MOBILE
2	CCs	STATIC

ACTIVITY ZONES		
TEACHING LEARNING ACTIVITY ZONES		
1	Zx1	
2	Zx2	
3	Zy1	
4	Zy2	
5	Zy3	
6	Zy4	
7	ZxA	
8	ZxB	
9	ZxC	
10	ZyA	
11	ZyB	
12	ZyC	
SERVICE ACTIVITY ZONES		
1	Zt	TOILET
2	Zl	LAVORATORY
3	Zo	OBSERVATION
4	Zm	MEETINGS
5	Za	ADMINISTRATION
ACTIVITY ZONE CHARACTERICS		
1	Pe	PERMANENT
2	SPe	SEMI-PERMANENT
3	Te	TEMPORARY
HIERARCHY OF ZONAL INTERACTIONS		
1	1z	ONE ZONE
2	2z	TWO ZONES
3	3z	THREE ZONES
4	4z	FOUR ZONES

This matrix was used together with floor plans to record the sequence of tests in Phase 1 (see appendix) and to demonstrate to the staff some of the basic variables that should be considered in the program.

B. Methodology and Procedure

Three input sources were used as the phase 1 evaluations:

1. Feedback from participant during testing period.
2. Visual observation of the operations of the program during a period of one year prior to testing.
3. Simulated time/activity cycles.

The basic objectives of the time/activity studies were to demonstrate the characteristics of M.A.Z.E. to the participants, and to analyze their response to all basic classes of activities and physical configurations over a compressed time period.

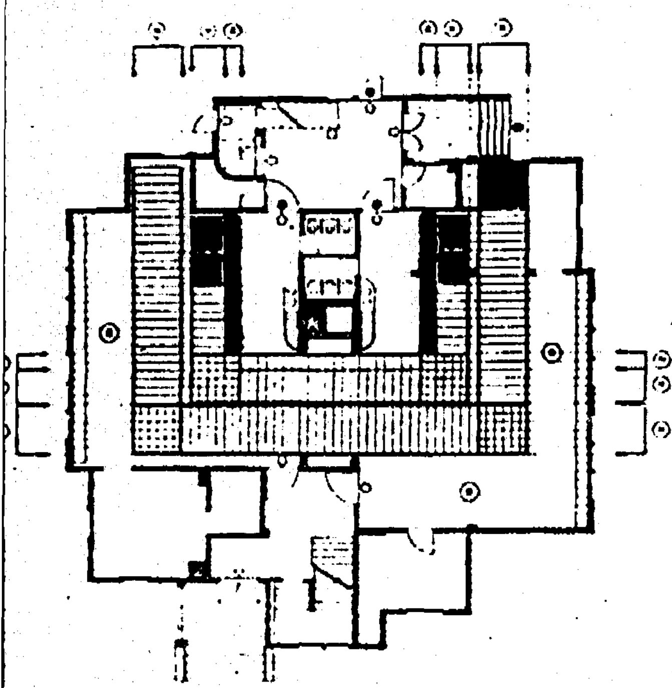
This was accomplished by systematically moving the modules at thirty minute time intervals, as is shown on the following pages, and recording the children's and staff's response on slides, audio tape and the Activity Matrix (see appendix). In order to ensure that the teachers' preconceptions had a minimal effect upon the results, they were assigned to certain zones and instructed to assist the children, only at their request.

These time/activity sequences encompassed a wide range of activities at different scales - art, reading, music, small and large muscle play, etc. When the play module was activated, for example, the children were observed to transform the space into an indoor playground. Then, when a thirty foot long wall was formed by lockers, and covered in paper, children seized paint brushes and paint and spontaneously engaged in group painting. As the time/activity sequences overlapped, different activities occurred simultaneously. One group of children were raucously making music, while another smaller group was huddled in a distant corner listening intently to a teacher reading.

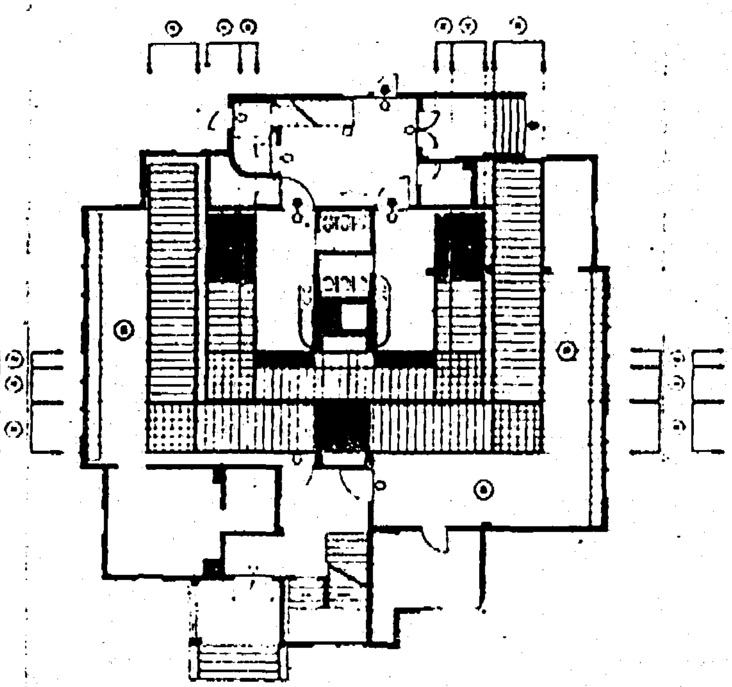
It became clearly evident during these cycles, that M.A.Z.E., in itself, has an enormous capacity to structure and catalyze spontaneous activities.

Simulated Time/Activity Cycle

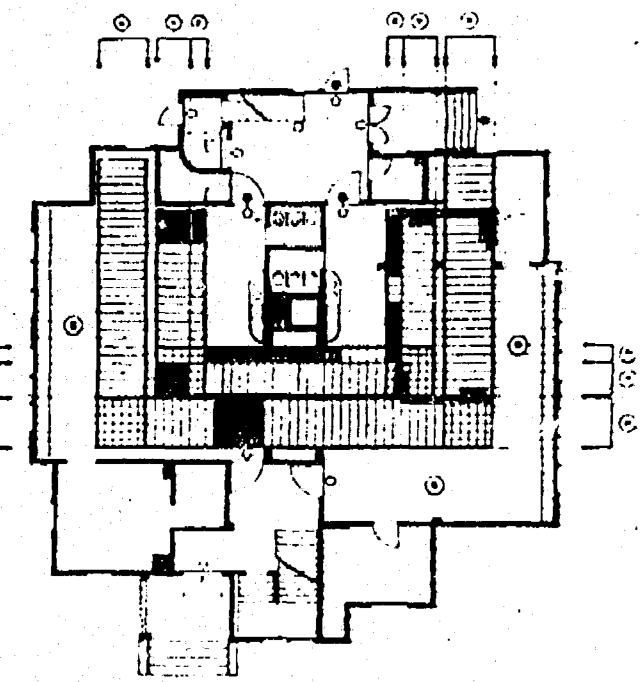
9AM 1 Orientation



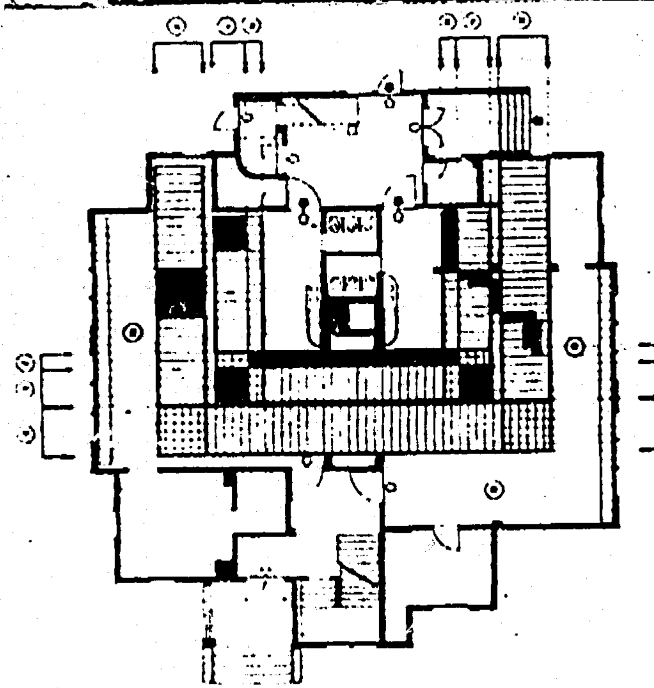
10AM 2 Large Muscle Play



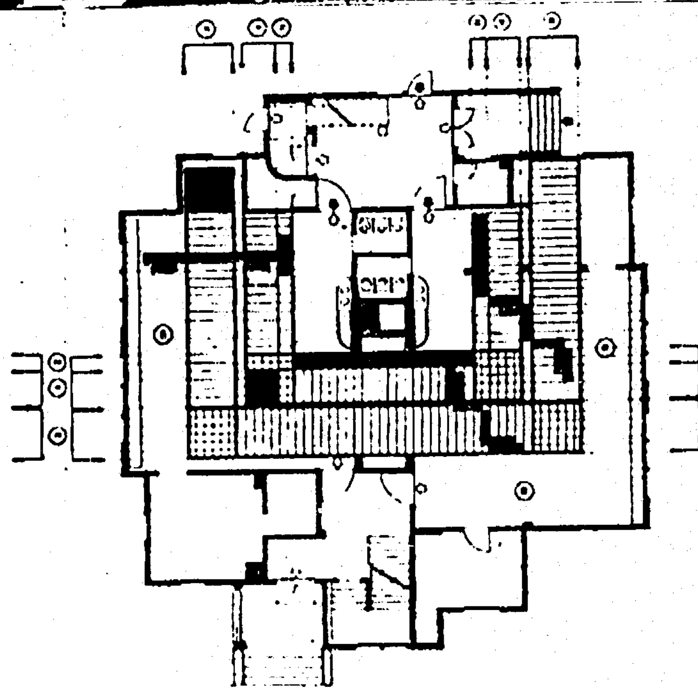
11AM 3 Small & Large Muscle Play
Number Concepts



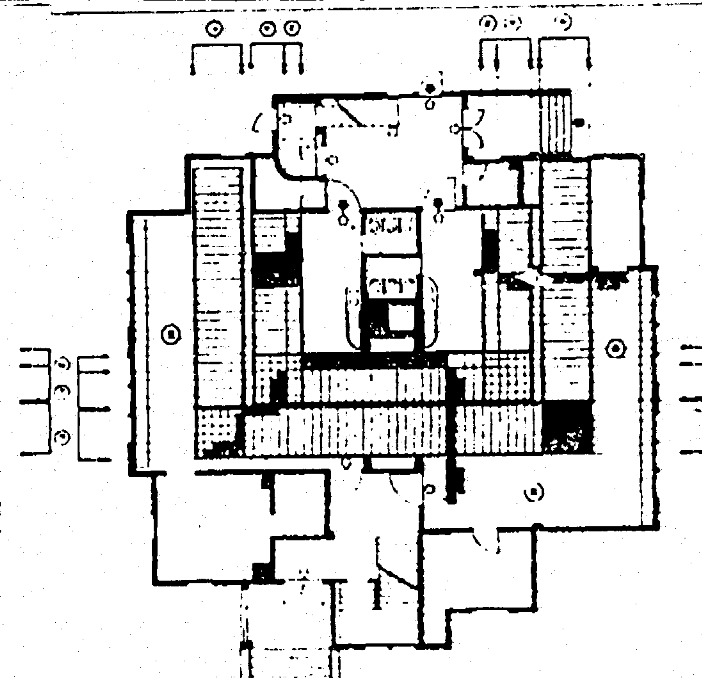
1 PM 4 Large Muscle, Science
Art, Sleep



2 PM 5 Language, Drama, Music,
Manipulative Play



3 PM 6 Large Muscle, Art, Sleep
Manipulative Play



C. Observations

The following evaluation of M.A.Z.E.'s operations during Phase 1, represents an attempt to test its operational and behavioral performance against S.E.T.'s original design objectives.

1. Operational and Educational Characteristics

a. Multi-functionality

Analysis of early learning indicates that the child does not view the physical environment as a set of functionally predetermined parts. His concept of a chair, for example, is not merely an object to sit on but a complete environment in itself for standing, jumping, crawling, hiding, etc. This spontaneous, explorative, inventive response to the environment should be reinforced as much as possible in the early learning process. Accordingly, M.A.Z.E. was conceived as a set of multifunctional interchangeable components. Table units become easels, carrels, play wagons. Foam blocks become construction elements, chairs, slides, and exercise elements. Storage lockers become work surfaces, places to hide. Counters become stoves, and wall modules backdrops for puppet theatre.

Our observations indicated that this multi-functionality not only resulted in a highly interpretive environment but also one in which activities could overlap and change continuously. As a consequence M.A.Z.E. is able to generate a high degree of environmental complexity with a minimum of physical complexity.

b. Manipulability

Educators such as Montessori have long recognized that, if the environment is to act as an effective discovery and learning vehicle the child must not only be able to interpret it but also act on and transform it. The traditional wood building blocks offers a simple example of a learning process in which the child is simultaneously able to formulate an environmental concept translate it physically, and receive instantaneous feedback.

M.A.Z.E. seeks to apply this process over the widest possible range of scales and activities. As a result the child is able to participate with the teachers in determining the basic characteristics of their environment. Because the components were fabricated by a small local contractor, they were constructed with plywood instead of light weight structural plastic. Our observations confirmed that the Teaching/Learning units were too heavy to be manipulated by the children, hence our objectives are not yet entirely realized. This was interpreted by the teachers however, as an asset, because it enabled them to maintain control over the basic environmental changes.

c. Mobility

Most traditional learning environments consist of static spaces and equipment that are monofunctional (functionally predetermined) hence are obstacles to spontaneous needs and changing activity patterns.

M.A.Z.E. attempts to overcome this by the structuring of activities through time rather than static equipment. All components are movable. When not in use they can be stored away therby enabling the environment to be continuously operational. When in use they can be programmed in activity cycles to respond to continuous changes in the range of scale and distribution of activities.

During a simulated activity cycle the teaching staff was instructed to supervise rather than direct activities while environmental transformations were performed in accordance with our program variables. It was discovered that the components by themselves acted as catalysts for generating activity patterns.

Long term observations have indicated that as a rule children sustained the spontaneous inventive response to the environment. Teachers did not. The teachers acquired "favorite" activity patterns and spatial configurations very quickly. Preconditioning and a lack of understanding of the potential of M.A.Z.E. seemed to be partly responsible for this.

d. Expandability

It was previously stated one of M,A.Z.E.'s objectives is to offer the maximum environmental complexity with the minimum physical complexity. In order to achieve this the environment must expand and contract like a living organism, in response to continuous changes in activity cycles. Hence all M.A.Z.E. components and modules are minimal when inoperative and expand in stages in accordance with qualitative and quantitative program requirements such as class of activity, size of groups, degree of environmental control required. This expandability also enables components to interact forming activity "networks". Our long term observations indicated that although the movement of the Teaching/Learning Modules was infrequent its expandability was fully ytilized by both the children and staff.

2. Behavioral Characteristics

a. Privacy

An essential requirement of the early learning process is that it be responsive to the emotional makeup of the child at various stages of his development. The need for privacy - to control the scale and frequency of interaction with others - is essential to the formation of the child's identity. Environments which restrict the child's ability to do this necessitate compromises between individual and group needs. M.A.Z.E. responds to this need for privacy by offering all of its participants clear choices as to the scale and frequency of group interaction with varying degrees of environmental control. The traditional classroom wall is replaced by a set of components that can change the amount and configuration of space, the degree of openess, and disappear when not in use.

The significance of these choices was clearly evident during the simulated activity cycles. At a given moment activities that demanded varying degrees of privacy occurred simultaneously. One child was observed huddled in a locker merely observing the outside world, three others clustered around a teacher reading a book, oblivious of the intense activity that enveloped them. Twenty others were engaged in making a group painting.

Since M.A.Z.E. does not provide a high degree of audio privacy, we were particularly interested in evaluating its performance in this respect. In a space containing forty people the children demonstrated an ability to switch off background noise and perform a task with intense concentration.

b. Territoriality

Recent works, particularly by Robert Ardrey in the "Territorial Imperative" have revealed that all living organisms possess instinctual sense of territory. In animals this instinct is directly related to survival. Lions for example establish invisible yet measurable radiating defense zones or boundries for themselves and their families beyond which no intruder can enter.

In man's case the survival basis for the instinct has been sublimated by cultural conditioning. Instead it reveals itself as the need to establish one's identity in relationship to the environment. Failure to do this results in "Anomaly" the feeling of being rootless and isolated.

The traditional classroom acknowledges this need for territoriality by providing relatively static spaces and equipment that the child can identify with - his own special place, his own special chair, his own special toy.

By contrast, M.A.Z.E.'s territory and equipment is transitional. Activities are defined by time rather than place. Not only can the child make his own environment, he can also respond to it over a wide range of activities and scales. Hence his understanding of it is more complex. His identification with the environment is more intense.

c. Change and Entropy

Up to this point the dynamic characteristics of M.A.Z.E. have been documented in terms of functional considerations. However, man's need for change extends beyond such considerations. This can be understood in terms of the concept of <u>entropy</u> - the natural tendency of any organism to run down, be it the universe, man or a learning environment. Change regardless of its functional justification demands a response, an adaptation, hence provides the source of energy to overcome entropy. Boredom is the behavioral manifestation of entropy. The amount of energy an educational environment can generate is directly related to its ability to sustain change.

Since the M.A.Z.E. concept is based on controlled cyclic change it has a unique potential to continuously overcome entropy in the learning process. Our observations clearly confirmed this. There was no evidence of boredom during the simulated activity cycles. Children of differing attention spans simply restructured the environment or changed activities. Hence they were able to continuously maintain a high attention level.

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Phase 2:

Application of M.A.Z.E. to the Joslin Early Childhood Program

A. The Early Childhood Curriculum

The early childhood education program at the Joslin Day Care Center is essentially an adaptation of the New Nursery School curriculum developed at the Far West Laboratory for Educational Research and Development by Glen P. Nimnicht. Although some of the teaching methods may differ from those proposed by Nimnicht, the overall child development principles of the Joslin preschool program are similar. The fundamental early childhood objectives of the New Nursery School have been assimilated to accommodate a low-income, inner city day care program within which local residents are trained to work with nursery and kindergarten children. Training community personnel is a major developmental goal of the Joslin program.

The child development program intends to develop each child's cognitive ability and positive self-image with regards to learning. This is accomplished through a child centered curriculum which allows each child to freely explore the contents of the classroom environment according to his particular ability. Hence, the physical environment at the Joslin Center is differentiated into various activity zones or spatial territories: art, reading-language, puzzle-manipulation, dress-up, creative play, block and locker areas. The children move freely from area to area while participating in the various activities offered in each activity zone. Little emphasis is placed upon traditional academic skills but rather on sensory-motor, cognitive, language, and social-emotional development. Activities accentuate sensory-perceptual descrimination; non-interactional, interactional, and affective problem solving and concept formation; verbal acquisition and development of ego-integrity.

Such an eccletic approach to learning is drawn from the "autotelic" responsive environment concept: children like to learn and will learn given the proper freely within the controlled environment of the classroom and to work at their own pace. Children are encouraged to make a series of interconnected discoveries about their physical, cultural, and social world.

The focal point of this concept is the self-manipulative and self-pacing role of the child. Children initiate activities and are free to terminate them when they wish, whether or not they complete these activities. Pressure exerted on a child to complete an activity he has lost interest in may discourage him from returning to the activity at a later date. Moreover, the child, not the teacher, determines if an activity is too difficult for him to engage in.

The teacher's role is one of guidance. She determines how the learning environment will be structured to accomplish weekly objectives, selects learning units, and observes and responds to the needs of the children. Children are not coerced to respond to the environment in a set manner. Rather they are encouraged to explore and innovate at will.

In accord with the concept of autotelic learning, both curriculum and physical environment must remain open-ended. New materials and ideas must be continually tested and, when applicable, incorporated into the curriculum design. To accomplish this objective the physical structure of the classroom must be multifunctional.

B. Evaluation Procedure

To secure an evaluation of the multi-functionality of M.A.Z.E. with regards to the educational program at Joslin, the Teaching/Learning, Locker, Play, and Table Modules were physically manipulated over a ten week period, providing continual change in the learning environment. Prior to the project the six activity zones (art, puzzle-manipulative, reading, dress-up, block, and locker zones) underwent a minimal amount of change. Each modification of a module and/or activity zone was proceeded by observations. These observations recorded the effects of physical change upon learning, child-child and teacher-child interaction, and the implication of M.A.Z.E. on curriculum development. Slides showing previous arrangements of modules were also studied to assist in developing alternate ways of manipulating the modules and in the final evaluation of the multi-functionality and manipulability of M.A.Z.E.

A succession of minor changes in M.A.Z.E. were introduced during phase one of the project. Shelves and drawers of Teaching/Learning Modules and their materials were constantly rearranged in order to explore the interior workings of the modules. Movement of Teaching/Learning Modules (i.e. contraction, expansion) resulted in overall diverse configurations: ells, alcoves, compartments. The Play Module was moved from its original position in which it was accessible from all four sides into a corner in which only two sides were obtainable. Half of the light weight foam blocks were removed from activity zones and replaced by traditional, four legged chairs. Some of the Locker Modules were relocated while Table Modules underwent expansion and contraction.

Such changes were followed by somewhat more drastic modifications during the next phase. Movement and expansion of modules was accompanied by minor relocation and subsequent configurational changes of activity zones. Locker Modules were refinished and moved to form a different arrangement. This new arrangement acted as a divider, separating the puzzle-manipulative area from the art and block areas.

The last phase resulted in a break down and relocation of M.A.Z.E., introducing a classroom with entirely new physical and special dimensions.

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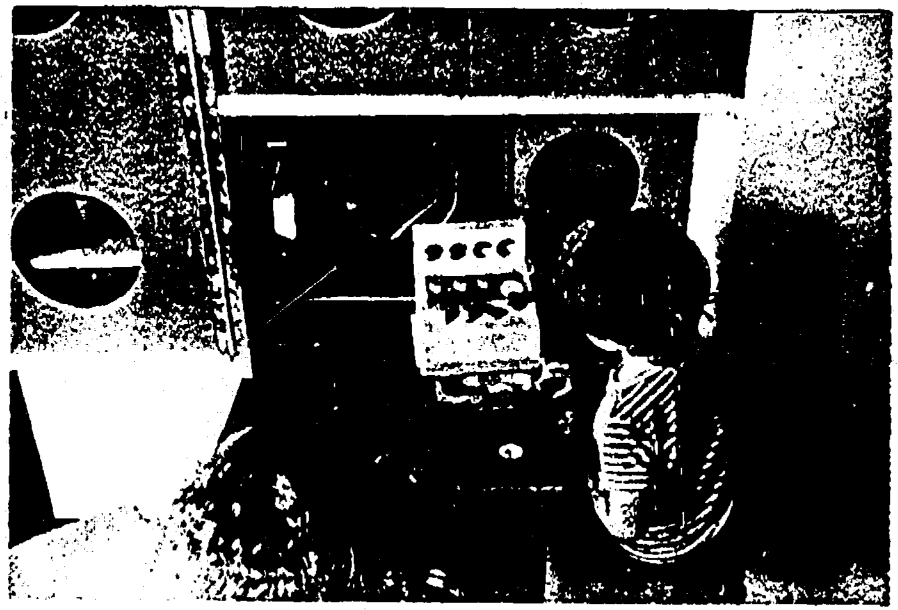
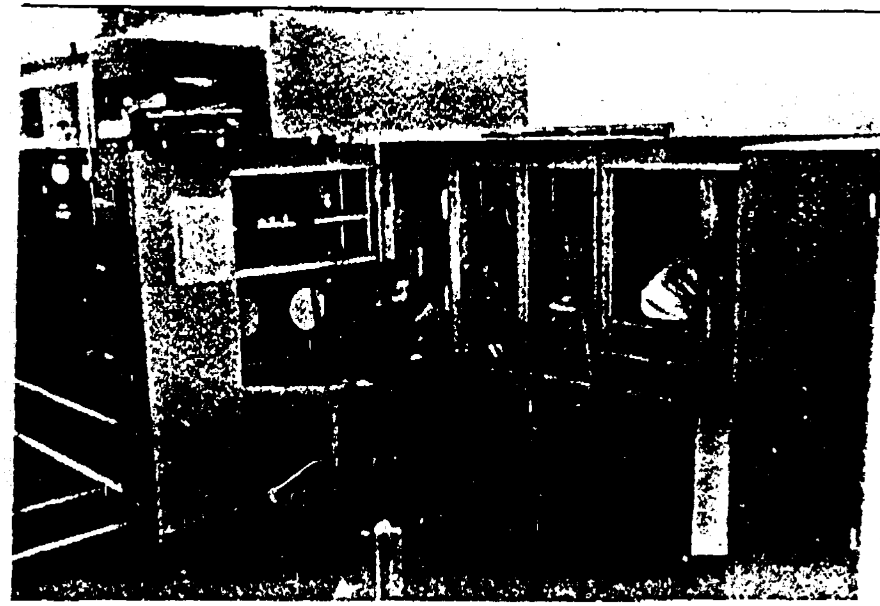
Specific evaluations of the effects of these changes are discussed according to their educational implications within each of the designated activity zones and with regards to the impact of M.A.Z.E. upon curriculum and staff development.





C. Analysis of Activities

1. Puzzle-Manipulative Area

Teaching/Learning Modules were rearranged to form an area that was less public, more secluded yet still large enough to allow children adequate work space.

Prior to these alterations the zone was rather large, open and subject to constant traffic flow to outdoor and office areas. Distractions from these areas were constantly a problem. The new configuration alleviated this situation. Traffic flow to the outdoor area was rerouted to the periphery of the activity zone. This was accomplished by moving one of the Teacher/Learning Modules and by expanding a Table Module to block the rear entrance of the area. The mobility and expandability of the modules enabled this change to take place. Moving the Teacher/Learning Module also allowed more natural light to enter the activity zone.

A minimum of manipulation of the area on the part of the children was recorded. However, this condition was remedied by making the small manipulative materials more accessible to children: materials were set out on the Table Modules and rearranged on the shelves and in the drawers of the Teaching/Learning Modules. Prior to this change most of the children were not aware of variety of available materials since they had never really explored the contents of the Teaching/Learning Modules. Some of the materials were stored on the higher shelves which the children could not even see, much less reach. Rearranging the contents of the drawers motivated children to search through them and discover.

While the area was being modified, it was suggested that children help themselves. This objective was actualized by placing lottoes, peg boards and puzzles on lower shelves and in drawers where children could readily obtain them. Construction paper guides were made for each article and taped onto the shelves. This procedure enabled children to put materials back into their proper place. They were not told about these guides, instead they were allowed to discover them. Matching the article with the paper guide familiarized children with the equipment and assisted them in developing size and space concepts.

Such changes also precipitated a high degree of interaction among children. They became quickly accustomed to helping themselves and many articles previously unused were rediscovered. Children encountered little difficulty in manipulating the equipment. The sliding panels in the Teaching/Learning Modules were easily operated by the children. The drawers, except for a few that needed waxing, were also easily handled. The higher shelves on the modules cannot be reached by the children. This problem was partly solved by having small footstools available. It also proved convenient to keep the highest shelves inaccessible to the children so that certain materials could be stored for future use. The cut-out circles on the sliding plywood panels, aside from being decorative, allowed children a glimpse of what was stored inside the Teaching/Learning Modules. Very often children randomly explored beyond the panels to satisfy their curiosity.

Theoretically the black Table Modules were a great idea and had they been constructed from light weight plastic they might have proven to be more functional. Made of plywood however, they were much too heavy for the children to expand and move. When the leaves were extended the base of the module was too small to ensure stability; consequently, the table was constantly tipping when weight was applied unevenly to one of its sides.

It also proved to be more practical to employ regular preschool size chairs for seating purposes rather than foam play modular blocks. These multi-colored rectangles, squares and circles displayed a high degree of multi-functionality in block building activities; however, when employed as chairs the foam blocks lost air and deflated, making it difficult to sit on.

The side tables on the Teaching/Learning Modules demonstrated a degree of inconvenience for use by children as a work surface, when they were seated the surface area of the table was approximately chest high. Most of the children were able to utilize the table only when standing. However, the side tables were frequently used as a display area and as a stage for puppet shows.

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2. Art Area

Modifications of Teaching/Learning and Locker Modules in the art area consisted mainly of changing the position of a Teaching/Learning Module to form an entrance near the office and in shifting three Locker Modules to secure an additional entrance near the sink and wash-up area. Previously there was only one entrance to this area. Although this innovation created an intermittant traffic flow, causing numerous distractions, the mobility and manipulability of the modules was apparent. Besides their storage capacity, the backs of the Locker Modules proved valuable for defining activity zones and for displaying children's art work.

Art materials on the shelves and in the drawers of the Teaching/Learning Module were also rearranged. Pencils, crayons, magic markers, scissors, etc., were placed on the lower shelves allowing children once again to reach them more readily. Each drawer on the Teaching/Learning Module was filled with a different color construction paper while a butterfly color guide was placed on each drawer so children could obtain the desired color. Preceeding these changes children engaged in greater manipulation of the art materials.

It was also observed that children experienced difficulty in manipulating the Table Module. Any expansion of the leaves of the table to form an easel or a work surface required adult assistance.

As noted earlier the foam blocks were better suited for construction activities. Given the choice children preferred to utilize child-size wooden chairs. Hence, all of the foam blocks were moved to the block area where they were stored in the Play Module (tubular aluminum space grid). This resulted in an increase in the multi-functionality of the blocks. Children were observed finding innovative ways of employing the foam rectangles, squares and circles. Their vinyl surfaces and light weight quality enabled children to manipulate them easily in block building.

3. Reading Area

The reading area, a relatively small, quiet, semi-public activity zone, was structurally defined by the same Teaching/Learning Modules as the puzzle area. Accordingly, when the Teaching/Learning Modules in the puzzle area were moved, this also modified the dimensions of the reading area. The area acquired a greater sense of privacy. The overhead storage module, in a rather remote location, was shifted along its track to an area where books could be conveniently stored. Books in use were displayed on the table and shelves of the Teaching/Learning Module and on the Table Module, increasing their accessibility.

Hand puppets were stored in a box under the table of the Teaching/Learning Module. The sliding panels and table surface of the Teaching/Learning Module enabled the children to set up a puppet theatre with a minimum of adult assistance.

The manipulability and expandability of the modules allowed children to select and utilize the various books and reading materials without depending upon staff. A child frequently entered the area, chose a book to be read to him, returned the book to its proper place and left to engage in another activity.

The multi-functionality and mobility of M.A.Z.E. was further demonstrated during lunch and rest periods and large group activities. Activity zones were easily transformed to accommodate eating and sleeping facilities. When inclement weather prevented outdoor play, the block area was easily adjusted to create space for riding tricycles and conducting large muscle games; therefore, accommodating the needs of large group activities. With a minimum of effort any one of the activity zones could be modified spontaneously to fulfill the physical requirements of a particular learning episode. For example, on one particular afternoon the reading and puzzle areas were combined to provide enough space to show a film. This newly acquired space was later utilized for conducting a creative dramatics session.

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4. Dress-Up Area

Teaching/Learning and Table Modules were rearranged to create a larger, yet more private activity zone. The resulting area consisted of small alcoves, ideal for individual work and an open middle area for small group activity. The mobility and expandability of the modules made this configuration possible.

An additional Teaching/Learning Module was introduced into the area, the right side of which consisted of a folding shelf with sliding panels above it, while the left side contained a large closet. The right side transformed into a variety store front, with a cash register and various merchandise arranged on the shelf top - all readily accessible to the children. The closet was perfect for storing clothes which the children used for dress-up play. The shelves were utilized as storage for dishes, pots and pans. Children encountered little difficulty securing various household utensils. Doll-house furniture was arranged on the lower shelves and table surface of a Teaching/Learning Module. The result was favorable. The doll furniture, previously kept in a box under the table of the unit, was not really noticeable. Now that it was placed out in the open and more easily attainable, it was utilized more frequently by the children. They also employed unused drawer space as doll beds, bathtubs, even as storage space for combs, brushes, and jewelry.

As was apparent in the other activity zones, the flexible structure of the modules made it possible for children to manipulate most of the materials in the dress-up area. More importantly, when it was discovered that some aspect of an area was inaccessible to children, modules underwent appropriate changes to respond to the situation.

Thus, the area was in need of a large, full length mirror to assist children in various role playing and dress-up activities. This problem was later solved by moving the entire activity zone to a location which had a one-way safety glass mirror built into the wall.

5. Block Area

The block area, the largest and most spacious of the activity zones, was least affected by the changes that occurred during the first phase of the project. It remained the same - a large, public area, the only indoor zone where noise and large muscle activity was permitted. Since it was situated in the middle of relatively quiet areas (dress-up and art) it was concluded that this area's potential would be more fully realized if it were located near the noisier, outdoor area.

Teaching/Learning Modules, then underwent minor movements, altering the dimensions of the block area. Consequently, the block zone developed two additional alcoves that lent themselves to more privacy. A woodworking unit was astablished in one of the alcoves while a water-play table was placed in the other.

As with the other activity zones, materials in Teaching/Learning Modules were rearranged to stimulate greater manipulation. Small building blocks, cars, and trucks on upper shelves were brought down and placed on lower ones; drawers previously empty were filled and materials, stored in boxes on otherwise obscure places, were made more accessible. Paper cut-outs of the materials were taped onto the shelves to assist children in matching the particular article i.e., square or rectangle block with its proper cut-out. The flexibility of the sliding panels and the shelves on Teaching/Learning Modules allowed children to secure materials with minimal difficulty.

The block area afforded ample space for block building and the children experienced only minor difficulty helping themselves to both foam and wood blocks. The blocks were fully utilized by the children, especially the foam modular units which proved extremely adaptable. They readily became houses, buses, slides, secret hide-a-ways, etc. They are light weight and store neatly and easily in the tubular aluminum space grid and when stored in this manner served to make the monkey bars safer for the children to use.

The tubular space grid was utilized by children in a variety of ways: they climbed, hung from, built secret compartments in and even pretended that the grid was a space ship. This module was extremely valuable during free play; it fostered socialization, a meeting place. When children congregated around and in the grid, they often engaged in spontaneous group and parallel play.

However, the plywood panels that clip into the grid splintered when too much weight was applied. This condition rendered them unsafe for use in the tubular grid. Since the Play Module was designed for large muscle activity, the clip-on panels should have been constructed from a more durable material This was unfortunate for the multi-functionality did lend an element of diversity to the spacial grid. The panels could be employed in climbing, building, and free play activities.

6. Locker Area

The Locker Modules were employed as storage units and personal retreat cubicles. They also aided in defining activity zones. Children encountered little difficulty hanging up their clothes on hooks located inside the lockers. Toys and other personal articles placed on top of the locker shelf were reached easily by using the bottom shelf as a stepping stool. The two cut-outs on the bottom front panel allowed children to see things stored in the bottom compartments of the lockers.

Each locker provided ample space for three to four children to share. The locker indirectly served to stimulate conversation. Children were often observed sitting around and/or inside a locker while engaging in active verval interaction. The Locker Module was often employed as a personal retreat for children who desired privacy and/or to work out their feelings; it afforded children with a safe place to hide and be alone.

The modules also acted as physical barriers differentiating quiet and noisy zones. They could be moved along their runners to help enclose or open-up an area. Their mobility was extremely useful when the classroom was reorganized during the last stage of the project. Locker Modules acted to separate quiet from more active zones, insuring privacy for the puzzle and reading areas. Likewise, backs of lockers were simultaneously utilized as display surfaces for bordering areas.

7. M.A.Z.E. Changeover

The operational and educational characteristics of M.A.Z.E. were aptly demonstrated in the final stages of the project. During this time the entire matrix was rearranged, creating a new classroom environment. The quiet activity zones (reading, manipulative, and art) were established on one side of the room while the more noisy activity zones (dress-up and block) were situated on the other. The locker zone, as noted, provided a physical division between quiet and noisy zones. Previously, activities in the block and dress-up zones tended to overlap disrupting learning episodes conducted in more quiet areas.

The changeover mitigated the above condition. Areas developed a greater sense of privacy. A more effective utilization of space, particularly corners, also occurred. Hence, when the space of each activity zone was fully explored, utilized, made functional, it was possible to trim away excess space and create an entirely new activity zone, the science area. Spacial economy became the guide line for optimal functioning; dead space was virtually eliminated.

Consequently, positive changes were noted within each of the activity zones. The art area received more natural light, was more expandable and developed a supply alcove which effectively made art supplies available to children. The reading area also attracted more sunlight once it was moved next to the windows. An alcove, previously wasted space in the reading area, proved to be ideal for the tubular grid. The block area, with its new proximity to the playground area, permitted bikes, wagons, and outdoor toys to be stored in the block area, ready for the children to take out in the morning.

This more effective use of space was accompanied by a more effective utilization of modules. Subsequently, a Teaching/Learning Module previously employed in the block area was now free (an extra) to serve as a display area for books and language materials.

As previously mentioned, areas gained additional privacy. Such privacy helped to reduce excessive noise and aggressive behavior, especially in the puzzle and reading areas. Children were better able to concentrate on activities without the threat of unnecessary distractions. This additional sense of privacy greatly assisted the afternoon rest period.

The changeover precipitated a greater degree of spontaneous activity among both children and staff. New configurations motivated children to actively explore and manipulate the contents of activity zones. A new sense of alertness and involvement with the environment was noticed in children and staff alike. Since most of the materials on the shelves and in the drawers of the Teaching/Learning Modules were also rearranged, children and staff appeared to develop new interest in exploring and working with the materials. Often children and staff were observed working with the materials in new and creative ways. Everyone seemed to become more attuned and responsive to the classroom environment.

D. Conclusions

Such cyclical change, as is possible in M.A.Z.E., supplies the necessary energy to overcome entropy and boredom helping to maintain a dynamic learning atmosphere. Moreover, it is beneficial in familiarizing children with environmental changes since we no longer live in a relatively stable environment. Change and the pace of change is accelerating. Therefore, it may be a valuable learning, as well as survivial, mechanism to expose children to changing environments. A static school environment does not prepare the child for living in a constantly evolving society.

Of course when things are changing quickly or periodically, it is imperative to keep certain elements stable. If all aspects of a child's physical as well as psychic environment undergo constant modification, if he is subject to continually new configurations without the security of one large focal point (i.e., an accustomed table, chair, etc.) then his very adaptive processes, his world trust, would be worn crucially thin. Thus, although the lockers may not be in the same spot after a change, the child can be assured that his name, and his belongings will be on and in his locker.
He can also be assured of seeing the same, or nearly the same staff that he saw before the change occurred.

Multi-functional modules also allow the child to choose the degree of interaction he feels capable of handling at a particular moment - public, semi-private or completely private. When a child's attention wanes he can remedy this by changing activities, thereby maintaining an overall high activity level. The manipulability of M.A.Z.E. allows children to select materials with a minimum of adult assistance. Such a multi-functional environment is able to be manipulated into responding to the diverse needs of both staff and children.

M.A.Z.E. contains many advantages over a conventional, non-functional, static environment. These include: adaptability to specific learning episodes and programs, accommodation of modules to fit various spacial configurations, and stimulation for staff and children arising from the mobility and expandability of modular units. However, there are a number of limitations placed on these objectives. The two major limitations are the physical construction of M.A.Z.E. and those problems associated with inadequate acquaintance with possibilities of the system by staff.

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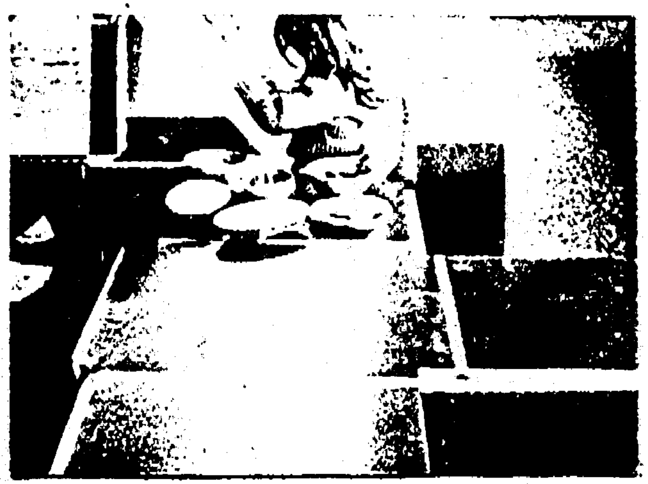
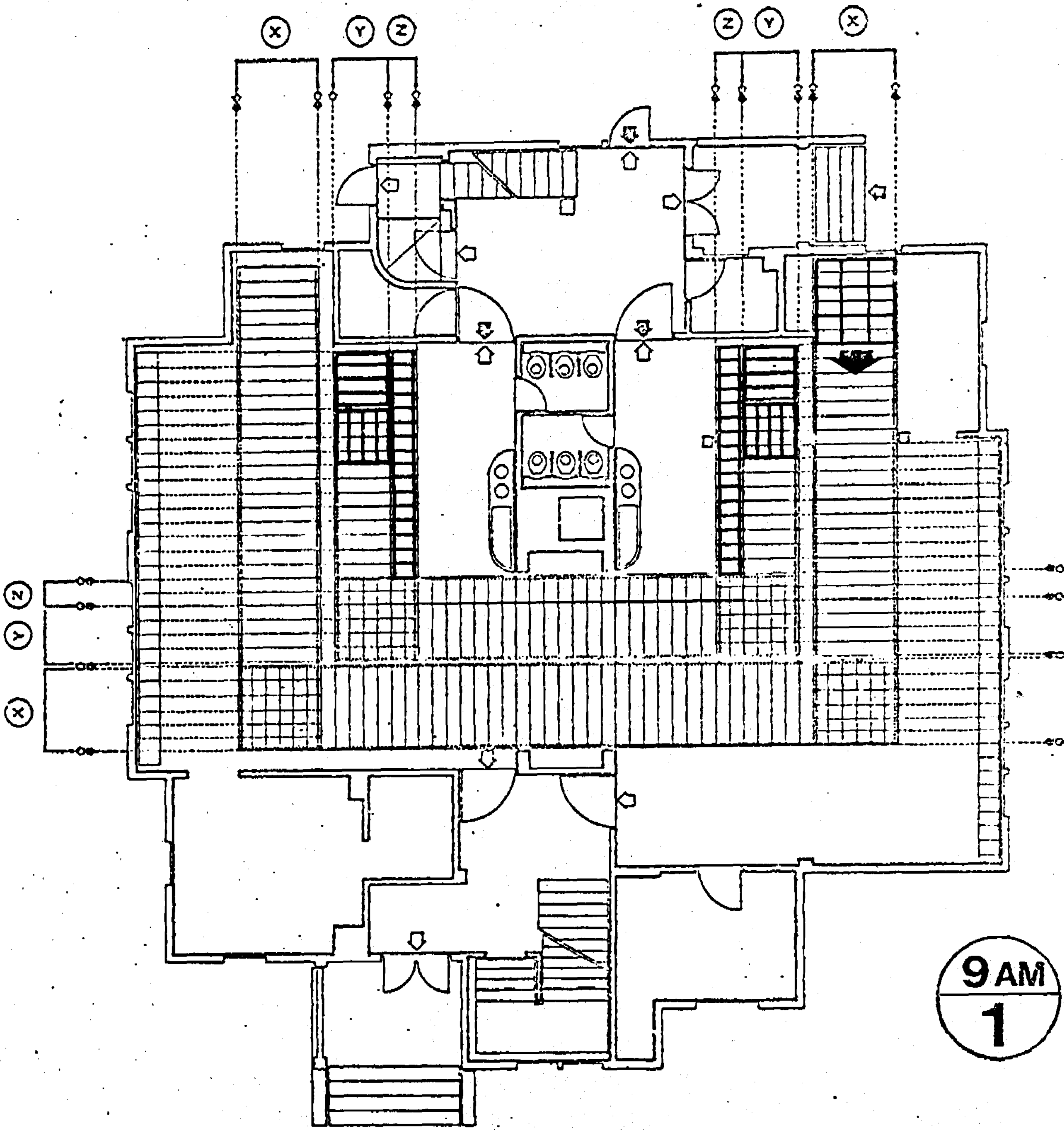
Modular mobility is hindered by the use of plywood instead of lightweight structural plastic in the construction of Table and Teaching/Learning Modules. They have become essentially static features in the child's environment, manipulated only occasionally by an adult staff member. Also, there exists the problem of staff maintaining previously established patterns of interaction with children and environment. This seems to be partially remedied with the introduction of new configurations of the environment. It would seem advisable to employ intermittent staff exploratory sessions as an integral part of staff training. Occasionally a staff member was observed actually stifling a new method of interaction in favor of a more established pattern. This condition can be counteracted by rearranging activity zones at least once a month, if not more frequently.

In conclusion, the process of entropy has been observed. The two basic problems have been described. There is no real solution to the first problem. However, the problems involving staff and program deficiencies are solvable once staff becomes better familiarized with the comprehensive dynamics of M.A.Z.E.



APPENDIX

Simulated Time/Activity Cycles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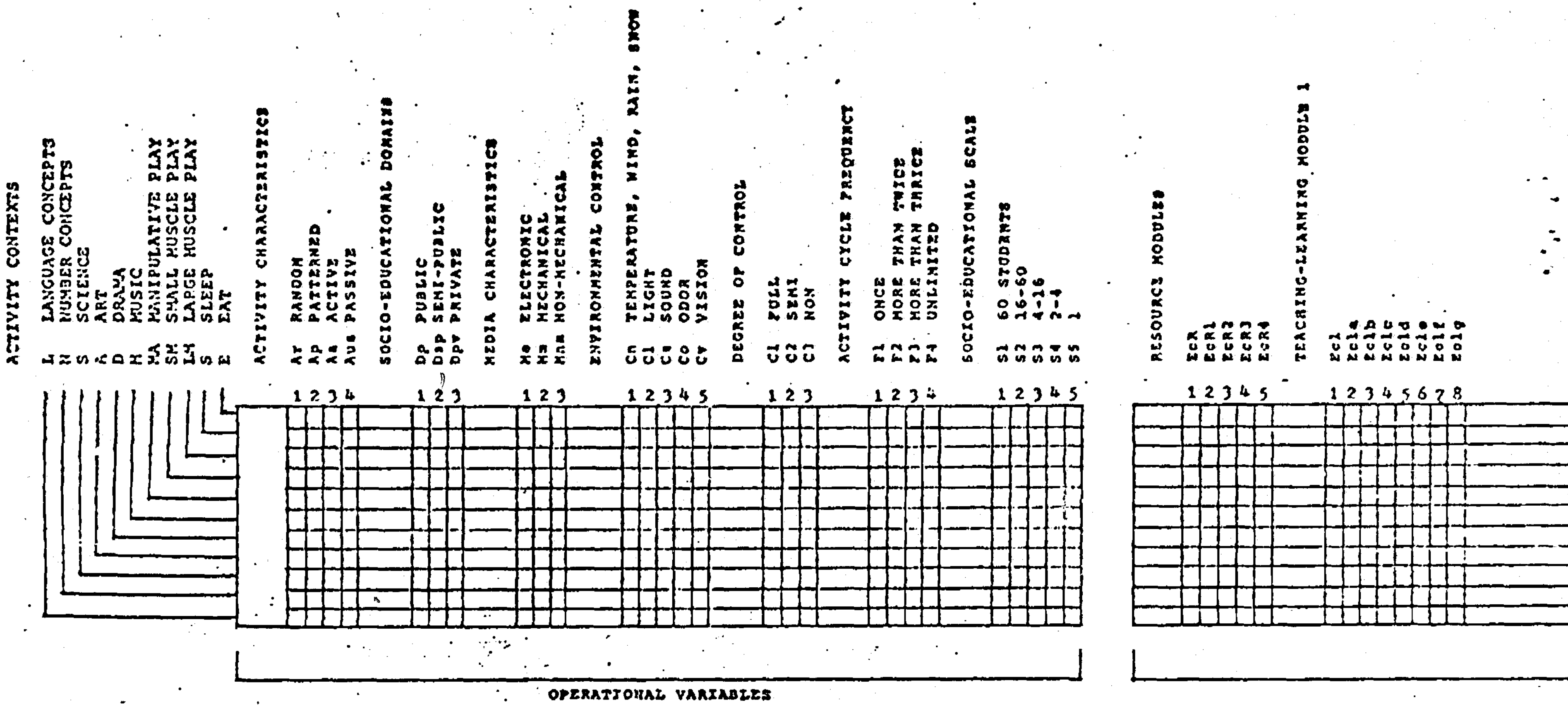


9 AM / 1 — Simulated Time/Activity Cycle

PHYSICAL SYSTEM

TEACHING-LEARNING MODULE II

1 EcII
2 EcIIA
3 EcIIAa
4 EcIIAb
5 EcIIAc
6 EcIIAd
7 EcIIAe
8 EcIIAf
9 EcIIAg
10 EcIIB
11 EcIIBa
12 EcIIBb
13 EcIIBc
14 EcIIBd
15 EcIIBe
16 EcIIBf
17 EcIIBg
18 EcIIC
19 EcIICa
20 EcIICb
21 EcIICc
22 EcIICd
23 EcIICe
24 EcIICf
25 EcIICg
26 EcIID
27 EcIIDa
28 EcIIDb
29 EcIIDc
30 EcIIDd
31 EcIIDe
32 EcIIDf
33 EcIIDg

ENVIRONMENTAL CONTROL COMPONENTS

1 Ce ELECTRONIC
2 Cm MECHANICAL
3 Cs STRUCTURAL

MODULE CHARACTERISTICS

1 CCm MOBILE
2 CCs STATIC

ACTIVITY ZONES

TEACHING LEARNING ACTIVITY ZONES

1 Zx1
2 Zx2
3 Zy1
4 Zy2
5 Zy3
6 Zy4
7 ZxA
8 ZxB
9 ZxC
10 ZyA
11 ZyB
12 ZyC

SERVICE ACTIVITY ZONES

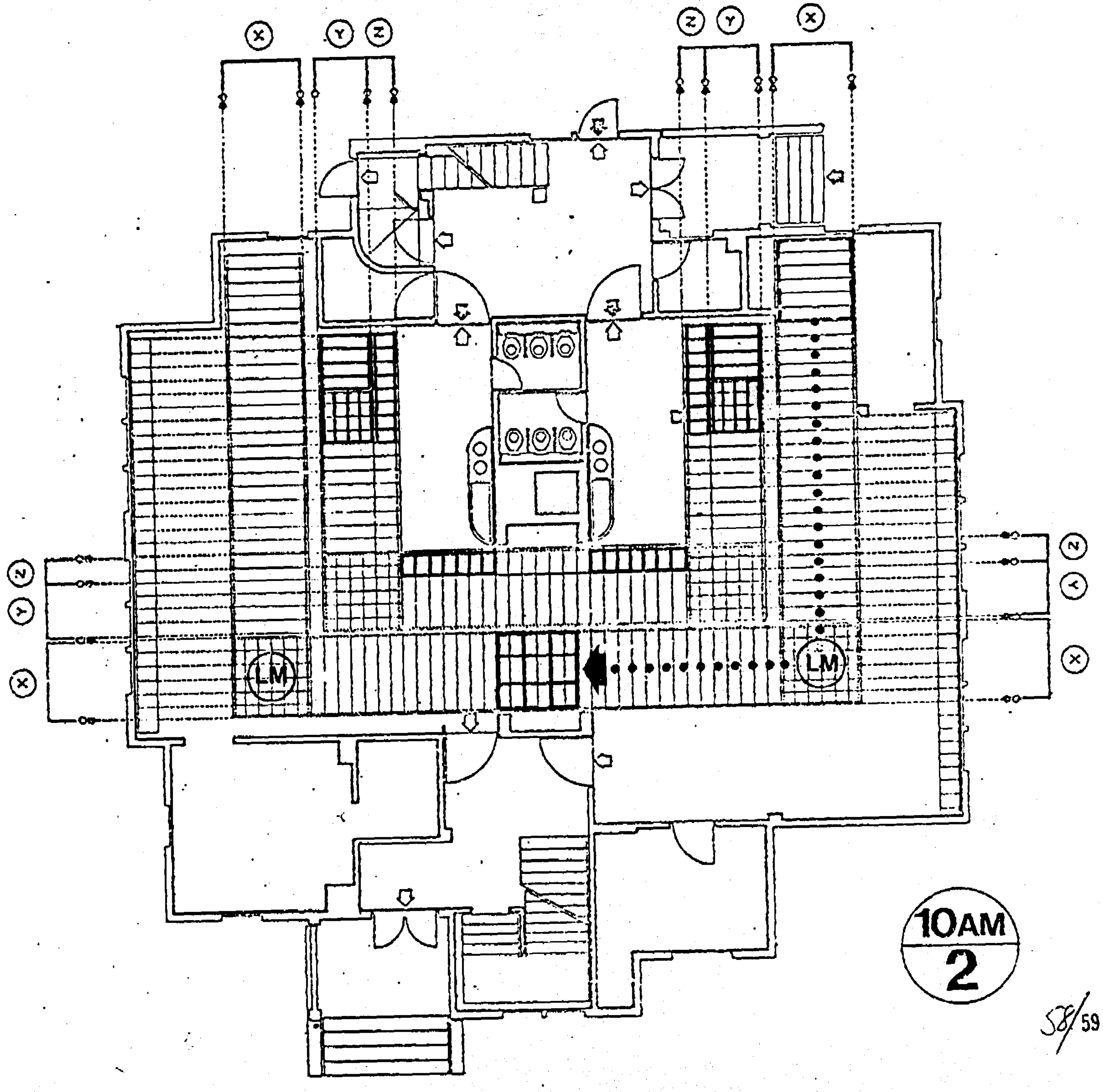
1 Zt TOILET
2 Zl LAVORATORY
3 Zo OBSERVATION
4 Zm MEETINGS
5 Za ADMINISTRATION

ACTIVITY ZONE CHARACTERICS

1 Pz PERMANENT
2 SPz SEMI-PERMANENT
3 Tz TEMPORARY

HIERARCHY OF ZONAL INTERACTIONS

1 1z ONE ZONE
2 2z TWO ZONES
3 3z THREE ZONES
4 4z FOUR ZONES



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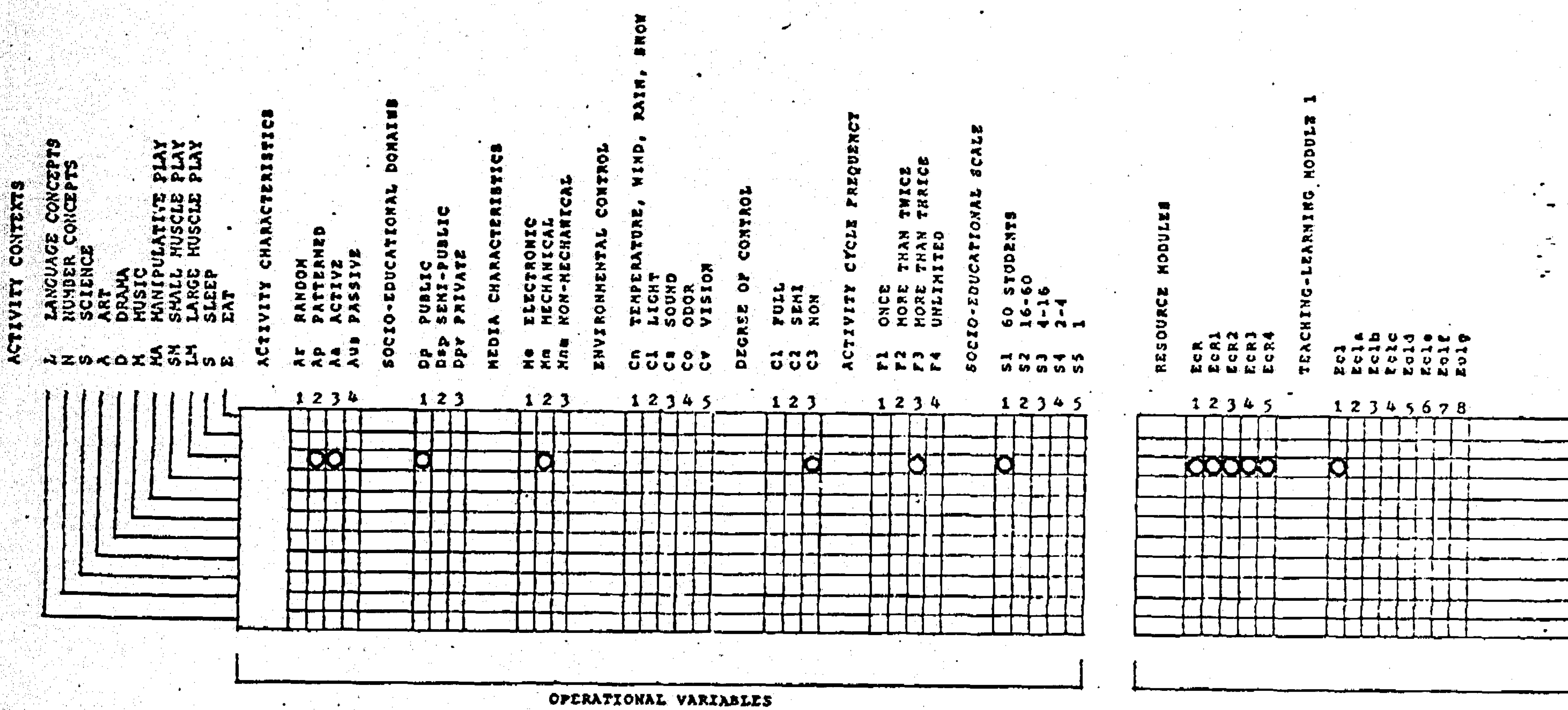
M.A.Z.E. PROGRAM MATRIX



10AM
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Simulated Time/Activity Cycle

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5	EcIIAc	
6	EcIIAd	
7	EcIIAe	
8	EcIIAf	
9	EcIIAg	
10	EcIIB	
11	EcIIBa	
12	EcIIBb	
13	EcIIBc	
14	EcIIBd	
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22	EcIICd	
23	EcIICe	
24	EcIICf	
25	EcIICg	
26	EcIID	
27	EcIIDa	
28	EcIIDb	
29	EcIIDc	
30	EcIIDd	
31	EcIIDe	
32	EcIIDf	
33	EcIIDg	
	ENVIRONMENTAL CONTROL COMPONENTS	
1	Ce ELECTRONIC	O
2	Cm MECHANICAL	
3	Cs STRUCTURAL	O
	MODULE CHARACTERISTICS	
1	CCm MOBILE	O
2	CCs STATIC	

ACTIVITY ZONES

	TEACHING LEARNING ACTIVITY ZONES	
1	Zx1	O
2	Zx2	O
3	Zy1	O
4	Zy2	O
5	Zy3	O
6	Zy4	O
7	ZxA	O
8	ZxB	O
9	ZxC	O
10	ZyA	O
11	ZyB	O
12	ZyC	O
	SERVICE ACTIVITY ZONES	
1	Zt TOILET	O
2	Zl LAVORATORY	O
3	Zo OBSERVATION	
4	Zm MEETINGS	
5	Za ADMINISTRATION	
	ACTIVITY ZONE CHARACTERICS	
1	Ps PERMANENT	
2	SPs SEMI-PERMANENT	
3	Ts TEMPORARY	O
	HIERARCHY OF ZONAL INTERACTIONS	
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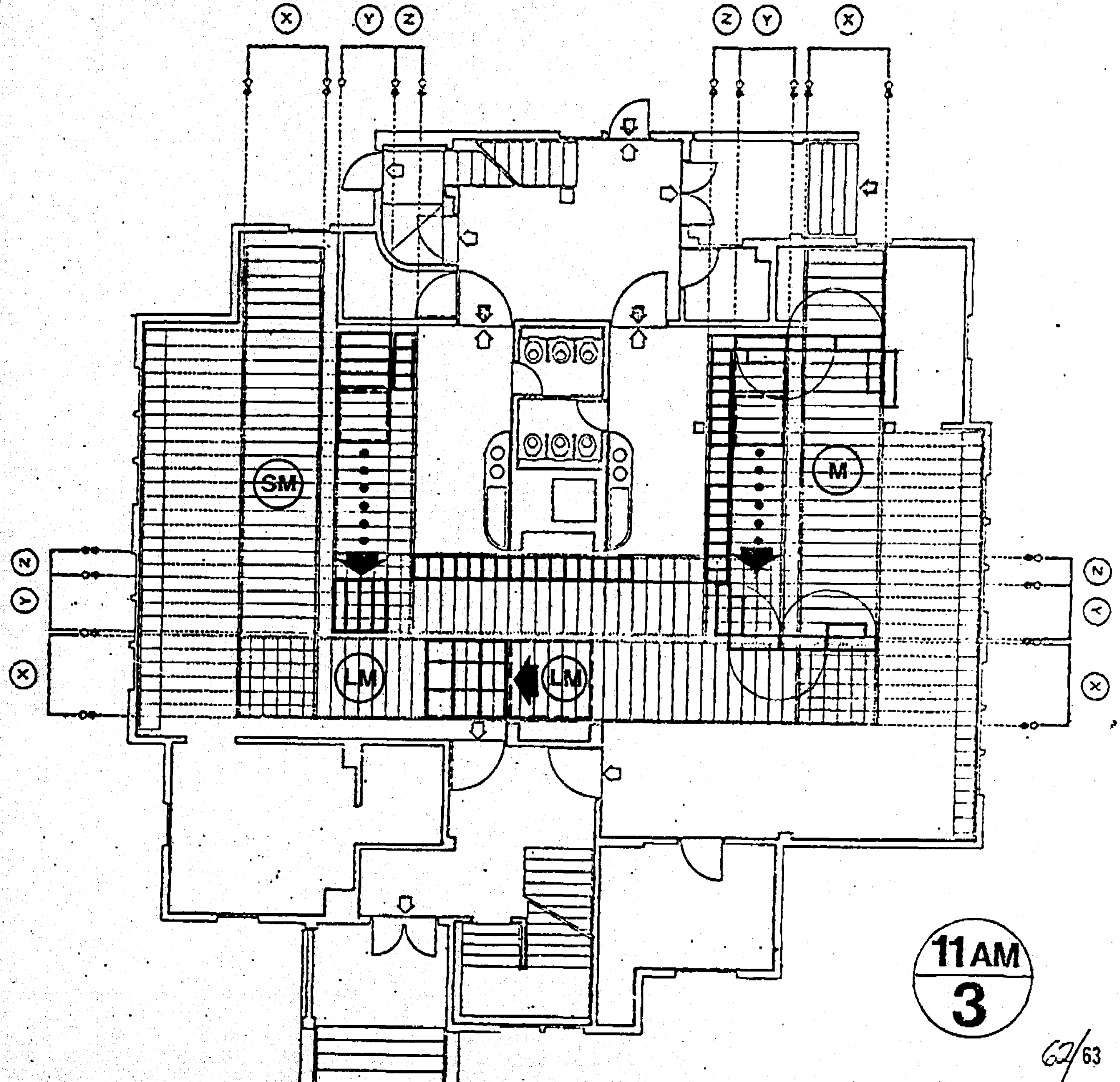
4	4s FOUR ZONES	O



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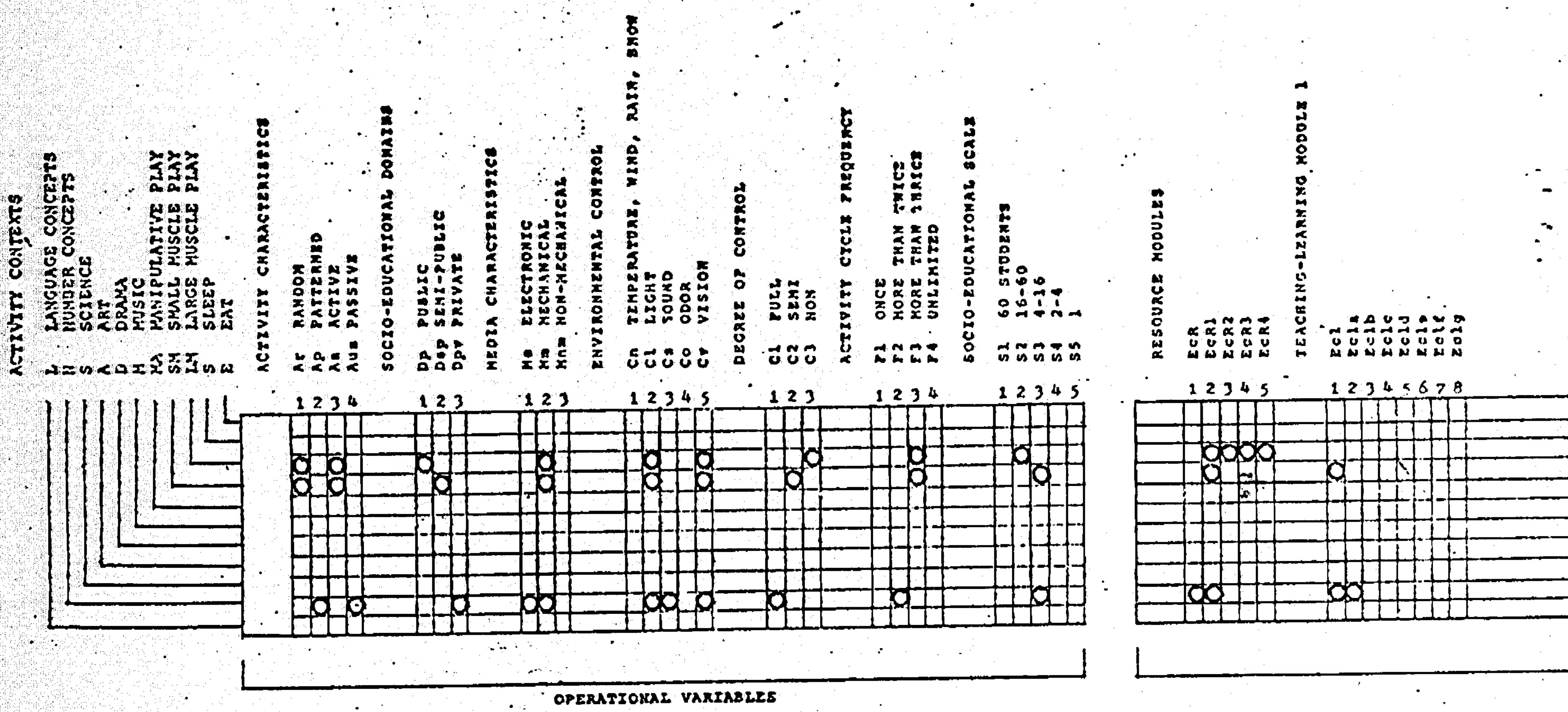
M.A.Z.E. PROGRAM MATRIX



11AM
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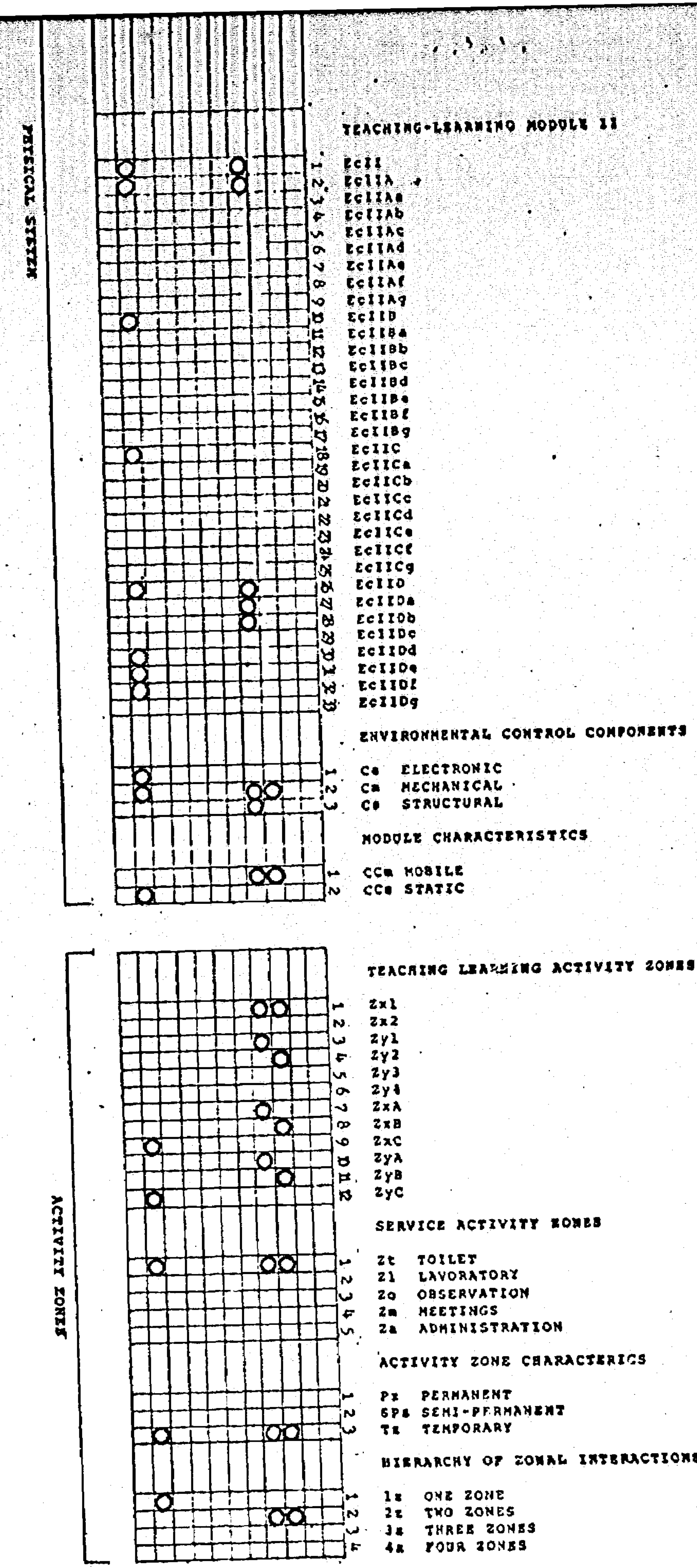
Simulated Time/Activity Cycle

65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EcIICf
EcIICg
EcIID
EcIIDa
EcIIDb
EcIIDc
EcIIDd
EcIIDe
EcIIDf
EcIIDg
ENVIRONMENTAL CONTROL COMPONENTS
Ce ELECTRONIC
Cm MECHANICAL
Cs STRUCTURAL
MODULE CHARACTERISTICS
CCm MOBILE
CCs STATIC
TEACHING LEARNING ACTIVITY ZONES
Zx1
Zx2
Zy1
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Zy3
Zy4
ZxA
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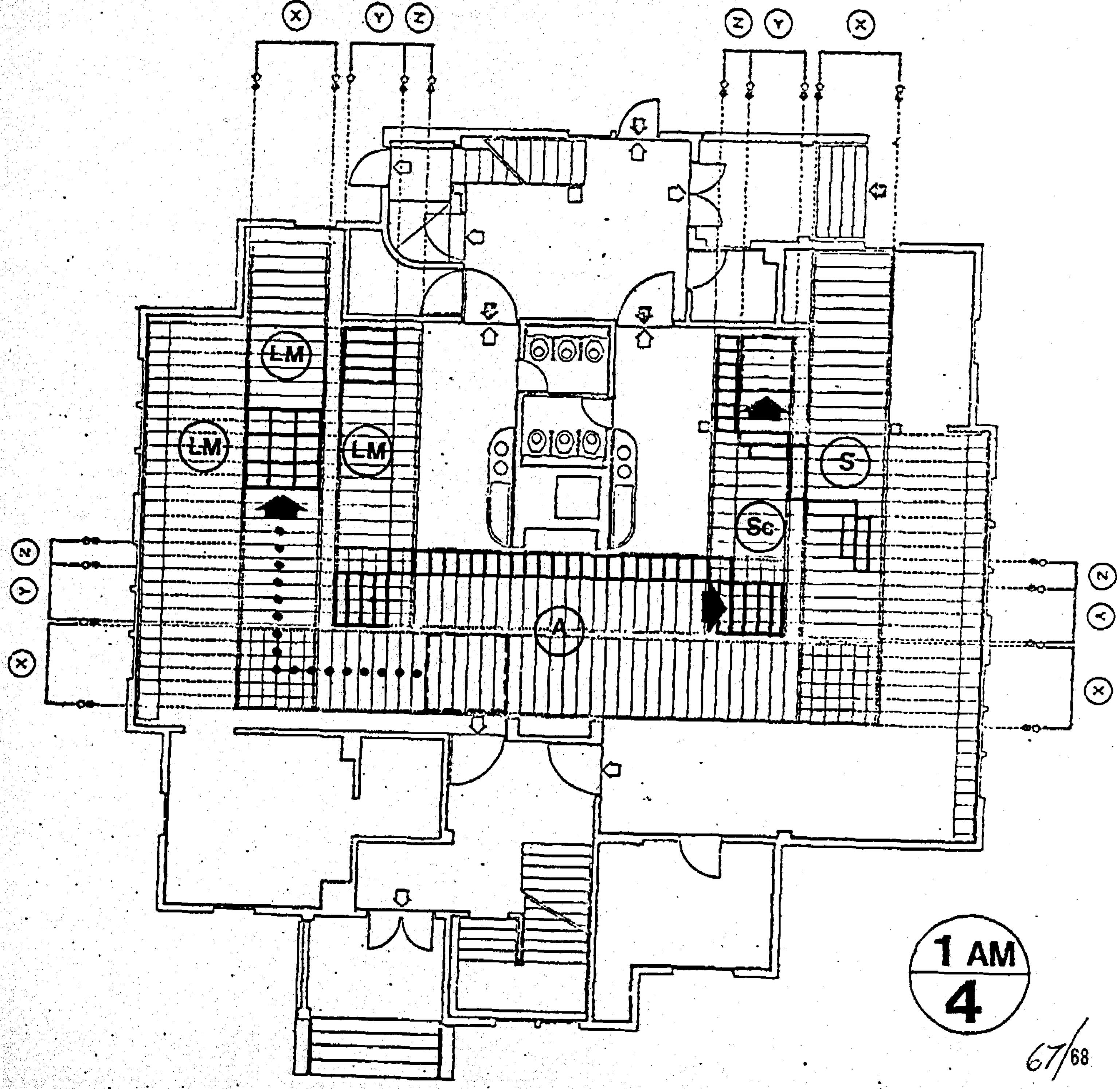
ZyB
ZyC
SERVICE ACTIVITY ZONES
Zt TOILET
Zl LAVORATORY
Zo OBSERVATION
Zm MEETINGS
Za ADMINISTRATION
ACTIVITY ZONE CHARACTERICS
Px PERMANENT
SPs SEMI-PERMANENT
Tx TEMPORARY
HIERARCHY OF ZONAL INTERACTIONS
1z ONE ZONE
2z TWO ZONES
3z THREE ZONES
4z FOUR ZONES
PHYSICAL SYSTEM
ACTIVITY ZONES



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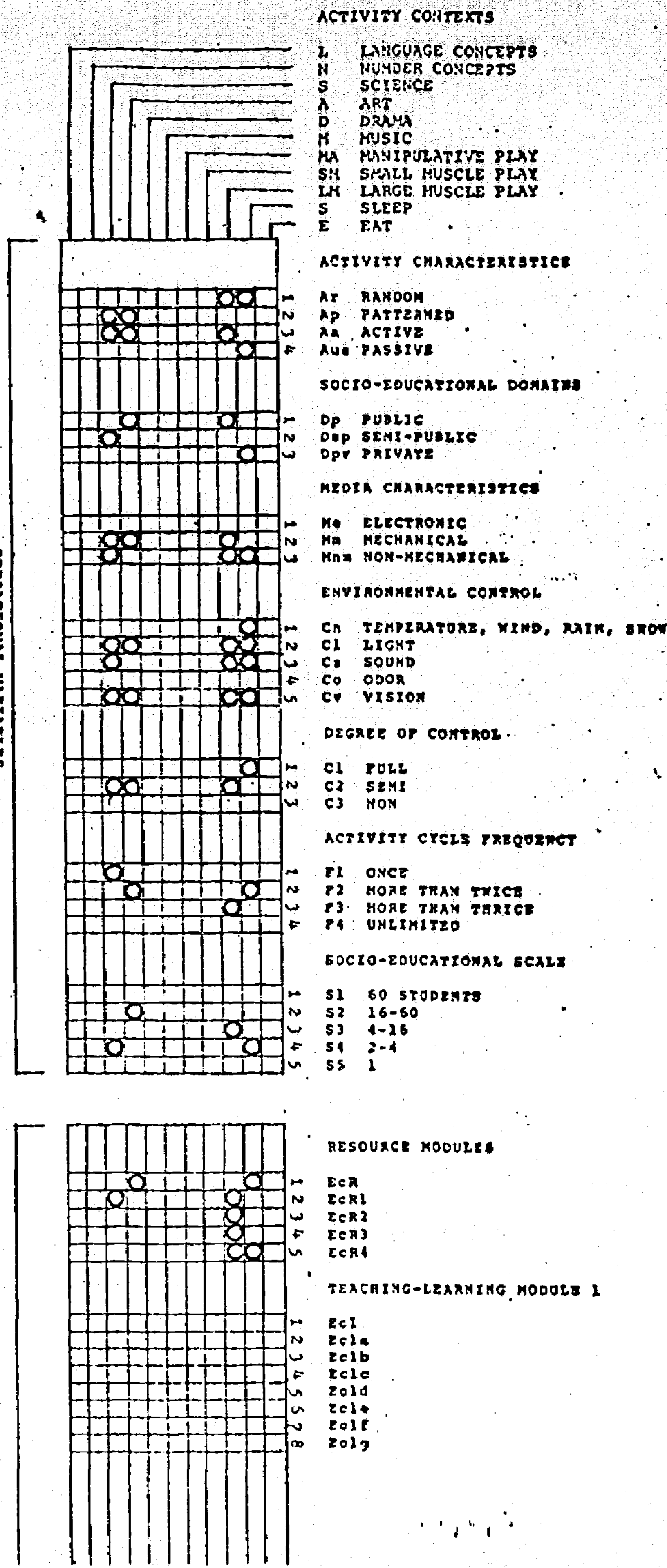
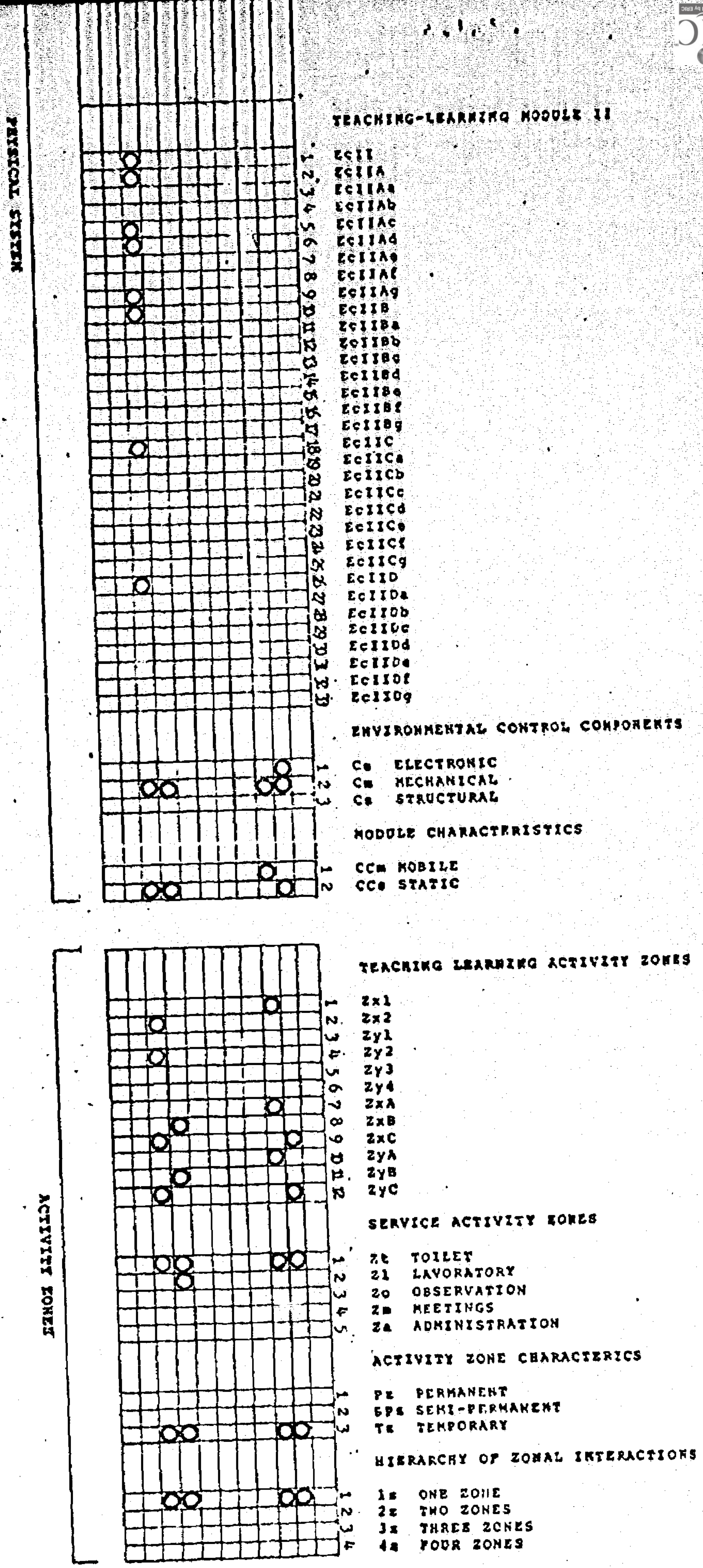


1 AM
4

Simulated Time/Activity Cycle.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EcIIBa
EcIIBb
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EcIIDf
EcIIDg
ENVIRONMENTAL CONTROL COMPONENTS
Ce ELECTRONIC
Cm MECHANICAL
Cs STRUCTURAL
MODULE CHARACTERISTICS
CCm MOBILE
CCs STATIC
ACTIVITY ZONES
TEACHING LEARNING ACTIVITY ZONES
Zx1
Zx2
Zy1
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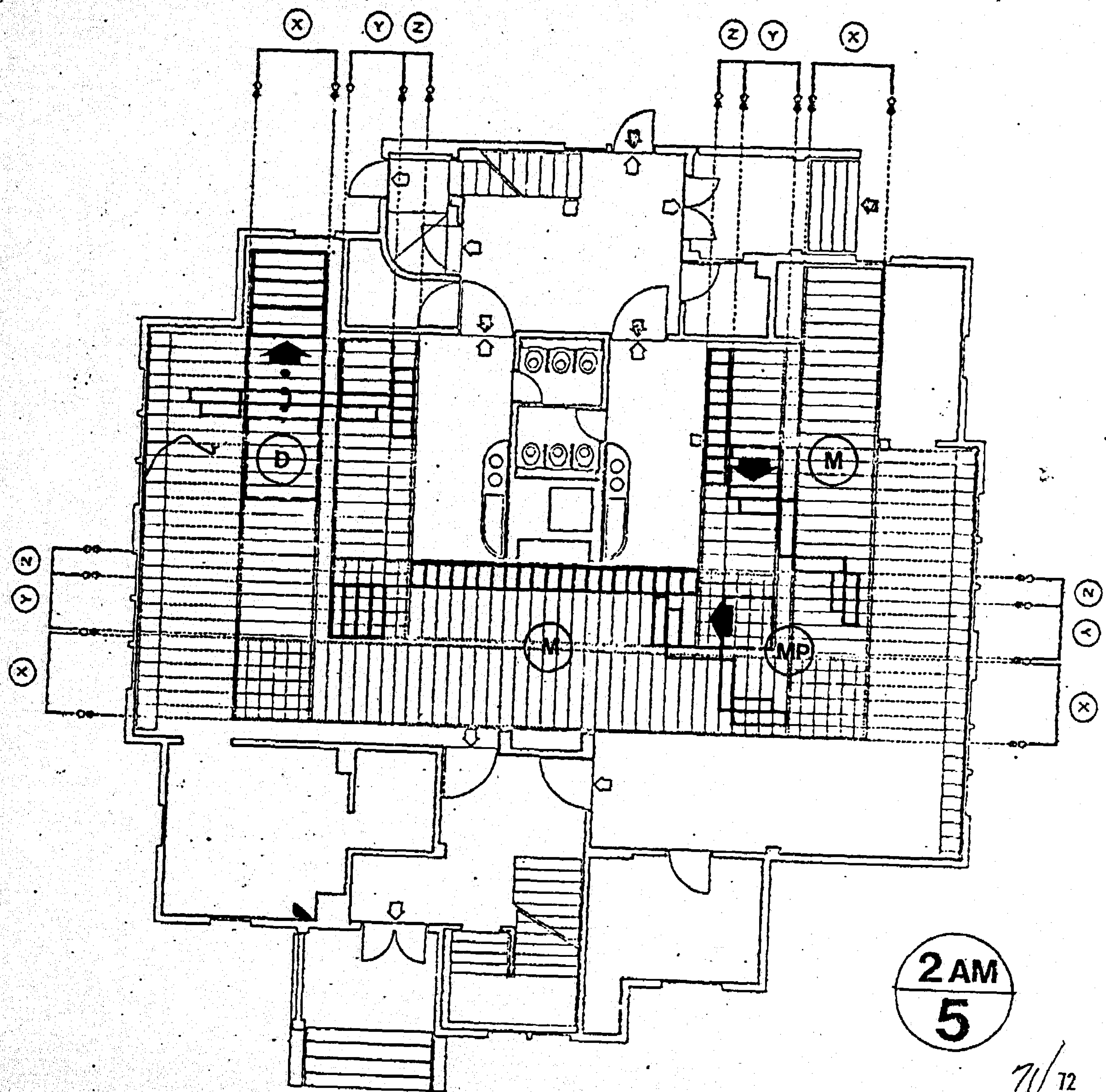
ZyA
ZyB
ZyC
SERVICE ACTIVITY ZONES
Zt TOILET
Zl LAVORATORY
Zo OBSERVATION
Zm MEETINGS
Za ADMINISTRATION
ACTIVITY ZONE CHARACTERICS
Pz PERMANENT
SPz SEMI-PERMANENT
Tz TEMPORARY
HIERARCHY OF ZONAL INTERACTIONS
1z ONE ZONE
2z TWO ZONES
3z THREE ZONES
4z FOUR ZONES



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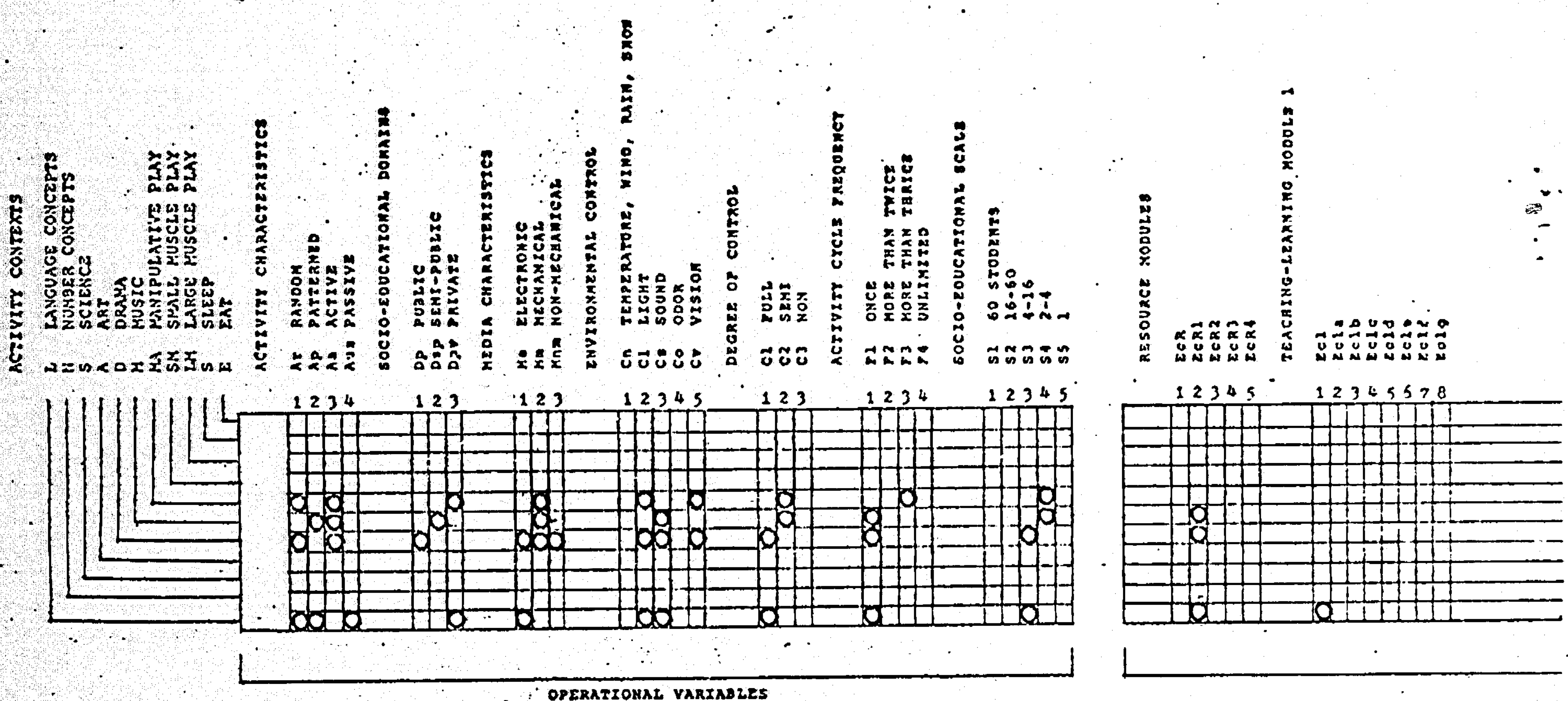
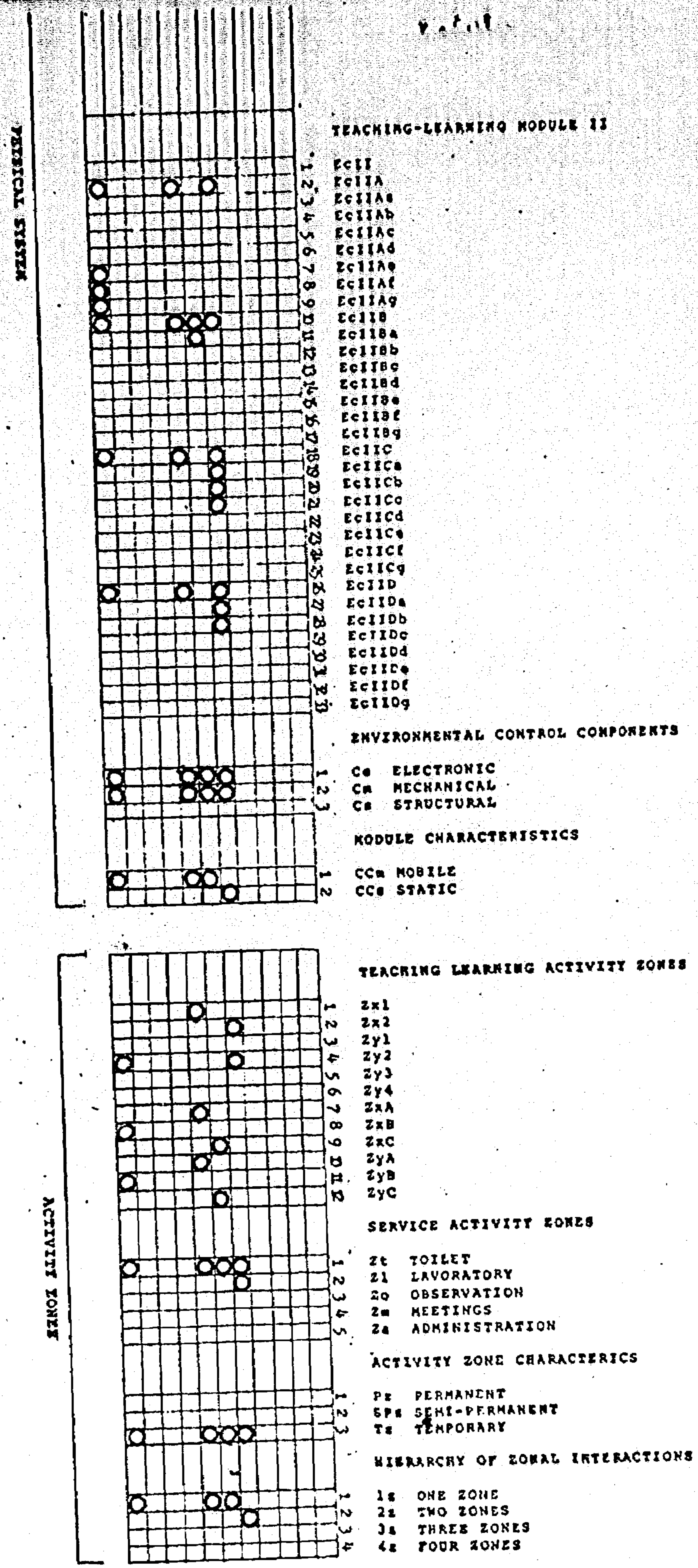
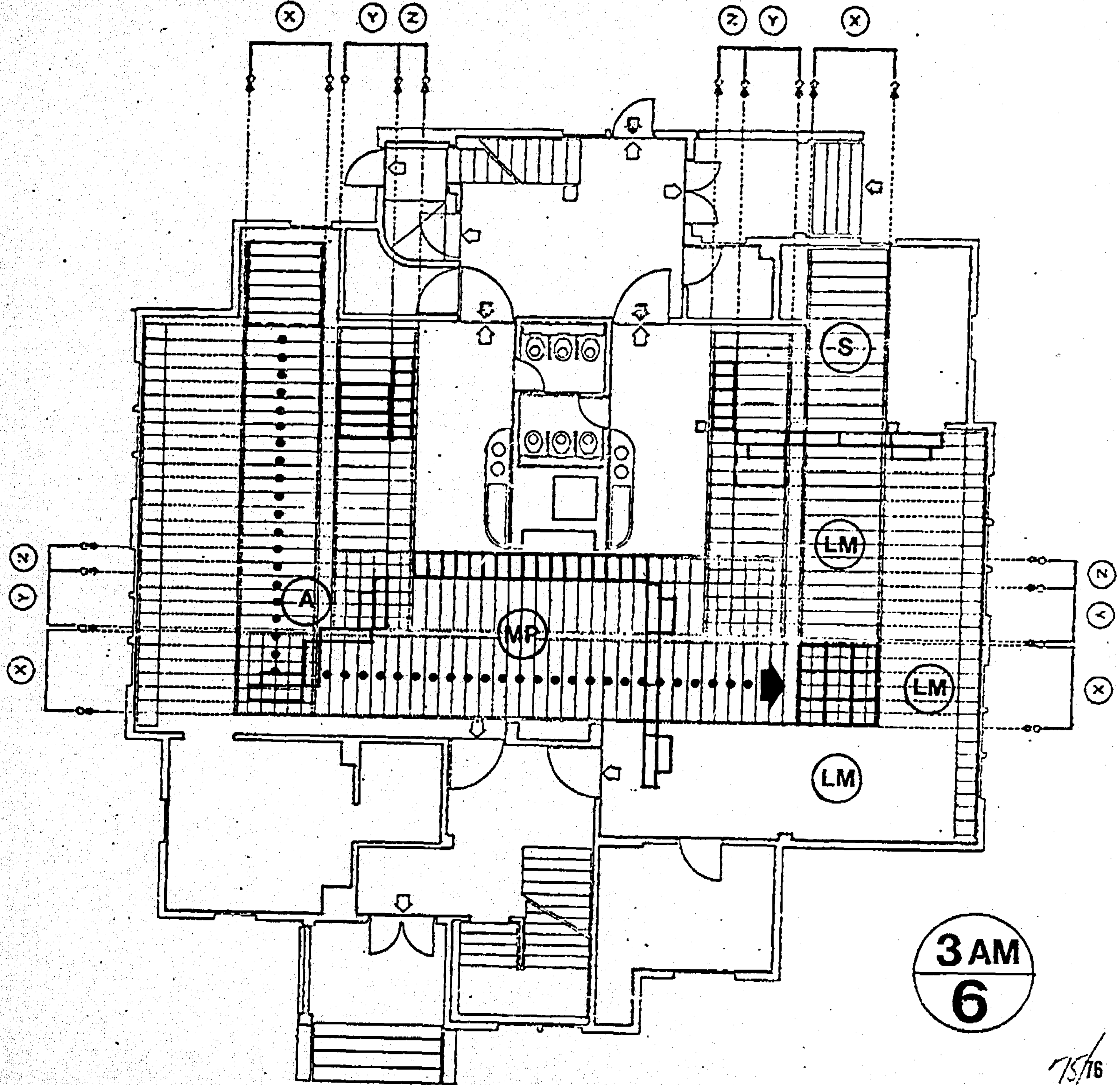
M.A.Z.E. PROGRAM MATRIX



2AM 5 Simulated Time/Activity Cycle



PHYSICAL SYSTEM
ACTIVITY ZONES
TEACHING-LEARNING MODULE II
EcII
EcIIA
EcIIAa
EcIIAb
EcIIAc
EcIIAd
EcIIAe
EcIIAf
EcIIAg
EcIIB
EcIIBa
EcIIBb
EcIIBc
EcIIBd
EcIIBe
EcIIBf
EcIIBg
EcIIC
EcIICa
EcIICb
EcIICc
EcIICd
EcIICe
EcIICf
EcIICg
EcIID
EcIIDa
EcIIDb
EcIIDc
EcIIDd
EcIIDe
EcIIDf
EcIIDg
ENVIRONMENTAL CONTROL COMPONENTS
Ce ELECTRONIC
Cm MECHANICAL
Cs STRUCTURAL
MODULE CHARACTERISTICS
CCm MOBILE
CCs STATIC
TEACHING LEARNING ACTIVITY ZONES
Zx1
Zx2
Zy1
Zy2
Zy3
Zy4
ZxA
ZxB
ZxC
ZyA
ZyB
ZyC
SERVICE ACTIVITY ZONES
Zt TOILET
Zl LAVORATORY
Zo OBSERVATION
Zm MEETINGS
Za ADMINISTRATION
ACTIVITY ZONE CHARACTERICS
Ps PERMANENT
SPs SEMI-PERMANENT
Ts TEMPORARY
HIERARCHY OF ZONAL INTERACTIONS
1z ONE ZONE
2z TWO ZONES
3z THREE ZONES
4z FOUR ZONES



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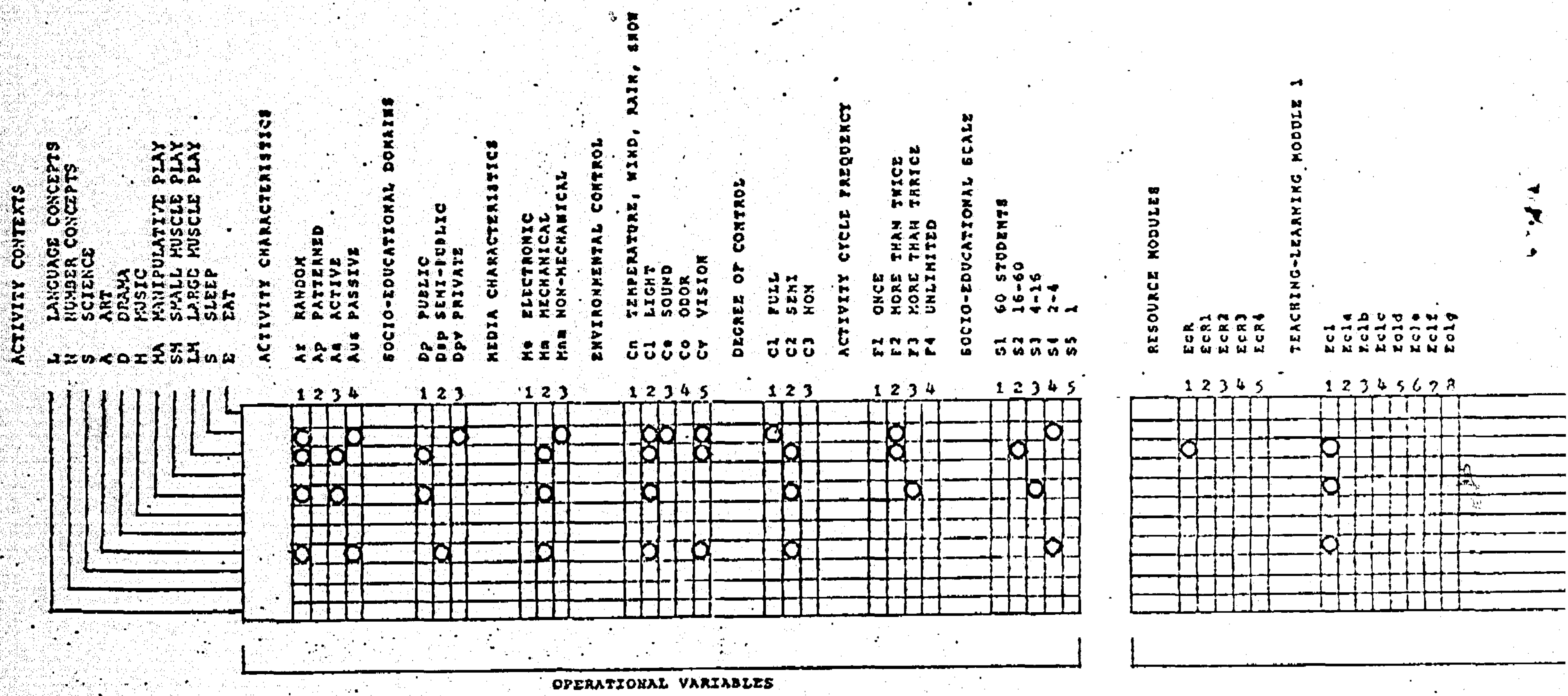
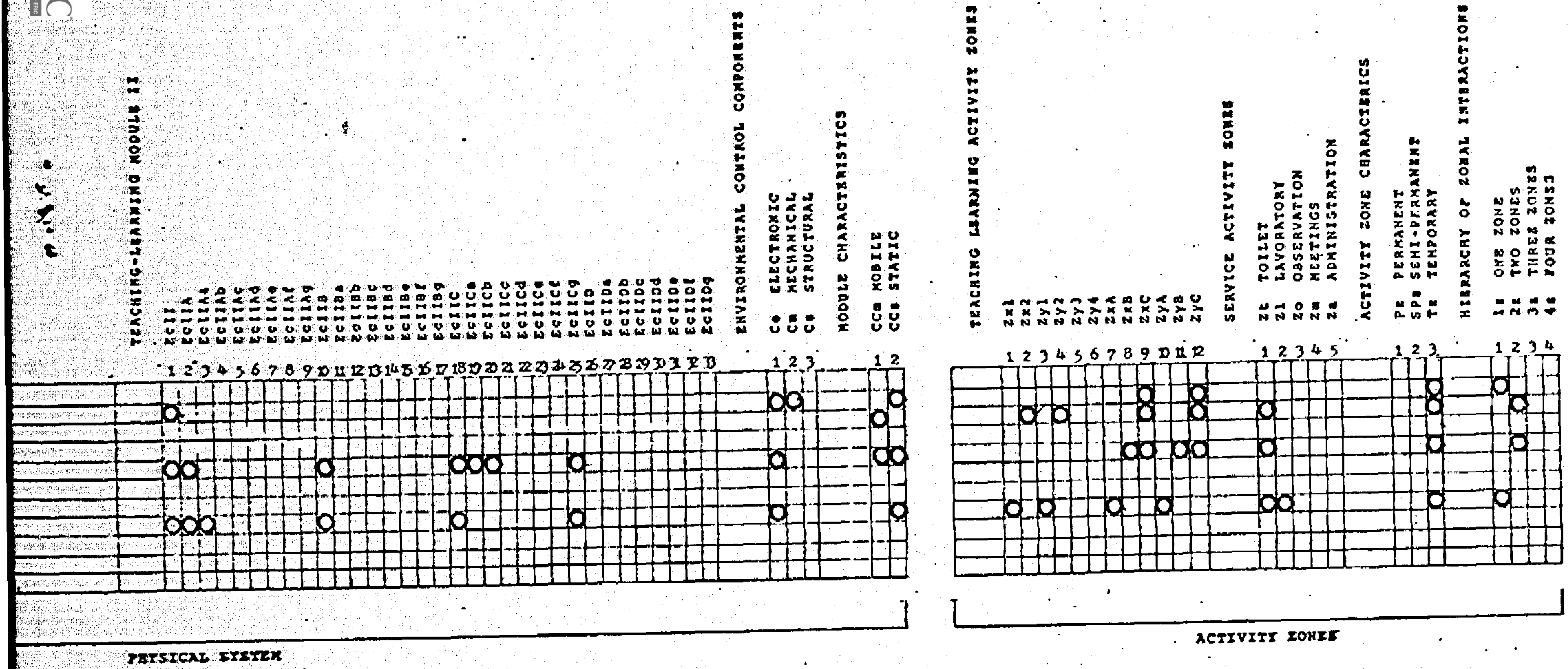


3AM
6
Simulated Time/Activity Cycle


TEACHING-LEARNING MODULE II
EcII
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EcIIAe
EcIIAf
EcIIAg
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EcIIBc
EcIIBd
EcIIBe
EcIIBf
EcIIBg
EcIIC
EcIICa
EcIICb
EcIICc
EcIICd
EcIICe
EcIICf
EcIICg
EcIID
EcIIDa
EcIIDb
EcIIDc
EcIIDd
EcIIDe
EcIIDf
EcIIDg
ENVIRONMENTAL CONTROL COMPONENTS
Ce ELECTRONIC
Cm MECHANICAL
Cs STRUCTURAL
MODULE CHARACTERISTICS
CCm MOBILE
CCs STATIC
PHYSICAL SYSTEM
TEACHING LEARNING ACTIVITY ZONES
Zx1
Zx2
Zy1
Zy2
Zy3
Zy4
ZxA
ZxB
ZxC
ZyA
ZyB
ZyC
SERVICE ACTIVITY ZONES
Zt TOILET
Zl LAVORATORY
Zo OBSERVATION
Zm MEETINGS
Za ADMINISTRATION
ACTIVITY ZONE CHARACTERICS
P= PERMANENT
SP= SEMI-PERMANENT
T= TEMPORARY
HIERARCHY OF ZONAL INTERACTIONS
1= ONE ZONE
2= TWO ZONES
3= THREE ZONES
4= FOUR ZONES
ACTIVITY ZONES